2018 LABOR MARKET AND ECONOMIC REPORT

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Seasonal employment
Unemployment
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Income and wages
Economic comparisons

Employment Security Department
WASHINGTON STATE

Labor Market and Economic Analysis
January 2019

2018 Labor Market and Economic Report

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Further analysis and detailed statistics are available from the Employment Security Department upon request. Historical values are subject to revision and may not equal prior report values. To get this report in an alternative format, call the Labor Market and Economic Analysis Division at 360-507-9621.

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Labor market fast facts

Fast facts 1. Labor force and unemployment, not seasonally adjusted
Washington state, annual data of selected years for the period from 1990 to September 2018
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics

Year	Labor force	Employed	Unemployed	Unemployment rate
1990	2,525,326	2,392,891	132,435	5.2%
1995	2,811,332	2,630,220	181,112	6.4%
2000	3,059,339	2,901,492	157,847	5.2%
2005	3,263,703	3,082,399	181,304	5.6%
2006	3,323,938	3,156,626	167,312	5.0%
2007	3,403,163	3,243,308	159,855	4.7%
2008	3,478,577	3,291,309	187,268	5.4%
2009	3,535,200	3,211,649	323,551	9.2%
2010	3,511,326	3,160,544	350,782	10.0%
2011	3,461,428	3,140,190	321,238	9.3%
2012	3,471,282	3,189,271	282,011	8.1%
2013	3,463,869	3,219,842	244,027	7.0%
2014	3,489,666	3,275,753	213,913	6.1%
2015	3,545,904	3,345,496	200,408	5.7%
2016	3,635,200	3,444,126	191,074	5.3%
2017	3,724,722	3,547,430	177,292	4.8%
2018 January to September*	3,766,009	3,594,236	171,773	4.6%

*2018 data is averaged for nine months.

Fast facts 2. Labor force and unemployment, not seasonally adjusted
Washington state metropolitan areas, January through September 2018
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics

Metropolitan area	Labor force	Employed	Unemployed	Unemployment rate
Washington state	3,766,009	3,594,236	171,773	4.6%
Bellingham	110,613	105,329	5,284	4.8%
Bremerton	120,976	115,216	5,760	4.8%
Kennewick-Pasco-Richland	139,118	131,448	7,670	5.5%
Longview-Kelso	45,946	43,197	2,749	6.0%
Mount Vernon-Anacortes	59,436	56,167	3,269	5.5%
Olympia	135,471	128,909	6,562	4.8%
Seattle-Bellevue-Everett MD*	1,689,659	1,629,344	60,315	3.6%
Spokane	259,254	244,735	14,519	5.6%
Tacoma MD * (Pierce)	417,219	394,842	22,377	5.4%
Wenatchee	66,374	63,153	3,221	4.9%
Yakima	129,538	121,436	8,102	6.3%

*Metropolitan Division

Fast facts 3. Projected industry average annual growth rates
Washington state, 2017 to 2026
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics

NAICS	Industry sector	2017 Q2 to 2019 Q2	2016 to 2021	2021 to 2026
	Total nonfarm	2.02%	1.90%	1.28%
22, 48, 49	Transportation, warehousing and utilities	1.21%	1.34%	0.53%
23	Construction	2.35%	2.75%	0.81%
31-33	Manufacturing	0.25%	-0.07%	0.13%
42	Wholesale trade	1.04%	1.00%	0.40%
44-45	Retail trade	2.09%	2.11%	0.76%
51	Information	4.03%	4.07%	3.05%
52	Financial activities	1.43%	1.16%	0.40%
54-56	Professional and business services	3.22%	2.65%	2.12%
61-62	Education and health services	2.31%	2.22%	1.67%
71-72	Leisure and hospitality	2.38%	2.37%	1.88%
GOV	Government	1.57%	1.49%	1.12%

Fast facts 4. Wages and employment by industry
Washington state, 2017 annual averages (revised)
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

NAICS	Industry sector	Average number of firms	Total wages paid	Average employment	Average weekly wage
	Total	217,415	$204,193,487,297	3,289,580	$1,194
11	Agriculture, forestry, fishing and hunting	7,208	$3,276,143,108	105,158	$599
21	Mining	152	$177,373,759	2,494	$1,368
22	Utilities	223	$440,905,600	4,738	$1,790
23	Construction	25,043	$11,458,059,671	187,140	$1,177
31-33	Manufacturing	13,007	$10,113,532,795	131,591	$1,478
42	Wholesale trade	3,701	$21,700,831,004	125,735	$3,319
44-45	Retail trade	5,733	$8,512,060,194	93,674	$1,747
48-49	Transportation & warehousing	6,773	$2,616,050,110	50,745	$991
51	Information	25,057	$17,967,026,491	194,611	$1,775
52	Finance and insurance	632	$4,950,401,151	44,223	$2,153
53	Real estate, rental and leasing	12,010	$8,036,043,179	165,746	$932
54	Professional, scientific and technical services	3,230	$1,627,148,914	42,313	$740
55	Management of companies and enterprises	50,312	$20,856,683,185	409,190	$980
56	Admin. and support and waste mgmt. and remediation svcs.	2,791	$1,635,921,944	51,005	$617
61	Educational services	14,309	$6,240,548,907	274,121	$438
62	Healthcare and social assistance	18,611	$3,781,848,909	97,390	$747
71	Arts, entertainment and recreation	7,373	$21,386,234,460	280,287	$1,467
72	Accommodation and food services	14,561	$19,868,634,790	378,150	$1,010
81	Other services (except public administration)	4,575	$5,584,857,100	96,194	$1,117
GOV	Government	2,118	$33,963,182,026	555,076	$1,177

Executive summary

U.S. economy and labor market

The national economy grew at a faster pace in 2018 relative to 2017 based on measures of national output. New expansionary fiscal policy introduced at the close of last year has added temporary momentum to the expansion and partially offset tensions arising from uncertain trade policy. The current expansion is now in its tenth year making it the second longest on record. If the economy is still in expansion by next July, it will establish a new record for longevity. A strong record of job creation coupled with resilient hiring has pushed the unemployment rate down to 3.7 percent in September 2018, considerably tightening the labor market. Wage growth has picked up, but still remains modest considering how low the current unemployment rate is.

Total nonfarm employment in the United States reached 149.5 million in September 2018, up by 1.7 percent from September 2017. Private sector job growth was up 2.0 percent. Since September 2017, the largest percentage of jobs gained by major private industry sectors has been in mining and logging. Information was the only industry sector to lose jobs over this period. Public sector hiring was more subdued, rising by 0.3 percent from September 2017 to September 2018.

Washington's economy and labor market

Using state gross domestic product as the comparison measure, economic growth in Washington expanded by 4.7 percent in 2017, the highest growth rate of any state for the second straight year, and well above the 2.2 percent growth achieved by the nation. From second quarter 2017 to second quarter 2018, personal income in the state increased by 6.1 percent compared to 4.6 percent nationally.

Seasonally adjusted total nonfarm employment increased by 3.1 percent from September 2017 to September 2018 with the addition of 105,800 jobs. The private sector accounted for the majority of the jobs added, with 97,600 added to private payrolls while government added 5,800 jobs. Employment growth in mining and logging, which employs the fewest number of workers of the major industry sectors, remained steady and did not increase or decrease over the course of the year.

Every major industrial sector, except for mining and logging, added jobs. The industry with the largest percentage increase was information. The state unemployment rate was 4.4 percent in September 2018 compared to the U.S. rate of 3.7 percent. Washington's unemployment rate of 4.4 percent is at the time considered an historical low for the state based on statistical series maintained by the Bureau of Labor Statistics dating back to 1976.

Seasonal, structural and cyclical industry employment

An analysis of 97 industries in Washington state identified 18 as having high levels of seasonality. The analysis is based on historical data from January 1990 through December 2017. The industries that are most sensitive to seasonal forces include crop production, scenic and sightseeing transportation, and support activities for agriculture and forestry. There were 28 industries that are most influenced by structural factors. Structural factors such as productivity improvement, policy changes, technological innovation and social change have heavily influenced employment in ambulatory healthcare services, software publishing non-store retailing, food services and drinking places, and educational services. For 15 industries, the cyclical component accounts for more than half of the change in employment. Those most influenced by cyclical factors include support activities for mining, crop production, and scenic and sightseeing transportation.

Unemployment

The seasonally adjusted unemployment rate in Washington fell to 4.4 percent in September 2018, 0.3 percentage points below the September 2017 rate of 4.7 percent. The number of unemployment recipients was roughly 40,000 in September 2018, down from a peak of 305,000 in January 2010 and 5,000 less than in September 2017. The number of unemployed individuals exhausting unemployment benefits has declined from roughly 15,000 in May 2010 to 3,000 in September 2018. The manufacturing and construction industries accounted for the greatest portion of workers who exhausted unemployment benefits from October 2017 through September 2018.

Employment projections

Total nonfarm employment in Washington state is expected to grow at an average annual rate of 1.59 percent to 2026. Computer and mathematical occupations, management occupations and building and grounds cleaning and maintenance occupations are projected to grow faster than other occupational groups from 2016 to 2026. By 2026, office and administrative support occupations are projected to comprise the largest share of total occupational employment.

Income and wages

Recently released data show the median household income measured in 2017 dollars in Washington rose by 14.3 percent from 2013 to 2017. The median hourly wage increased by 2.3 percent in 2017. From 2015 to 2017, the number of occupied jobs increased in all hourly wage ranges, with the exception of jobs paying less than $12 per hour. Job gains were greatest in occupations that paid between $12.00 and $17.99 per hour. From 2001 to 2017, jobs paying an hourly wage of $54.00 and above have been growing faster than jobs in middle and lower wage categories.

Chapter 1: U.S. economy and labor market

The U.S. economy continues to maintain strong momentum through the period coverd by this report. Having lasted in excess of nine years, the expansion that has sometimes proceeded slowly is performing very well. If the economy is still in expansion by next July, this expansion will break the record for the longest uninterrupted expansion on record.

A resilient pace of hiring underlines the current strength of the economy. Employers filled more jobs thus far in 2018 than they had in 2017, and the unemployment rate has reached its lowest level since 1969. Growth is occurring at a healthy pace. Income and wages are up, and inflation is tame.

Rising trade tension, however, introduces an element of downside risk for the economy. Retaliatory tariffs can disrupt business supply chains and raise the cost of certain products, as well as dampen private capital spending. The business environment is becoming more challenging for some domestic industries, and the level of trade activity it produces is likely to subtract from economic growth in the near future. The negative impact at present, however, does not appear to be altering the current trajectory the economy is on in a major way.

Recent changes in GDP

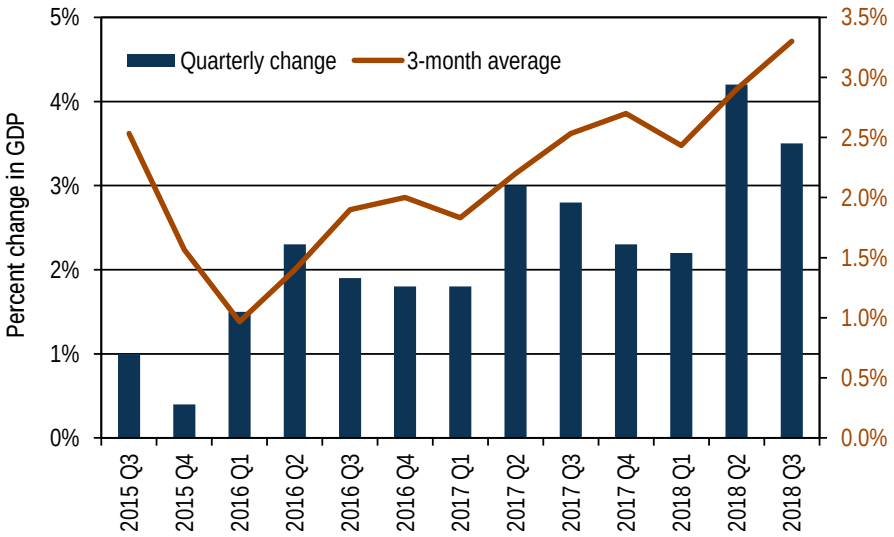
U.S. Gross Domestic Product (GDP) is the measure of the value of output of goods and services produced by the economy. A goal of the economy is for GDP to grow over time to increase the stock of products available to domestic households, as well as their ability to purchase them. As such, changes in real GDP are used as a measure of economic growth.

GDP had grown slowly and unevenly throughout much of the expansion. From 2010 to 2016, GDP grew at an annualized rate of 2.1 percent. A trend shift in growth emerged in 2017 (*Figure 1-1*) that has continued into 2018. Second quarter growth in 2018 reached 4.2 percent, the first time since 2014 that the growth rate has exceeded 4.0 percent. Much of the trend increase in growth is being driven by the private sector, primarily through sustained consumer spending and a rebound in business fixed investment spending. Government spending has also risen at a solid pace beginning with fourth quarter 2017. The manner to which spending by economic sectors, namely domestic and foreign consumers, businesses and government has contributed to economic growth, which can be seen in *Figure 1-2.*

Fiscal policy, and foreign policy as it relates to trade, are both impacting economic growth. These factors have had their greatest impact so far in second quarter 2018. Three pieces of legislation affected the nature of fiscal policy. The first, the 2017 Tax Cuts and Jobs Act (TCJA), enacted in December 2017. It lowered the top corporate income tax rate to 21.0 percent and changed the way that business's foreign income is taxed. The act also lowered individual income tax rates and broadened the base of income subject to tax through 2025. In addition, it includes various provisions that affect how businesses and individuals calculate their taxable income.[1]

The TCJA has the goals of lowering individual tax rates, promoting economic growth by lowering the user cost of capital for businesses leading to greater business investment, and repatriating overseas earnings. The lower individual taxes are designed to provide a boost to take-home pay and support consumer spending. The repatriation of earnings involves the implementation of a tax break, which gives U.S. multinational corporations a one-time tax break on money earned in foreign countries. The government's rationale is for the tax break to incentivize American multinationals to use their foreign earnings to create jobs domestically and/or expand operations in the U.S.

Figure 1-1. U.S. gross domestic product (chained 2012 dollars), quarterly percent change and three-month moving average, seasonally adjusted annualized rate
United States, third quarter 2015 through third quarter 2018
Source: U.S. Bureau of Economic Analysis, Domestic Product and Income



The rate of U.S. economic growth has improved in recent years.

[1] Congressional Budget Office, "An Update to the Budget and Economic outlook: 2018 to 2028. August 2018.

Figure 1-2. Contributions to percent change in real GDP, seasonally adjusted annualized rate
United States, third quarter 2016 through third quarter 2018
Source: U.S. Bureau of Economic Analysis, Domestic Product and Income

Contributions	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3
GDP percent change annual rate	1.9	1.8	1.8	3.0	2.8	2.3	2.2	4.2	3.5
Percentage contribution by factor									
Consumption expenditures	1.79	1.75	1.22	1.95	1.52	2.64	0.36	2.57	2.45
Fixed investment	0.52	0.28	1.60	0.72	0.44	1.04	1.34	1.10	0.25
Change in private inventories	-0.59	1.03	-0.80	0.23	1.04	-0.91	0.27	-1.17	2.27
Net exports of goods and services	0.03	-1.32	-0.10	0.08	0.01	-0.89	-0.02	1.22	-1.91
Government expenditures	0.17	0.03	-0.13	0.01	-0.18	0.41	0.27	0.43	0.44

Consumer expenditures have contributed the most to economic growth, but fixed investment and government spending have grown the past year and are making positive contributions to growth.

Two other pieces of legislation impact government spending. The Bipartisan Budget Act of 2018 increased the caps on discretionary funding for 2018 and 2019 and provides substantial funding for emergency assistance. The Consolidated Appropriations Act, 2018, provides appropriations for all discretionary accounts for 2018. Together with TCJA, the three legislative pieces are having the effect of boosting the demand for goods and services in the economy and thereby generating higher levels of economic growth, at least for the near term.

First quarter GDP growth has not been as impressive but was still solid. The rate of growth essentially held steady at the beginning of 2018 relative to fourth quarter 2017. First quarter GDP growth registered 2.2 percent with positive contributions to growth coming from fixed investment, personal consumption expenditures, private inventory investment and government spending. Consumer spending, which has been the chief contributor to past economic growth, provided just a mild boost to growth this quarter as consumers decided to take a breather from spending after the holidays. The contribution made by fixed investment improved substantially to 1.34 basis points. Much of the increase was attributable to strong investment in non-residential structures and equipment used for oil and gas exploration. The trade sector had little impact on growth in this quarter.

Growing trade policy concerns prompted producers to ship products abroad in second quarter 2018 in larger amounts to get ahead of retaliatory tariffs. This boosted the contribution that net exports made to GDP, but also resulted in an inventory drawdown with production pulling forward.

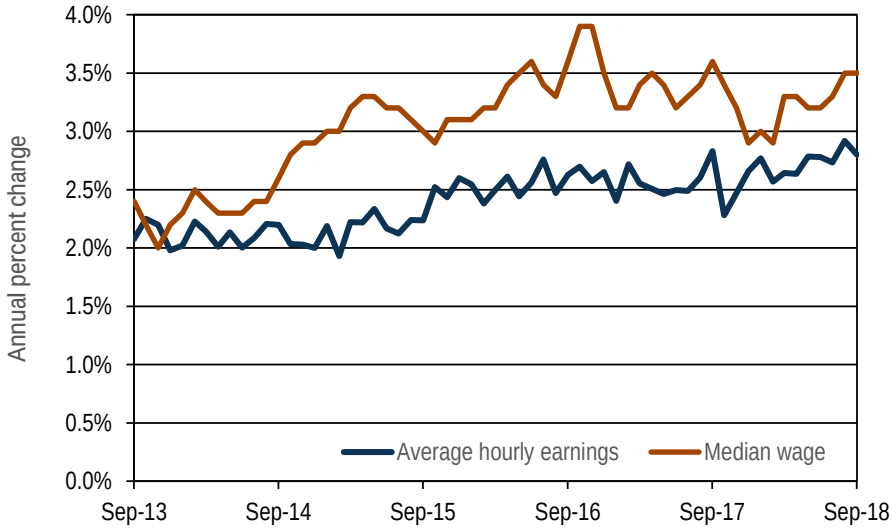
Growth continued at a strong pace into the third quarter. The economy grew at an annualized rate of 3.5 percent during that time. It marks the first time in three years that growth has measured at least 3.0 percent for two consecutive quarters, and it was the sixth consecutive quarter with growth above 2.0 percent. Consumers held up their end by continuing their torrid pace of spending at a level in excess of their monthly income. This marks the second consecutive quarter consumers have outspent their income. The extra allocation of consumption came from savings, which were built up during the first quarter.

The slower rate of growth this quarter relative to last was partially due to a deceleration in business investment, which had increased during the first half of the year. Net export activity went through a correction of sorts, declining after it had surged the previous quarter when producers moved to sell ahead of expected retaliatory tariffs. The decline meant that inventories were built back up. Consequently, the contribution inventories made to growth this quarter was over 2 percentage points. Government spending continues to support growth, especially for defense, where spending grew by 4.6 percent. State and local spending also grew at the fastest rate since first quarter 2016.

Consumer spending is driving economic growth

Consumer spending makes up the greatest dollar-wise contribution to GDP, accounting for over two-thirds of total output value annually. Real personal consumption expenditures (PCE) have provided the momentum for economic growth since the recovery began in 2009 from the Great Recession. The strong pace of job growth and improved wages have been adding to consumers' desire and ability to continue to add to spending in recent years. The creation and filling of jobs over the period of the economic expansion has generated the expectation for rising wages to better support consumer spending. Despite the healthy labor market, available indicators suggest that the growth of hourly compensation has been moderate. Among measures that do not take employment benefits into account, average hourly earnings have been rising slowly and are up 2.8 percent over the past year (*Figure 1-3*). Hourly earnings have been trending up in recent years in response to tighter labor market conditions. The average annual increase in earnings was 2.1 percent during the first five years of the expansion.

Figure 1-3. Percent change in average hourly earnings of all private employees, seasonally adjusted annualized rate and percent change in median wage, annualized rate, three-month moving average
United States, September 2013 through September 2018
Source: U.S. Bureau of Labor Statistics, Current Employment Statistics; Atlanta Federal Reserve Bank Wage Tracker



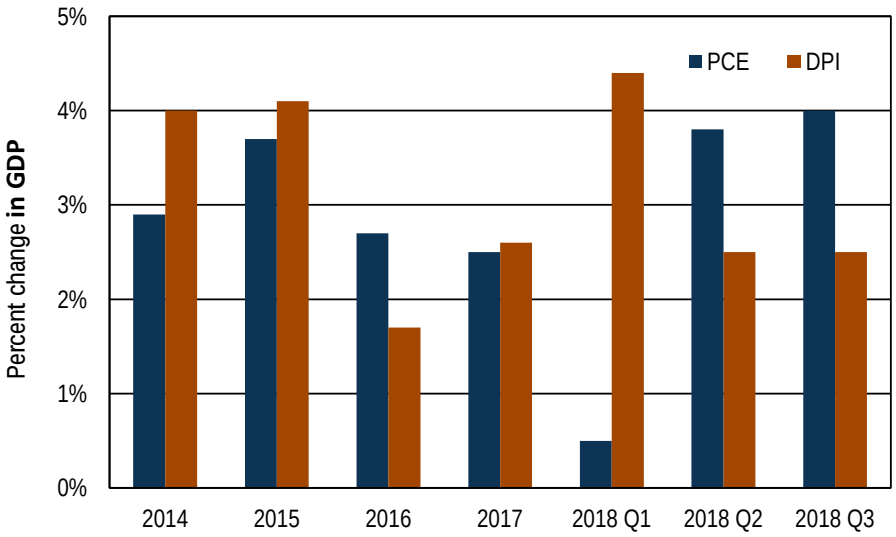
Wage growth has strengthened but is still just modestly improving.

Similarly, the measure of wage growth computed by the Federal Reserve Bank of Atlanta that tracks median 12-month wage growth of individuals reporting to the Current Population Surveys showed an increase of 3.5 percent in September. While this was similar to its readings from the past three years, it is above the average increase in the preceding few years. In lieu of offering higher wages, firms look to be taking a number of non-wage measures to attract and hire workers. Survey responses from the Federal Reserve's 2017 small business survey show that more than a quarter of businesses are easing job requirements, while one-fifth report enhancing benefits or raising non-wage compensation. Examples of this include irregular bonuses and paid leave. This strategy shows businesses to be more willing to hire marginal workers and commit resources to training workers, which could ultimately benefit productivity growth. It also helps extend the labor market recovery to workers that might have otherwise been left out of the expansion.

Despite the focus on nominal wage gains, the main takeaway for consumers is that real wages continue to rise and thereby help to boost household real incomes and spending. Real disposable income (DPI), a measure of income after accounting for taxes and adjusting for inflation has been rising with the economic expansion, and has

increased at a solid annual rate of 2.9 percent so far this year. Tax cuts have reduced the withholdong contributions workers make and have supported real DPI in 2018, as has the continued strength in the labor market. The gains in DPI have helped fuel continued growth in consumer spending (*Figure 1-4*). The consumer spending pattern has been strong, with consumers spending growing proportions of their incomes from 2014 up until the first quarter of 2018. During the first quarter, consumer spending rose by only one-half percent despite there being strong DPI growth in 2017. Some of the spending pause could have been attributable to poor weather due to repeated snowstorms through March in the Northeast. Regardless, spending bounced back in a major manner during the second and third quarters, rising by 2.5 percent in each quarter on an annualized basis, and spending at a faster rate than income was growing.

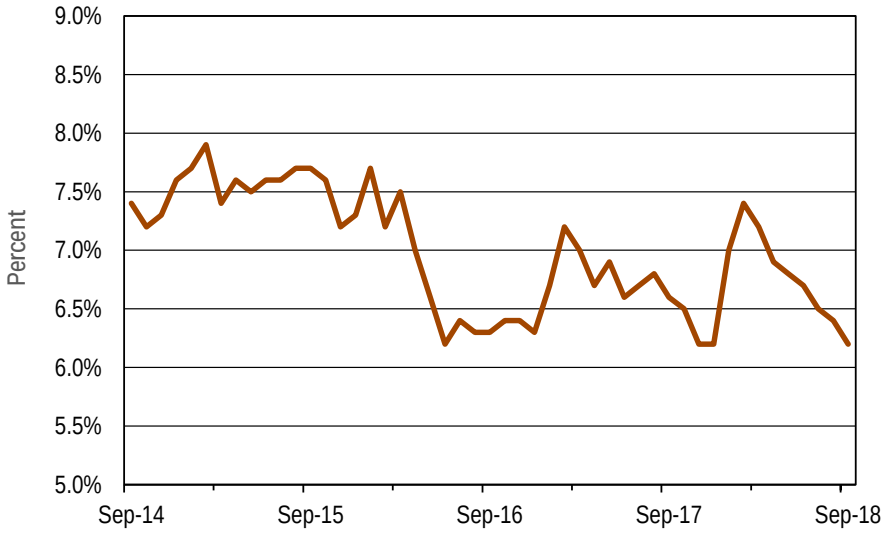
Figure 1-4. Personal change in real personal consumption expenditures and disposable personal income, seasonally adjusted annual rate
United States, 2014 through third quarter 2018
Source: U.S. Bureau of Economic Analysis, Personal Income and Outlays



Consumption activity paused during the first quarter of 2018, then rebounded strongly during the next two quarters.

High levels of consumer confidence should continue to support spending along with reliance on income and savings. The savings rate is still historically high relative to household wealth and being this late in the business cycle (*Figure 1-5*). Stronger wage growth should also support income growth and allow consumers the ability to increase spending in line with it.

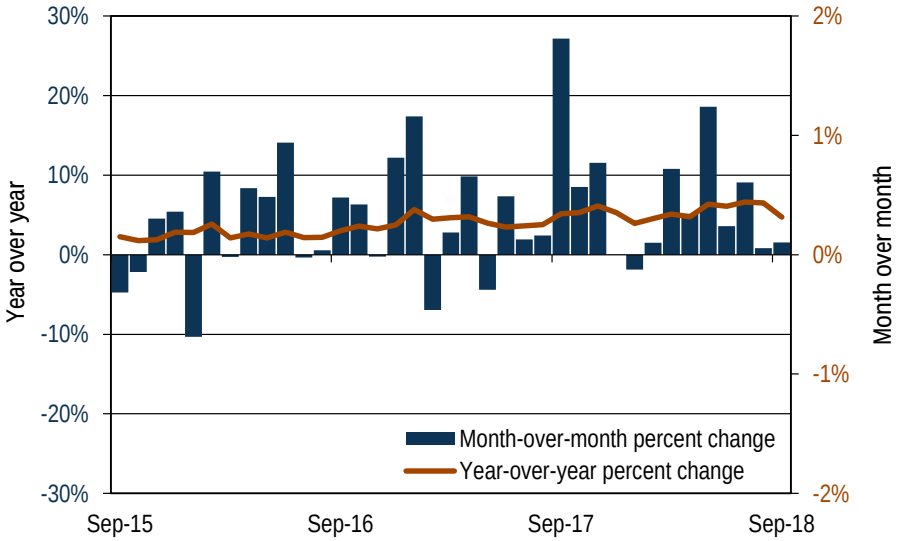
Figure 1-5. Personal savings as a percentage of disposable income, seasonally adjusted annual rate
United States, September 2014 through September 2018
Source: U.S. Bureau of Economic Analysis, Personal Income and its Disposition



Consumers built their savings to start 2018, but then drew on them to support spending as the year progressed.

Retail sales data provide another measureable way to determine both the level of consumer spending and the manner to which consumers allocate expenditures towards the purchase of durable and nondurable items offered by retailers. They also provide an indication of the demand for certain retail products and how that might affect hiring decisions within those industries. Since the data are available monthly, it can provide an early indication of how consumer spending is progressing. Retail sales are reported in nominal dollars, so sales value can be volatile since they are affected by price movements of items typically purchased like gasoline. Focusing on longer-term trends helps to navigate through some of this volatility. Sales grew by 4.7 percent from September 2017 to September 2018 and are currently up 5.4 percent over the first nine months of 2017 compared with the same time period one year ago (*Figure 1-6*). Sales rose in eleven of the 12 months from September 2017 to September 2018.

Figure 1-6. U.S. retail sales, month-over-month and year-over-year percent change
United States, September 2015 through September 2018
Source: U.S. Census Bureau, Monthly and Annual Retail Trade Report



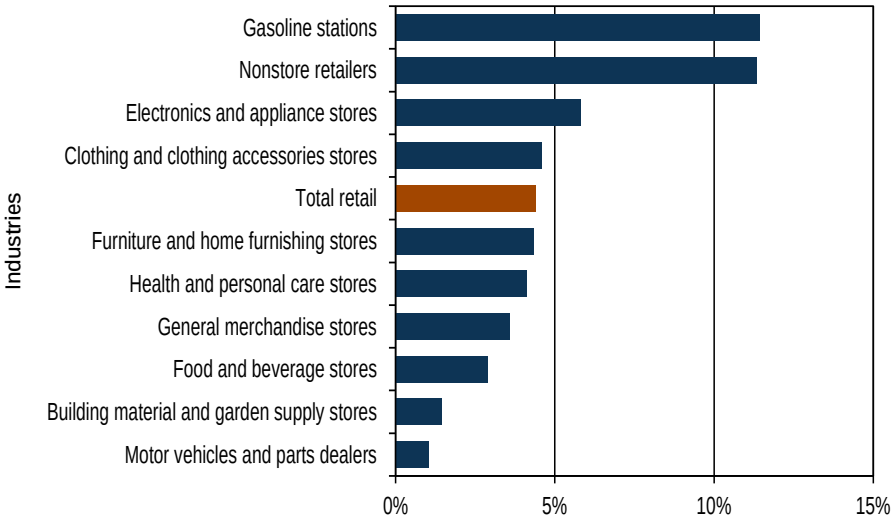
Increases in retail sales have been uneven but are still indicative of strong domestic consumption.

Monthly retail sales in fourth quarter 2017 started strong early as shoppers got an early jump on purchasing for the holidays. The weak sales volume occurring at the beginning of the year was consistent with personal consumption expenditures data. Sales activity pushed up again until the last two months of the third quarter 2018. It is difficult to speculate as to whether this constitutes a retrenchment or whether the figures will be revised upward when additional data arrives.

Figure 1-7 shows how retail sales grew by industry sector over the course of the year from September 2017 through September 2018. The rise in oil and gasoline prices since last year has resulted in annual sales revenue rising by 11.4 percent, well over the average gain for all retail categories in this group. Since people typically use about the same amount of gas annually, rising gas prices promote revenue gains, but can hinder discretionary spending in other categories unless supported by savings. Non-store retail sales, which includes online shopping, was another fast-growing category, rising by 11.4 percent, the same as sales at gas stations. Sales at food and beverage stores had been strong until the previous two months, when spending in this category softened in August and declined in September. Over the year, the increase in food and beverage sales is about consistent with sales growth the year prior. A notable weak spot has been auto sales,

whose revenue was up only 1.1 percent over the year. Motor vehicle sales comprise roughly 23.0 percent of all consumer spending among the categories represented in *Figure 1-7*.

Figure 1-7. Percent change in nominal retail sales by industry
United States, September 2017 through September 2018
Source: U.S. Census Bureau, Monthly Retail Trade Report



Retail sales increased the most at gasoline stations and with nonstore retailers, and the least with motor vehicles and parts dealers.

Business fixed investment bounces back strong

Business fixed investment entails spending by businesses on nonresidential structures, equipment and software. This type of investment is expressed as "fixed" to distinguish it from investment in inventories. Spending on equipment, which is a component of nonresidential investment, constitutes the largest dollar outlay for businesses.

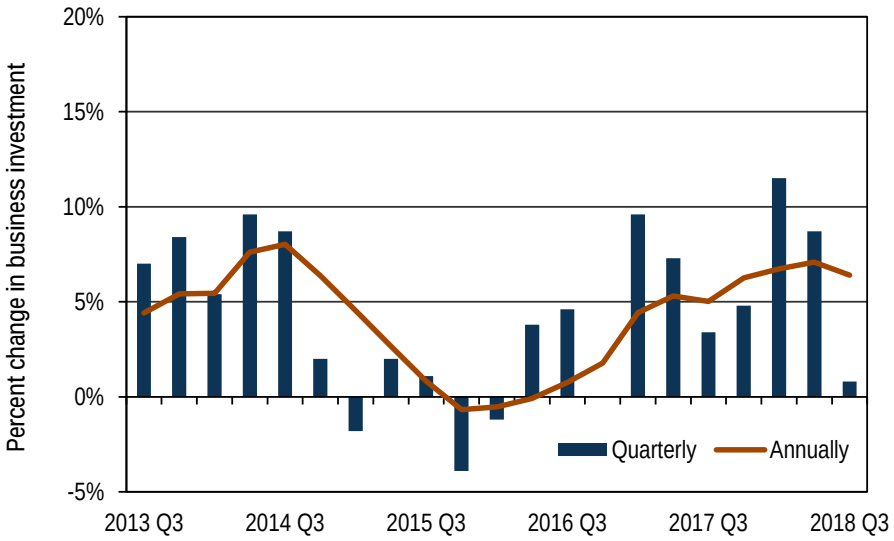
Business fixed investment, particularly involving equipment spending, had been a key driver of economic growth at the beginning of the current expansion. Growth rates for business investment through 2011 were largely supported by large increases in equipment spending, which grew as fast as anytime within the past 40 years. Spending on equipment tailed off considerably beginning in fourth quarter 2014, declining by 5.6 percent and dragging down business fixed investment to 2.0 percent (*Figure 1-8*). This period roughly coincided with a decline in oil and other energy prices. As energy prices declined, energy-related spending to finance the exploration and extraction of

crude oil and natural gas, as well as its transportation and delivery, fell off considerably. By 2015 and 2016, equipment spending grew modestly if at all, declining two more quarters and dragging business fixed investment into negative territory.

Oil prices stabilized in 2017 and began rising through most of 2018. Energy-related equipment spending resumed and business investment grew in response. By 2018, business investment outside the energy sector was also gaining strength. Tax reform, improved global demand, and higher business confidence together have encouraged stronger capital spending. Wage growth is leading more businesses to plan investments in labor-saving technologies and other equipment. Business investment rose by 20.0 percent in the first half of 2018, a rate of growth not seen since 2012.

Up until third quarter 2018, business spending held up in light of changes made to trade policy. Growing uncertainty regarding the targets, duration and magnitude of additional trade barriers may be starting to weigh on private capital spending as it increased just modestly in third quarter 2018.

Figure 1-8. Real business fixed investment, quarterly and annual percent change, seasonally adjusted annual rate
United States, third quarter 2013 through third quarter 2018
Source: U.S. Bureau of Economic Analysis, Domestic Product and Income



Business fixed investment has been recovering lately and contributing more to economic growth, but stumbled in third quarter 2018.

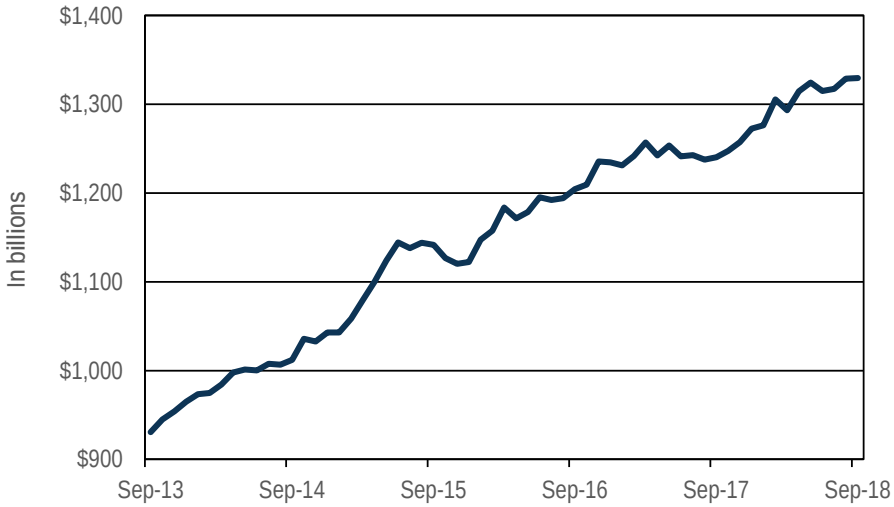
Construction spending growth is up, mostly in nonresidential

An important category of private fixed investment is the construction of new residential and nonresidential structures. Total private construction spending outlays from September 2017 to September 2018 are up 7.2 percent overall (*Figure 1-9*). The increase betters the 3.0 percent rate of growth during the same time period in 2017 and the 5.5 percent growth rate during the same period in 2016. Total construction spending had been enjoying decent growth through May this year but recently has shown signs of weakening.

Spending in the nonresidential construction sector has been more pronounced (*Figure 1-10*). Nonresidential outlays have increased in each of the past months from September 2017 to June 2018 before declining in July. May and August were particularly strong months for nonresidential spending, having increased by 1.5 percent and 1.7 percent respectively. Altogether spending in this sector is up 8.7 percent from September 2017 through September 2018. The increase has been driven by public spending on highway and street projects and educational buildings.

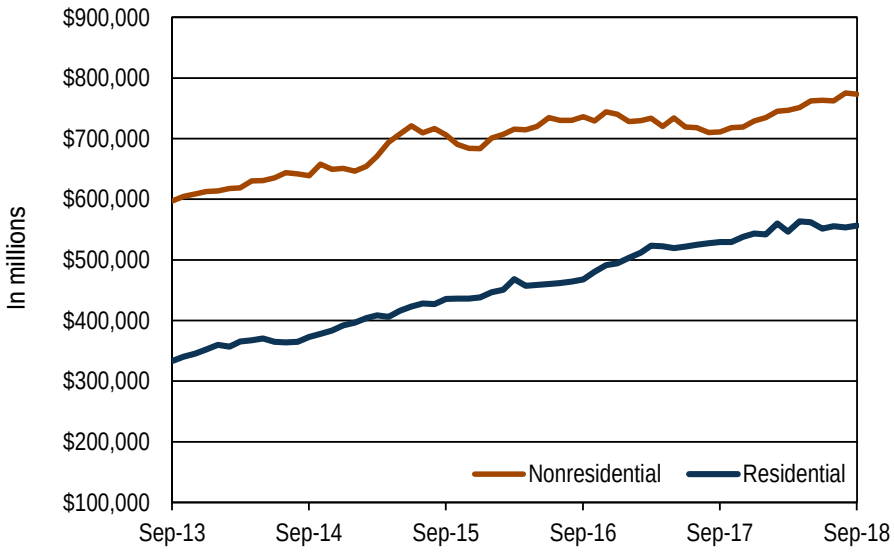
Residential construction spending is now 5.1 percent higher year to date, compared with 13.7 percent one year earlier. Housing remains a weak spot, with sales and new home construction moderating from their already modest levels. Rising material and labor costs are continuing to slow down residential activity. Home sales, new home construction and outlays for renovations and repairs collectively hampered overall economic growth during the year, even as it was ramping up in second and third quarter of 2018.

Figure 1-9. Value of total construction put in place, billions of dollars, seasonally adjusted annual rate
United States, September 2013 through September 2018
Source: U.S. Census Bureau, Construction Spending



Total construction spending has softened in recent months.

Figure 1-10. Value of residential and nonresidential construction, millions of dollars, seasonally adjusted annualized rate
United States, September 2013 through September 2018
Source: U.S. Census Bureau, Construction Spending

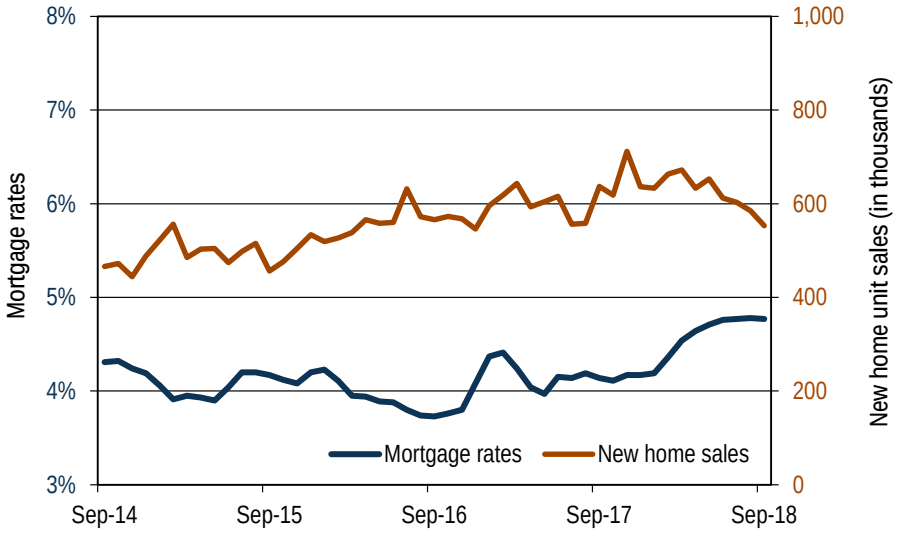


Nonresidential construction activity has strengthened recently while residential construction has weakened.

Stronger growth has bolstered the demand for new and existing homes, particularly those priced around the median home price or less. Inventories of homes at these price levels remain tight however, which has caused selling prices to rise faster than household incomes and well above historic levels for many markets. Rising mortgage rates are also reducing affordability and reducing sales (*Figure 1-11*). The new tax law, which limits the amount of mortgage interest that can be deducted, and puts limits on deductions for state and local taxes, also appears to be restraining sales of homes in higher-end markets.

New home sales in September 2018 fell to their lowest level since December 2016. September marks the fourth straight monthly decline. Sales in September are down 13.2 percent over the year compared to September 2017, although total annual sales since January remain 3.4 percent above the pace set last year.

Figure 1-11. Conventional 30-year mortgage rates and new home sales, thousands of units, seasonally adjusted annualized rate
United States, September 2014 through September 2018
Source: Federal Housing Finance Agency; U.S. Bureau of Economic Analysis, New Residential Sales



Sales of new homes in 2018 have started slumping as mortgage rates begin to rise.

Fiscal policy changes boost government spending

Real government purchases by federal, state and local government branches, plus gross investment have contributed little to nothing to economic growth, and even subtracted from it in recent years. Government's contribution to real GDP during the four quarters of 2017 was ever so slightly negative (-0.01 percentage points) and down from a negligible contribution of 0.25 points in 2016. Real federal

purchases increased 0.7 percent in 2017 after rising by 0.4 percent in 2016. Defense purchases, which consist of defense consumption and gross investment, contributed modestly, rising by 0.7 percent in 2017 after declining by 0.6 percent in 2016. State and local government purchases consisting of consumption plus gross investment rose by 2.0 percent in 2016 but declined by .05 percent in 2017.

The situation began to change starting with fourth quarter 2017 (*Figure 1-12*). Government expenditures improved by 2.4 percent. Looming federal legislation became policy at the end of 2017 and in early 2018. The caps on discretionary funding were loosened and additional funding for disaster relief was approved. Government spending has subsequently increased throughout 2018, rising by 1.5 percent and 2.5 percent respectively in the first and second quarters. The 2.6 percent jump in government spending in the third quarter caps off a strong sequential rate of growth over the past four quarters.

Most of the spending surge has been taking place at the federal level, primarily for national defense. Orders for military hardware have increased relative to what has been seen in the GDP data. State and local governments have also ramped up spending in response to economic expansion and the resulting increases in revenues and the demand for government services. Greater federal funding for emergency disaster assistance has also boosted investment by state and local governments as they spend on reconstruction related to summer wildfires and recent hurricanes.

Figure 1-12. Government purchases and gross investment, trillions of dollars adjusted for inflation, seasonally adjusted annualized rate
United States, third quarter 2016 through third quarter 2018
Source: U.S. Bureau of Economic Analysis, Government Current Receipts and Expenditures

Contributions	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3
Government expenditures percent change	1.0	0.2	-0.8	0.0	-1.0	2.4	1.5	2.5	2.6
Percentage change from preceding period									
Federal government expenditures	1.6	0.5	0.0	2.4	-1.3	4.1	2.6	3.7	3.5
National defense	2.8	-1.2	-0.3	5.6	-2.9	2.9	3.0	5.9	4.9
Nondefense	-0.1	3.0	0.4	-2.0	1.1	5.7	2.1	0.5	1.5
State and local government expenditures	0.6	0.0	-1.2	-1.3	-0.9	1.4	0.9	1.8	2.0
Federal government expenditures	1.6	0.5	0.0	2.4	-1.3	4.1	2.6	3.7	3.3

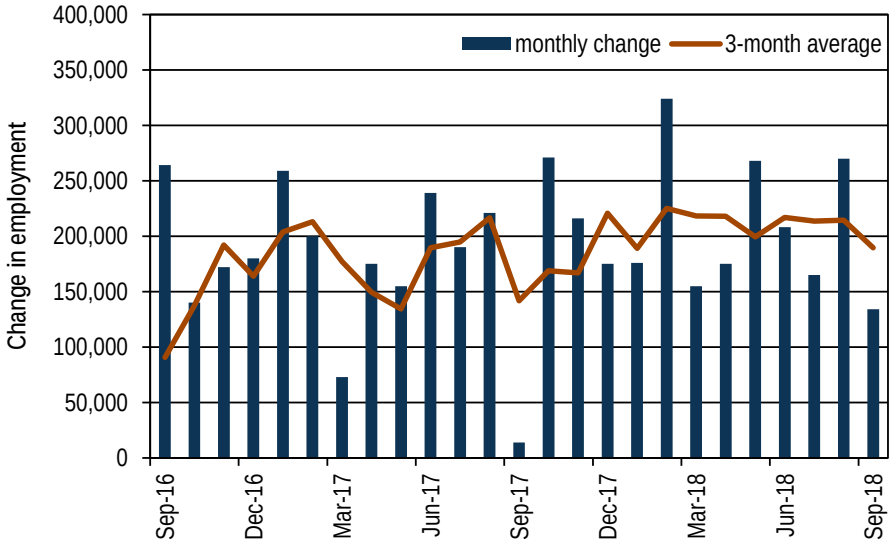
Government spending has grown in 2018 with help from fiscal policy legislation.

The state of the labor market

Two surveys are used by the U.S. Bureau of Labor Statistics (BLS) to measure national labor market trends. The *establishment survey* provides an estimate of the number of occupied jobs in the private and public sectors (federal, state and local government). The *survey of households* looks at roughly 60,000 out of about 125 million households in the country, and estimates the number of people either employed or unemployed but searching for a job.[2]

The labor market continued to improve in 2018 through September. According to the establishment survey, total nonfarm seasonally adjusted employment reached 149.5 million in September 2018, up 1.7 percent from September 2017. Employment using this survey approach uses payroll information provided by employers and is usually referred to as payroll employment. In terms of monthly job growth, payroll employment in the nonfarm business sector averaged over 208,000 per month (*Figure 1-13*). That pace is up from the average monthly pace of job gains in 2017 and is considerably faster than what is needed, on average, to provide jobs for new entrants into the labor force.

Figure 1-13. Total monthly nonfarm employment, in thousands, seasonally adjusted
United States, September 2016 through September 2018
Source: U.S. Bureau of Labor Statistics, Current Employment Statistics



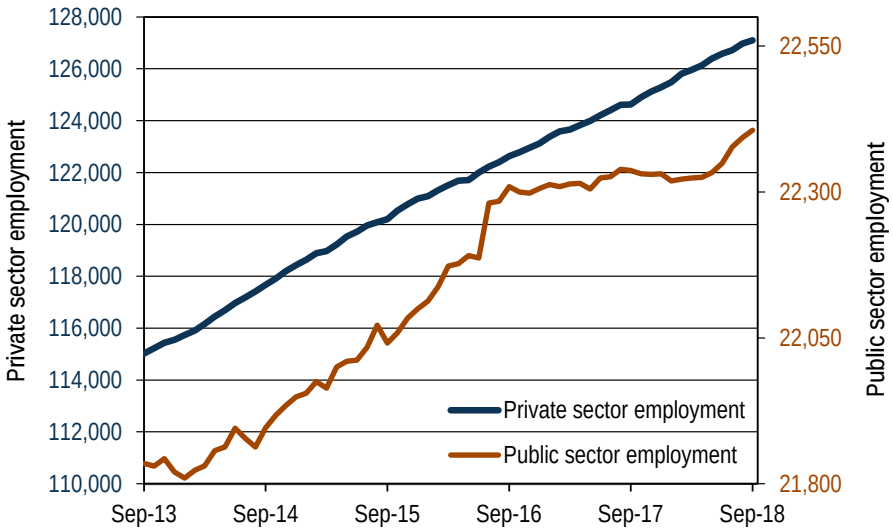
Payroll employment has grown in 2018 relative to 2017.

[2] The estimate of the number of households in the United States comes from the quarterly Homeownership and Vacancy report published by the U.S. Census Bureau.

Monthly job gains have been positive through September 2018 for 96 consecutive months. It can then be said that the economy has enjoyed 8 years of uninterrupted employment growth. During that time, the economy added over 19 million jobs. The monthly streak was close to being broken one year ago in September 2017, when hurricanes disrupted several regional economies that month. Weather again factored into the disappointing September 2018 payroll numbers. Hurricane Florence hit the Carolinas during the survey reference period. Relative to last year's storms, the hurricane hit a less populated area and also came at the tail end of survey week. While this impacted fewer workers than last year, a greater than average number of workers were unable to work due to bad weather.

Figure 1-14 shows how employment has been trending in both the private and public sectors since September 2013. Growth in employment in the private sector has been steady and counts for 95.0 percent of the jobs added by employers during this time. Public sector hiring has shown to be more erratic but the trend in hiring is also upward. State and local government employment makes up 88.0 percent of total government employment, so fiscal conditions in the states guide much of the hiring in the public sector.

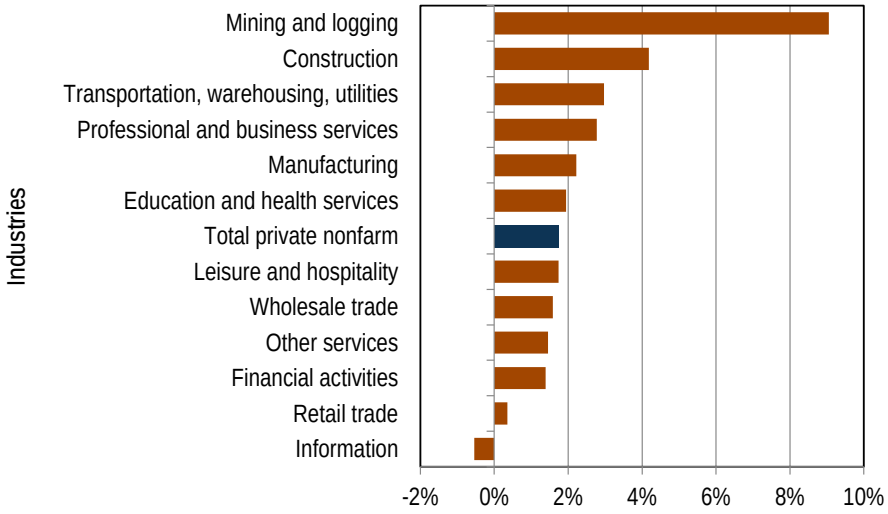
Figure 1-14. Total private and public nonfarm employment, in thousands, seasonally adjusted United States, September 2013 through September 2018
Source: U.S. Bureau of Labor Statistics, Current Employment Statistics



Private and public sector employment have both increased over the past year.

Job gains over the course of the year, from September 2017 to September 2018, have been widespread across major industry groups (*Figure 1-15*). The information sector was the lone industry to report job losses on an annual basis. The improvement in employment in the goods-producing sector has been prevalent, with manufacturing rising 2.2 percent over the past year, construction up 4.2 percent and mining and logging employment climbing 9.1 percent, with most of the gain coming from increased oil production. Notable strength was also seen in professional and business services, transportation, warehousing and utilities, and education and health services (*Figure 1-15*), all of which grew more than average with respect to total private nonfarm employment growth. The top two industries that added the most jobs over the year were professional and business services, with 572,000 jobs added, and education and health services, which added 447,000 jobs.

Figure 1-15. Percent change in private sector employment by industry
United States, September 2017 through September 2018
Source: U.S. Bureau of Labor Statistics, Current Employment Statistics

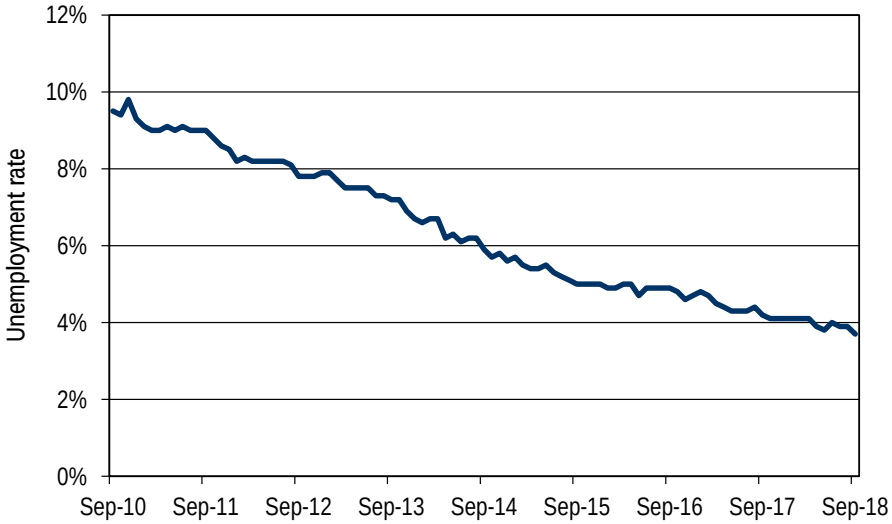


Private sector employment has expanded in all major industries but one in the past year.

The unemployment rate: how low can it go?

The headline unemployment rate is based on the national household survey and is arguably the most widely used indicator of labor market conditions. As of September 2018, the unemployment rate was 3.7 percent, the lowest it has been since December 1969. Annually, the unemployment rate is down 0.5 percentage points from September 2017, and it is significantly less than its recession peak of 10.0 percent in October 2009 (*Figure 1-16*).

Figure 1-16. Monthly unemployment rate, seasonally adjusted
United States, September 2010 through September 2018
Source: U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics



The national unemployment rate is at a 49-year low.

The past eight years of employment growth has thinned the number of available workers seeking employment, leading to a tightening of the labor market. A growing number of businesses have been expressing difficulty in finding workers. Currently, there are less job openings than there are unemployed people, compared with 6.5 openings per person in the wake of the Great Recession. With little to no slack remaining in the labor market, and with the near-term demand outlook for labor strong, it remains to be seen how much lower the unemployment rate can fall.

An aging workforce and slower population growth among working-age adults increases the likelihood of lower unemployment. Older workers have lower rates of unemployment since they are less likely to switch jobs and more likely to exit the labor force if unemployed. With fewer available potential workers and with no change in labor force participation rates, downward pressure gets exerted on the unemployment rate. Whether the labor force participation rate among prime age workers can significantly increase involves overcoming some challenges. Higher wage and other compensations are incentives being used to lure back those who had been most likely to drop out of the labor force. But other factors that are considered structural in nature, work against there being greater labor force participation. These include the willingness and ability of workers to relocate to where jobs are more available. A majority of new jobs tend to be located in metropolitan areas where living conditions may

not be as desirable and where the cost of living, mostly due to home-price appreciation, has been rising. Skill set mismatches with new and higher paying occupations leaves potential workers with less options. Those who do not have the skills to work in emerging fields and are unwilling to accept reduced wages for the lower skilled jobs or relocate, may choose to stay outside the labor force even as labor market conditions continue to tighten.

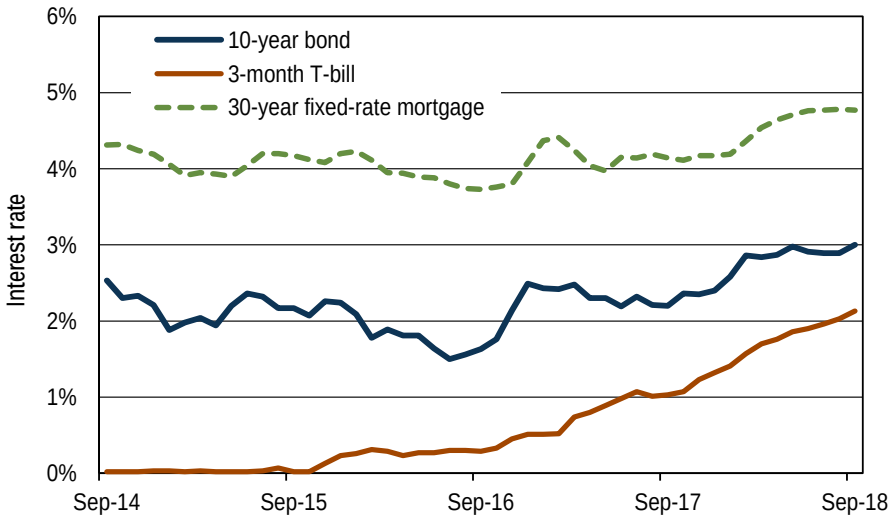
Monetary policy

The Federal Reserve Board (Fed) first began raising its benchmark short-term interest rate in December 2015 after the Great Recession. It followed that with three more rate hikes in 2017. In doing so, the Fed has been moving to fulfill its dual mission mandated by Congress. First, the Fed is charged with maintaining "full employment." With the unemployment rate as of September resting below 4.0 percent, it would appear "full employment" has essentially been achieved. The Fed itself has acknowledged in recent public statements how economic activity has been rising at a strong rate, that job gains have been strong, and the unemployment rate is low. Secondly, the Fed has a mandate to achieve "price stability," which it has defined as an inflation rate of 2.0 percent. The fed measures the rate of inflation by tracking the Personal Consumption Expenditure (PCE) price index measured by the Bureau of Economic Analysis. Both the overall PCE inflation rate and core (excludes food and energy prices) PCE are currently running at about 2.0 percent.

The Fed moved to raise interest rates four times again in 2018 while the economic situation played out. Each of the moves were made to bring monetary policy closer to "normalization" where the benchmark rate would be considered "neutral." That is, monetary policy would not be "accommodative" by boosting the pace of economic activity, nor would it be restraining. Moreover, with fiscal policy turning more simulative, the Fed feels it has had a better opportunity to bring short-term rates closer to their new normal.

The interest rate moves by the Fed impact other rate measures throughout the financial sector (*Figure 1-17*). Mortgage rates have been climbing. The average rate on a conventional 30-year mortgage climbed to 4.78 percent in August 2018 before leveling off in September.

Figure 1-17. Selected interest rates
United States, September 2014 through September 2018
Source: Federal Reserve Board, Federal Housing Finance Agency



Federal Reserve Board policy measures are resulting in higher market interest rates.

Home mortgage rates tend to move with the bond market, and the rates on a 10-year Treasury note recently hit their highest level in seven years. Yields have been pricing in previous and expected future increases in short-term rates, as well as expectations about the future rate of inflation.

For the Fed, the decline in the unemployment rate below 4.0 percent puts upward pressure on inflation. In the current expansion though, the decline in the unemployment rate has not been matched by an anticipated increase in measured inflation. The traditional link between unemployment and inflation has been broken by demographic changes in the form of declining labor force participation rates, and by the globalization of the labor market. Consistently low inflation rates have diminished inflation expectations, which has lowered the incentive of workers to seek higher wages, and reduced the need and limited the ability of firms to raise consumer prices to offset inflation.

With lower expectations of future inflation, the Fed is taking the opportunity to be more patient with rate increases and more reactive to price index increases rather than proactive. They appear to have relaxed their target of tolerable inflation somewhat from a fixed rate of 2.0 percent to somewhere around 2.0 percent, noting that price movements can be symmetric, or can vary up and down.

In the meantime, the Fed is content to raise rates in a very measured and gradual manner. The last gradual increase for 2018 took place in December.

Federal Reserve Chairman Jerome Powell addressed the Economic Club of New York and provided some insight into the Fed's viewpoint on monetary policy for 2019, as well as its outlook for the economy. The speech confirmed that rate hikes would likely continue in 2019, although the exact number of increases are to remain ambiguous. Powell's broader comments about the economic outlook leaned toward the upbeat with the statement "There is a great deal to like about this outlook."

The economic data tends to support Powell's comments. The economy, based upon its performance in terms of economic growth and employment, has strong momentum headed into the last quarter of 2018. The consensus outlook for fourth quarter growth expects some moderation, with most estimates centering around 2.5 percent. The moderation is expected to extend into 2019 with economic growth gradually scaling back to its long-term trend.

Chapter 2: Washington's economy and labor market

Economic developments and policies that affect and shape the national economy have extended effects on state economies. States are connected economically through the free flow of commerce across state lines and through the mobility of labor. Consequently, national recessions and expansions are typically experienced by all states, though the degree to which they are felt might differ between states.

As good as the national economy has been in 2018, Washington's economy may be even better. Over the last few years, the Washington economy arguably has outperformed nearly every state in the nation. The Seattle metropolitan area, which is home to just over half of the state's population and employment, has been accounting for the bulk of the economic activity. Seattle is home to Amazon and Microsoft, two of the world's five largest companies. Amazon had been expanding its presence in Seattle and Microsoft has shown continued growth. Both have helped to drive the region's technology (tech) sector and establish leadership roles in software, e-commerce, data visualization, big data, cloud computing services and virtual reality. Notable startups include Tableau Software, Expedia and Zillow. The region is also home to Starbucks, Nordstrom, Costco and many Boeing facilities.

Washington also stands to be adversely affected by the growing tensions linked to recent trade policies. It leads all states in terms of the total value of goods exported to China, with most of this owing to shipments of Boeing commercial aircraft and agricultural produce.

Washington state's GDP growth ranked first

Washington's level of economic activity can be measured by the value of the goods and services it produces at some point in time. This measure of the economic output of the state, formerly known as gross state product and now known as state gross domestic product (GDP), is the sum of all value added by industries within the state. It is the counterpart to the nation's GDP.

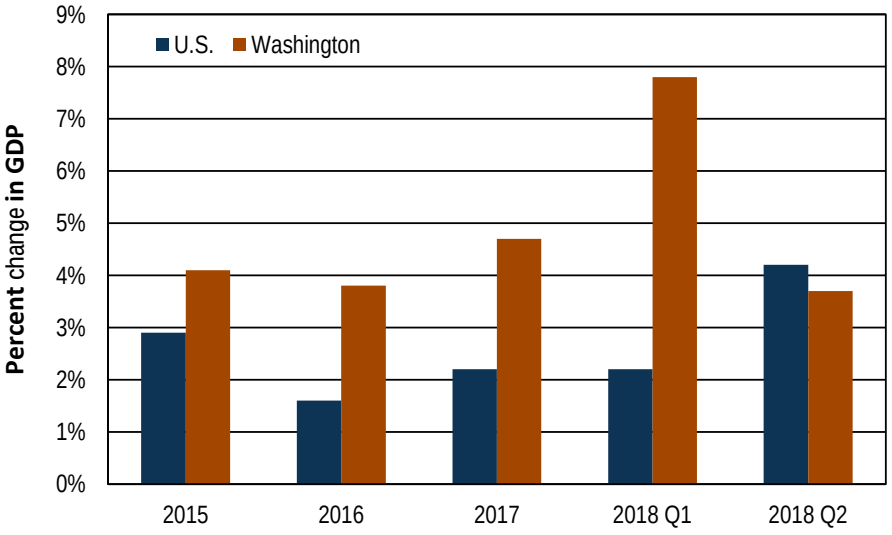
The U.S. Bureau of Economic Analysis (BEA) computes state GDP annually and quarterly. Changes in state GDP can be used as a measure of state economic growth, much as changes in national GDP are used to measure national economic growth.

Washington state's real GDP growth has been outpacing that of the nation for most of the expansion. Washington has ranked in the top ten in state GDP growth each quarter going back to 2016. It ranked first based on annual growth among all U.S. states and territories in

2016 and 2017. Its GDP expanded by 4.7 percent in 2017 (*Figure 2-1*), which outpaced the 2.2 percent growth achieved by the nation. From second quarter 2017 to second quarter 2018, the state achieved real GDP growth of 5.5 percent, the highest among all states and well above the national rate of 2.9 percent. Also, of the large metropolitan areas in the U.S., Seattle-Tacoma-Bellevue, Washington had the second largest increase in annual real GDP in 2017, posting a 5.2 percent gain.

The continued development of the state's tech sector and retail trade have had much to do with this. Technology is largely manifested within the information services industry and in professional and business services. Information services, which includes software development, contributed 1.53 percentage points of the 4.7 percentage points by which Washington's economy expanded in 2017. Retail trade, a category that includes non-store or online shopping, contributed 1.47 percentage points to total state GDP growth during the year. For the first half of 2018, where preliminary data are available, GDP growth in Washington expanded by a giant 7.8 percent rate before settling down to a more modest pace of 3.7 percent in the second quarter.

Figure 2-1. Gross domestic product, (chained 2012 dollars), annual and quarterly percent changes, seasonally adjusted annualized rate
United States and Washington state, 2015 through second quarter 2018
Source: U.S. Bureau of Economic Analysis, Domestic Product and Income

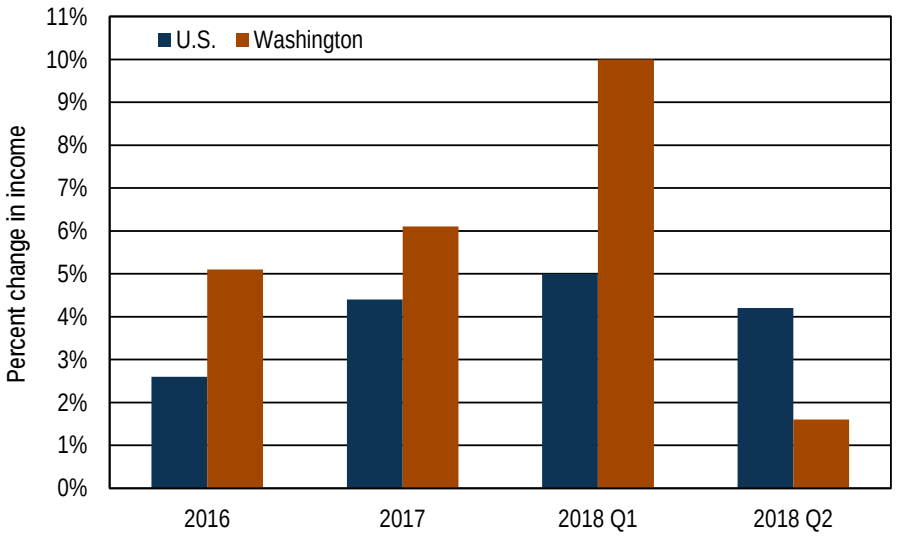


Washington's economy has grown faster than the national average through most of the current economic expansion.

Personal income gains supported with wage growth

Washington's GDP has expanded annually going into its ninth year in 2018. The higher levels of economic activity have contributed to greater employment and income for the state's residents. *Figure 2-2* shows how personal income growth in Washington compares with the U.S. The pattern of income growth is closely related to GDP growth making the results in *Figure 2-2* look very similar to those in *Figure 2-1*. From second quarter 2017 to second quarter 2018, the level of personal income in Washington grew by 6.1 percent, while U.S. personal income grew by 4.6 percent.

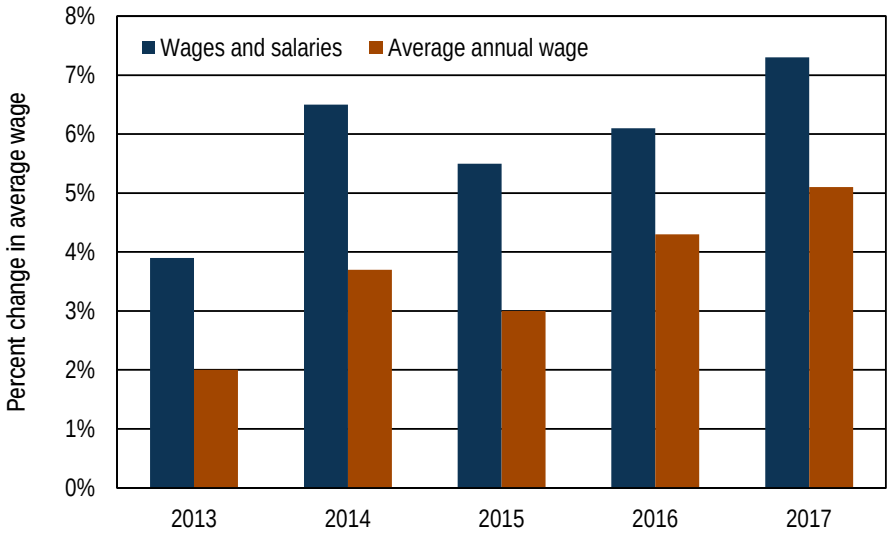
Figure 2-2. Personal income, (current dollars), annual and quarterly percent changes, seasonally adjusted annualized rate
United States and Washington state, 2015 through second quarter 2018
Source: U.S. Bureau of Economic Analysis, Personal Income and Outlays



Washington's level of personal income has grown as the expansion has progressed.

Wages and salaries make up the largest component of personal income. The annual growth in wages and salaries for Washington state is shown in *Figure 2-3* alongside the growth in the average annual wage obtained from the state's Quarterly Census of Employment and Wages (QCEW). The wages are expressed in nominal terms, unadjusted for inflation. The gains are somewhat higher using BEA data than from the QCEW, although the pattern of gains are the same from year to year. The degree of wage growth reached its highest point in 2017, with 2018 still pending.

Figure 2-3. Percent change in wages, salaries (BEA) and the average annual wage (QCEW), current dollars
Washington state, 2013 through 2017
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

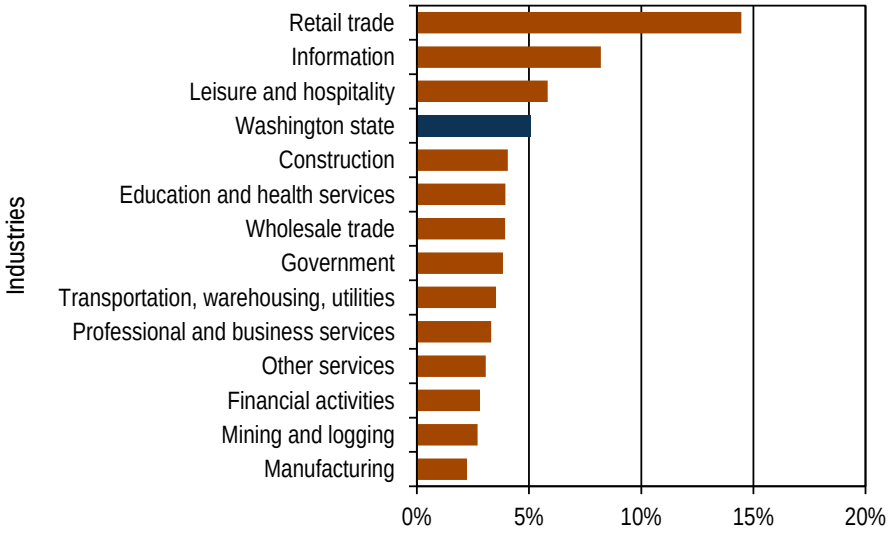


Wage growth in Washington state has posted significant gains.

Figure 2-4 shows on a percentage basis, the manner in which nominal wages have grown by industry sector from 2016 through 2017 using QCEW data. Average annual wage growth in 2017 was 5.0 percent in Washington state and was largely supported by wage gains in retail trade and information. These two industries have been producing a greater share of the state's output value, which is being reflected in the wages accruing to the industries. Leisure and hospitality also experienced above-average wage growth. Average wages in the remaining industry sectors grew more slowly than the state's average wage.

The industry that paid the highest average rate in 2017, at $172,600, was the information sector. From 2016 through 2017, wages in this sector have grown by 8.2 percent. During the same time, wages within the industry with the lowest average wage in 2017, leisure and hospitality at $24,000, grew by 5.8 percent.

Figure 2-4. Percent change in average annual wage by industry
Washington state, 2016 through 2017
Source: Employment Security Department/LMEA, U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

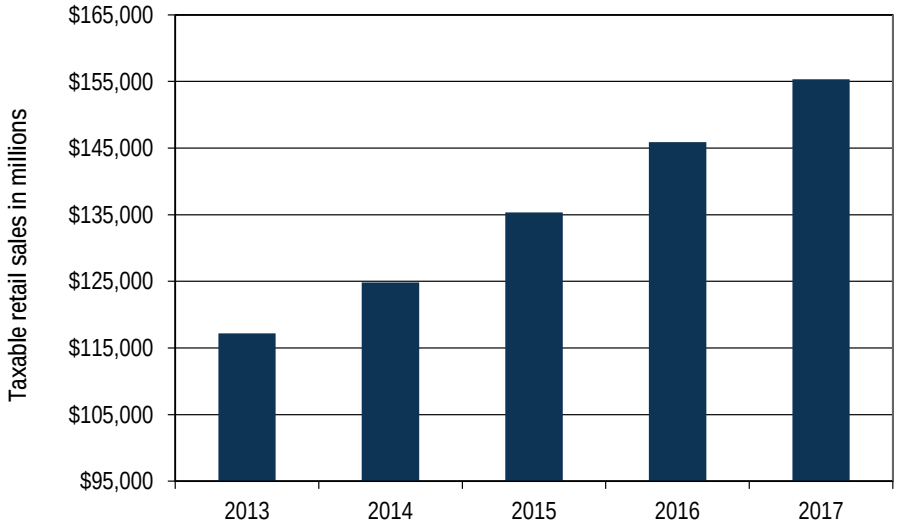


On a percentage basis, wages have grown the most retail trade and information and the least in manufacturing from 2016 to 2017.

Income and wage growth supports greater spending

Local consumer spending patterns are reflected in taxable retail sales. *Figure 2-5* shows how taxable sales have risen annually from 2013 through 2017. Spending by Washington consumers has increased throughout, following the higher total income earned over this period. Since 2013, sales revenues have increased by $38.1 million, an average of 7.3 percent per year. In 2017, taxable retail sales increased by $9.5 million from 2016, slightly less than the annual increases in each of the previous two years.

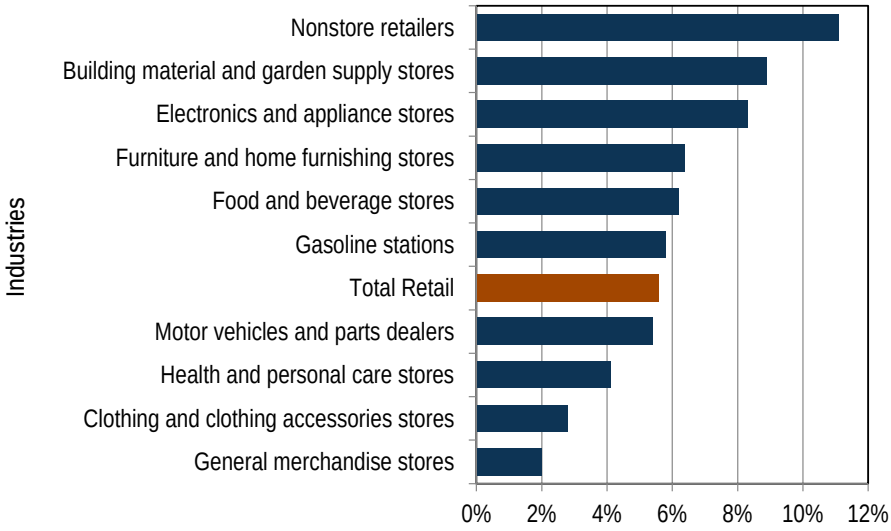
Figure 2-5. Annual taxable retail sales, millions of dollars
Washington state, 2013 through 2017
Source: Washington State Department of Revenue



Retail sales have consistently grown during the expansion.

Figure 2-6 shows how sales were allocated among the major retail industries. The retail industry with the greatest growth in sales volume in 2017 was non-store retailers. This category involves online shopping outside of brick-and-mortar stores, and shows how the shopping patterns of buyers have shifted over the years away from these more traditional locations. Other categories whose sales volume grew above average tend to reflect an emphasis on home improvement related to the housing market. Sales at gasoline stations grew slightly more than average as prices for gasoline rebounded during the year.

Figure 2-6. Percent change in retail sales by industry
Washington state, 2016 through 2017
Source: Washington state Department of Revenue



Retail sales have been shifting to nonstore retailing and home improvement.

Washington housing starts cool as home price affordability weakens; Seattle area driving up regional home prices

Years of top-level economic growth has generated employment opportunity, and has attracted job seekers from all over the country. Washington, which is the nation's 13th most populous state, has posted the sixth largest population gain since 2010. This rapid growth has accelerated the need for housing and pushed home prices in desirable areas sharply higher. Consequently, the growth has started to push more development into the central part of the state as businesses and individuals seek out less expensive and less congested locations.

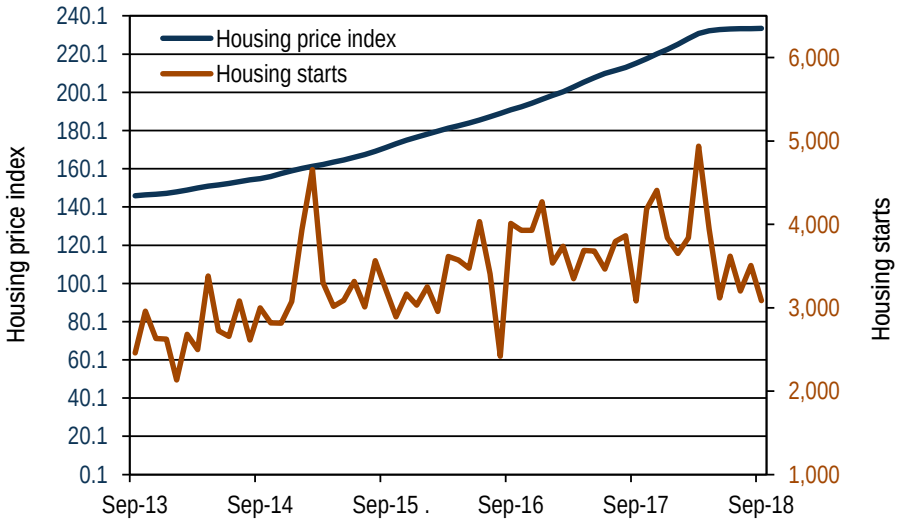
Builders had been responding by moving to build more homes (*Figure 2-7*) until most recently when the number of housing starts began to level off and then recede. Rising interest rates and the higher costs of building materials have pushed prices even higher into 2018 and are reducing buyer affordability.

Based on the Washington House Price Index provided by the Federal Home Loan Mortgage Corporation (or Freddie Mac), the Washington state home price index surpassed its pre-recession peak in March 2016. Since then, the index has risen by 25.7 percent into and through September 2018. Over the course of the year, the state's home price index in September 2018 is 8.4 percent higher than it was in September 2017.

Much of the increase in local home prices has been taking place in the Seattle area. Although, home price appreciation is taking place across most of the state as well. The area's vibrant tech sector has fueled economic growth and increased population inflows. The influx has generated a housing boom that has pushed prices sharply higher. Over the last two years, Seattle had mostly led the nation in home price appreciation. However, evidence is mounting that suggests prices are leveling off during third quarter 2018 and could decline into the fourth quarter as affordability concerns curtail local demand.

Housing starts had previously been moving to keep pace with the rise in home prices. Housing starts from October 2017 to September 2018 were 45,330 but are up by only 2.3 percent over the same period one year prior. Third quarter housing starts in 2018 were 9,800, below the 10,700 starts made during the third quarter in 2017.

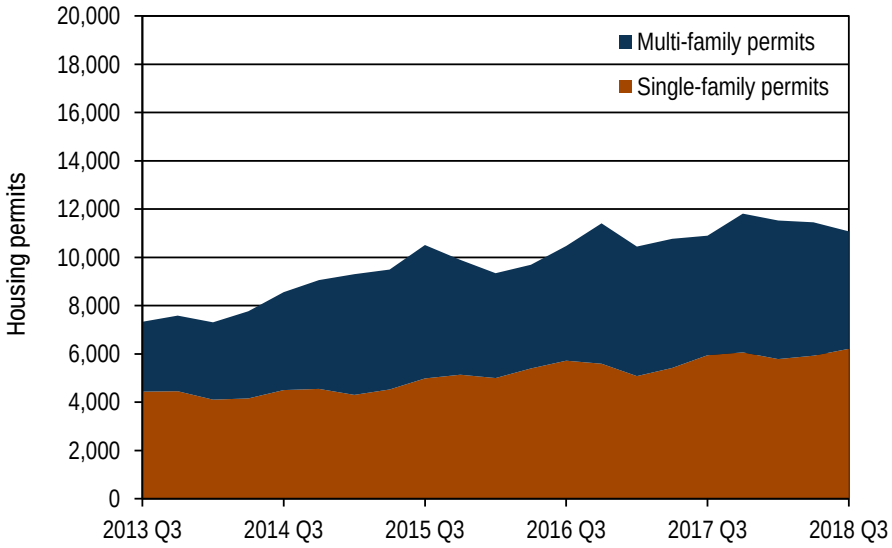
Figure 2-7. Housing price index and single-family housing starts, seasonally adjusted, December 2000 = 100
Washington state, September 2013 through September 2018
Source: Federal Home Loan Mortgage Corporation, U.S. Census Bureau



Affordability concerns appear to be impacting the demand for housing.

Residential building permits are the precursor to the start of housing projects, so it is generally expected for the level of permits to move in tandem with housing starts. Most residential activity has traditionally been aimed at construction of single-family units compared with multi-family residences (*Figure 2-8*). However, there has been a rebound in multi-family unit construction, including apartments and condominiums. Much of that shift has been driven by the expanding tech industry within the Seattle area attracting younger workers, who seek to live near their employers in apartments and condominiums. Multi-family building activity remains at an elevated level although it is currently lagging behind recent peaks. Consequently, builders have begun to gradually shift activity more toward the construction of single-family units and away from multi-family units.

Figure 2-8. Residential building permits by type of unit, three-month moving average
Washington state, third quarter 2013 through third quarter 2018
Source: U.S. Census Bureau, Building Permits Survey

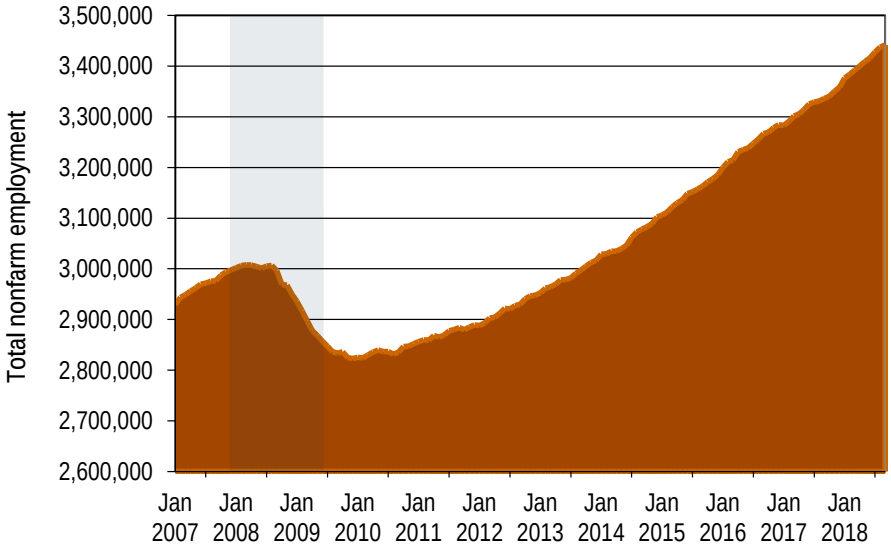


Builders have recently moved toward building more single-family housing units.

Employment grows as Washington's economy expands

Figure 2-9 shows how nonfarm employment in the state has grown since the U.S. economy was last in recession. Since that time, Washington has been able to recover the number of jobs it lost during the recession, and then add more than double that number of new of jobs through September 2018.

Figure 2-9. Total monthly nonfarm employment, seasonally adjusted
Washington state, January 2007 through September 2018
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Current Employment Statistics

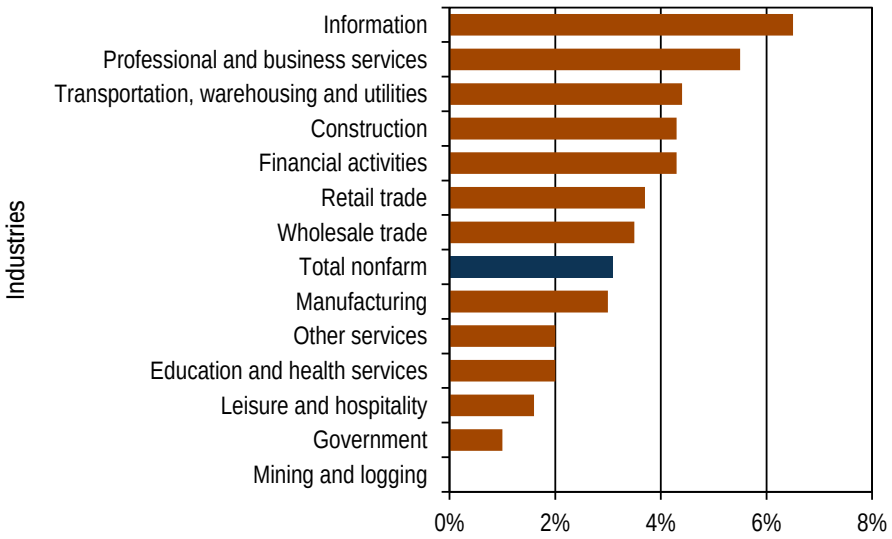


Shaded area is a U.S. recession period.

Employment has grown to new heights since the last recession.

Total payrolls expanded by 3.1 percent over the past 12 months ending in September 2018, with gains occurring in every major nonfarm industry but one (*Figure 2-10*). Agriculture also plays an important role in the state, mainly in eastern Washington. The highly seasonal nature of this industry produces wide swings in job growth over the course of the year. Although agriculture is important, it is not a large employer. Information and retail trade both show above-average employment growth. This tends to set Washington state apart, since these are two sectors that are generally declining throughout the rest of the country.

Figure 2-10. Percent change in nonfarm employment by industry sector
Washington state, September 2017 through September 2018
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Current Employment Statistics



Employment increased in every major industry sector but one over the last year.

Seven of the thirteen industrial sectors showed employment growth above the state average. Hiring in construction has been strong during the expansion and into 2018 as both residential and commercial activity have tried to keep pace with the significant levels of population and employment growth. Other sectors showing strong growth included professional and business services; transportation, warehousing and utilities; financial activities and wholesale trade. Manufacturing, which had been showing annual declines in employment in recent years, added jobs in 2018 at about the same rate as the state.

The greatest numbers of jobs added occurred within professional and business services and the retail trade sectors. These sectors added 23,400 and 124,600 jobs respectively. Employment growth in mining and logging, which employs the fewest number of workers of the major industry sectors, remained steady and did not increase or decrease over the course of the year.

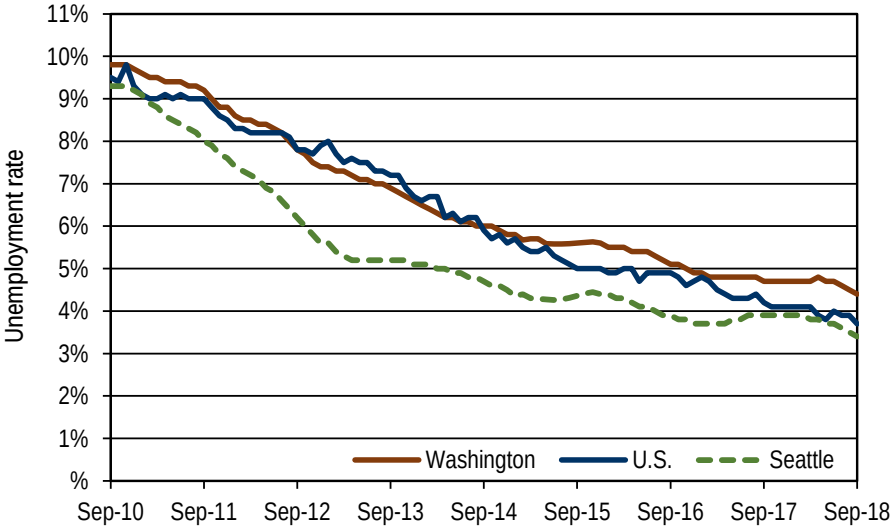
National, state and local unemployment rates push lower

Washington state's unemployment rate has tracked fairly close to the national unemployment rate during the last eight years (*Figure 2-11*). The downward trend in the unemployment rate for the state and nation reflect the employment growth that has ensued over time.

From September 2010 to September 2018, the unemployment rate for Washington has declined by 5.4 percentage points while the national rate declined by 5.8 percentage points. The Seattle Metropolitan Division (MD) saw its unemployment rate fall from 9.3 percent in September 2010 to 3.4 percent in September 2018. Washington's September 2018 unemployment rate of 4.4 percent established a new historical low based on the historical series tracked by the U.S. Bureau of Labor Statistics. The series begin in 1976 and shows the most recent month that a state reached its highest and lowest unemployment rate. The Seattle area September 2018 unemployment rate has not been this low since April 2008, right before the effects of recession set in.

The September 2018 unemployment rate for the U.S. stood at 3.7 percent. This marks a 49-year low. At this point in the economic expansion, the unemployment rates for the state and nation are widely considered to reflect full employment, a point at which any unemployment resulting from the last recession is at or near zero. Over the past year as labor market conditions have tightened, the decline in unemployment rates has been more gradual. It is possible for rates to decline further, depending upon future job openings, potential workers' willingness and ability to fill them and federal economic policy.

Figure 2-11. Monthly seasonally adjusted unemployment rates
United States, Washington state and Seattle MD, September 2010 through September 2018
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics



The Washington state unemployment rate has descended to a record low and is slightly above the national rate, while the Seattle area is less than both.

Chapter 3: Seasonal, structural and cyclical industry employment

The purpose of this chapter is to identify the most influential factors in employment trends for different industries in Washington state. The results are important for both a better understanding of current employment trends, and for practical applications such as job placement, unemployment insurance and training programs. Annually, for instance, industries with high levels of seasonality experience significant variation in monthly employment. With this monthly variation, short-term high job demand follows upon employment declines. For industries with high cyclical variation, periods of booming employment can be followed by periods of decline. Training programs should be developed in anticipation of such variation.

We have also analyzed the relationships between industry and total state employment (*Appendix 2*). The results of this analysis can help in creating a better understanding of the key components of state employment trends.

Our analysis is based on historical employment data from January 1990 through December 2017.[3] The analysis splits industry employment trends among the following four components:

1. **Seasonal**: regular and predictable employment changes that recur each calendar year, caused by seasonal factors, which can include natural factors (changes in weather), administrative measures (starting and ending of the school year) and social, cultural or religious traditions (fixed holidays such as New Year's Day).

2. **Trend**: shifts in long-term employment growth trends driven by fundamental structural change and productivity trends in industries, rather than the cyclical fluctuations in employment. Structural changes in employment can be initiated by productivity improvement, policy changes or permanent changes in resources, technology or society. Technological innovation has introduced entirely new industries and caused other industries to decline. In addition, it has reshaped the entire labor market through increased efficiencies, such as automated manufacturing, data collection and analysis and communications.

[3] Historical data for employment covered by the unemployment insurance system was categorized by NAICS (North American Industrial Classification System) code, at the 3-digit code level with some 4-digit level detail (aerospace product and parts manufacturing, ship and boat building, software publishers and wired and wireless telecommunications carriers). Private and public education services employment data were combined under the education and health services industry category. Private and public employment data were also combined under the postal services and ship and boat-building industries. The remainder of public-sector employment was aggregated and categorized by ownership (federal, state and local government). Three industries were excluded from the analysis due to data limitations and/or significant code changes: oil and gas extraction, rail transportation and internet publishing and broadcasting. Altogether, the historical time series data included 97 industries and one series for total employment.

3. **Cyclical**: employment changes attributed to the business cycle in general or specific events such as the housing bubble bursting in 2007 or cyclical variation in aerospace employment.

4. **Irregular**: random employment changes not picked up by regular seasonal and cyclical components (e.g., non-regular seasonality, weather variation and labor strikes).

Seasonal industries

Based on an analysis of 97 industries in Washington state, 18 industries were identified as having high levels of seasonality, with a seasonal factor[4] over 4.0 percent. Crop production, scenic and sightseeing transportation, and support activities for agriculture and forestry were the most seasonal industries (*Figure 3-1*).

Figure 3-1. Industries with high levels of seasonality
Washington state, 1990 to 2017
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

NAICS	Industry	Seasonal factor
111	Crop production	36.7%
487	Scenic and sightseeing transportation	18.7%
115	Support activities for agriculture and forestry	15.4%
711	Performing arts, spectator sports and related industries	9.1%
213	Support activities for mining	8.8%
237	Heavy and civil engineering construction	8.8%
114	Fishing, hunting and trapping	7.9%
814	Private households	7.7%
525	Funds, trusts and other financial vehicles	5.9%
721	Accommodation	5.7%
611	Educational services	4.9%
311	Food manufacturing	4.8%
492	Couriers and messengers	4.7%
713	Amusement, gambling and recreation industries	4.6%
448	Clothing and clothing accessories stores	4.6%
312	Beverage and tobacco product manufacturing	4.6%
512	Motion picture and sound recording industries	4.4%
316	Leather and allied product manufacturing	4.2%

Crop production, scenic and sightseeing transportation and support activities for agriculture and forestry have been the industries with the highest degree of seasonality in Washington state.

[4] See *Appendix 2* for seasonal factor definition

Structural and cyclical industries

Totals of seasonal, irregular and cyclical components represent an insignificant share of employment. Cyclical is balanced between years, while seasonal and irregular are balanced within a year. For annual trends, the combination of the trend and cycle components represents virtually all total employment.

For total covered employment, the trend component accounts for 77.4 percent of total employment changes (*Appendix figure A2-2*). There were 28 industries where the structural (trend) component accounted for at least two thirds of the change in employment (*Figure 3-2*). Ambulatory healthcare services, software publishers, non-store retailers, food services and drinking places and educational services were the most highly influenced by the trend factor and consequently less by the cyclical factor. The trend component contributed relatively more to these five industries than to employment changes for total employment. All other industries have lower trend contributions than total employment.

Figure 3-2. Industries most influenced by structural factors
Washington state, 1990 to 2017
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

NAICS	Industry	Structural factor
621	Ambulatory healthcare services	84.7%
5112	Software publishers	79.0%
454	Nonstore retailers	78.6%
722	Food services and drinking places	78.2%
611	Educational services	77.6%
453	Miscellaneous store retailers	76.7%
622	Hospitals	74.6%
903	Local government (other)	73.1%
312	Beverage and tobacco product manufacturing	73.1%
812	Personal and laundry services	72.9%
532	Rental and leasing services	72.7%
238	Specialty trade contractors	72.5%
425	Wholesale electronic markets and agents and brokers	71.0%
236	Construction of buildings	70.5%
531	Real estate	70.4%
519	Other information services	69.5%
541	Professional, scientific and technical services	68.9%
623	Nursing and residential care facilities	68.7%

NAICS	Industry	Structural factor
441	Motor vehicle and parts dealers	68.1%
481	Air transportation	68.0%
813	Religious, grantmaking, civic, prof. and similar organizations	68.0%
423	Merchant wholesalers, durable goods	67.9%
444	Building material and garden equip. and supplies dealers	67.7%
511*	Other publishers	67.3%
491	Postal service	67.1%
452	General merchandise stores	66.9%
561	Administrative and support services	66.9%
551	Management of companies and enterprises	66.7%

* Wild card symbol indicates the component of an economic subsector (3-digit NAICS) without the component of its industry groups (4-digit NAICS) that are listed separately in this figure.

These Washington industries have been most influenced by structural factors such as technology changes, policy changes and changing demographics.

For 15 industries, the cyclical component accounted for more than half of the change in employment in the indicated industries (*Figure 3-3*). For total covered employment, the cyclical component accounts for 22.6 percent of total employment change. Support activities for mining, crop production, and scenic and sightseeing transportation were the most highly influenced by the cyclical factor and consequently less by the structural (trend).

Figure 3-3. Industries most influenced by cyclical factors
Washington state, 1990 to 2017
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

NAICS	Industry	Cyclical factor
213	Support activities for mining	65.0%
111	Crop production	63.4%
487	Scenic and sightseeing transportation	63.2%
486	Pipeline transportation	59.2%
324	Petroleum and coal products manufacturing	58.3%
313	Textile mills	56.7%
316	Leather and allied product manufacturing	56.2%
515	Broadcasting (except internet)	55.2%
446	Health and personal care stores	54.9%
112	Animal production	52.7%
221	Utilities	52.6%
443	Electronics and appliance stores	52.2%
521	Monetary authorities-central bank	51.9%
114	Fishing, hunting and trapping	50.7%
901	Federal government (other)	50.3%
901	Federal government (other)	50.3%

These Washington industries have been most sensitive to cyclical movements and have exhibited shifts of relatively rapid employment growth and decline.

See *Appendix 2* for a description of the statistical methodology used to categorize and measure the major factors behind employment change by industries and *Appendix figures A2-2* and *A2-3* with the full results of these analyses.

In summary, training providers and other planners need to be aware that not every upswing in employment is an indication of an increase in demand. The upswing may simply be annual seasonal fluctuations or cyclical fluctuations.

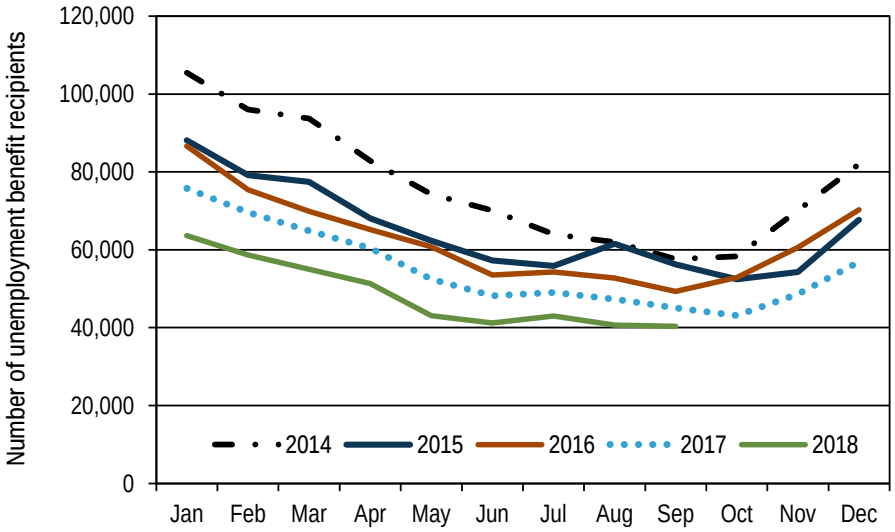
Chapter 4: Unemployment

This chapter discusses two important indicators of Washington's labor market: unemployment benefits and unemployment rates.

Unemployment benefits

In September 2018, more than 40,000 people received unemployment benefits.[5] *Figure 4-1* shows that the number of beneficiaries has continued to decrease, by 87.0 percent in September 2018 from a peak of just over 300,000 in January 2010. The drop in beneficiaries reflects factors including: individual beneficiaries finding jobs, fewer people being laid off and needing to apply for benefits, and beneficiaries exhausting all of their unemployment benefits.

Figure 4-1. Unemployment benefit recipients by month, all benefits[6]
Washington state, January 2014 through September 2018
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse



From year to year, the number of people receiving unemployment benefits has continued to decline since 2014.

[5] This number includes unemployment benefits from all entitlement programs: regular, emergency unemployment compensation (EUC) and extended benefits (EB). Currently, EUC and EB are not triggered on; so by default, the 40,000 people receiving unemployment benefits in September 2018 includes regular benefits only.

[6] All benefit programs include regular, emergency unemployment compensation (EUC) and extended benefits (EB).

Duration of unemployment benefits

Typically, workers covered by unemployment insurance can receive up to 26 weeks of regular unemployment benefits in a 52-week benefit year. The 52-week benefit year begins when an individual applies for unemployment benefits.

More weeks of unemployment benefits available after the recession

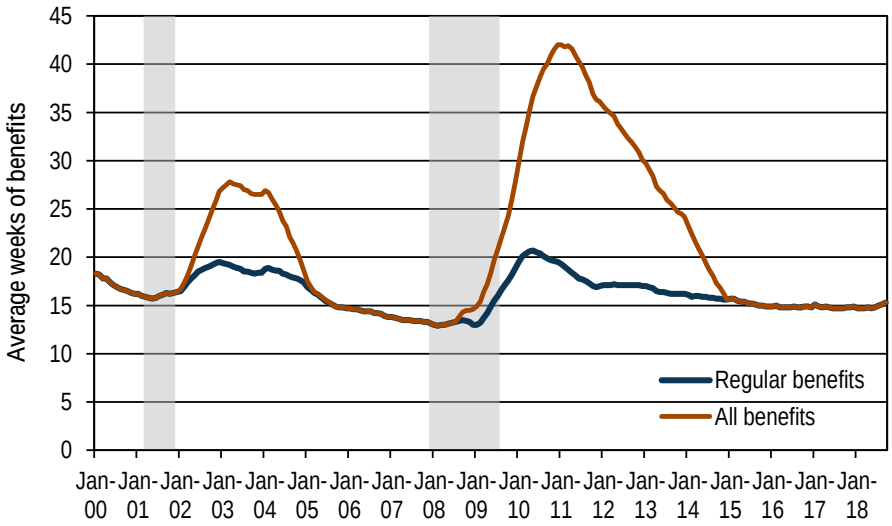
Because of the unusually steep loss of jobs during the Great Recession, additional weeks of federally funded unemployment benefits were made available to unemployed workers after they used all of their regular unemployment benefits. At one point, claimants could receive up to a total of 99 weeks of benefits – 26 weeks of regular benefits, 53 weeks of emergency unemployment compensation (EUC) benefits and 20 weeks of extended benefits (EB). Federal extensions have been phased out during the recovery. Since 2013, claimants could receive up to 26 weeks of state benefits.

The impact of these additional weeks of benefits is evident in the average duration (number of weeks) of benefits received. *Figure 4-2* compares the average duration of benefits in Washington state for those who were receiving only regular benefits (up to 26 weeks) to the duration of *all benefits*, including the EUC and EB.

The annual average duration for regular benefits and all benefits peaked in 2010 at 20.7 weeks and 42 weeks, respectively. In 2011, average duration of regular benefits declined to 17.9 weeks and 39.5 weeks for all benefits. The average duration of both regular benefits and all benefits, in 2017, was 14.8. From January 2018 through September 2018, the average duration for both regular benefits and all benefits increased to 15.3 weeks.[7]

[7] Federal extensions have been phased out during the recovery. Since 2013, claimants could receive up to 26 weeks of state benefits.

Figure 4-2. Average duration of regular unemployment benefits compared to all benefits
Washington state, January 2000 through September 2018
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse



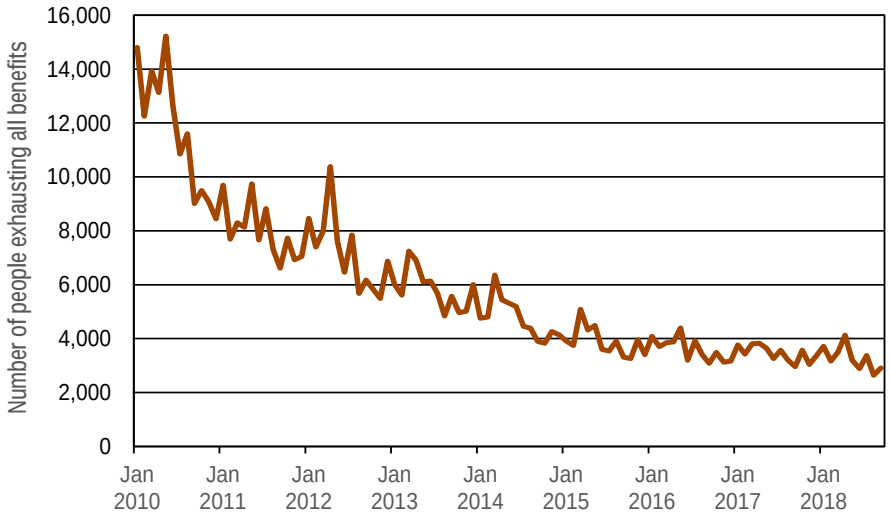
Shaded areas are U.S. recession periods.

The number of weeks claimants received benefits has decreased from the post-recession peak.

Benefit exhaustions continue to decline

Unemployed individuals exhaust their benefits when they have received all regular, EUC and EB available to them. *Figure 4-3* shows the monthly exhaustions for Washington unemployment benefits. The level of exhaustions have continued to decline since May 2010 when 15,227 individuals exhausted their benefits. By September 2018, 2,914 people had used all of their available unemployment benefits.

Figure 4-3. Number of people exhausting all unemployment benefits
Washington state, January 2010 through September 2018
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse



In September 2018, 2,914 people exhausted all of their unemployment benefits.

Benefit exhaustions by industry, occupation and area

Higher levels of benefit exhaustions are generally associated with long-term unemployment. The following figures detail patterns of benefit exhaustions by industry, occupation and location.

Exhaustions by industry

Figure 4-4 presents exhaustions by industry for the 12 months ending in September 2018. To provide further context, the figure also includes each industry's percent of total nonfarm employment[8] and exhaustion-to-employment ratio. The exhaustion-to-employment ratio can be used to identify industries characterized by long-term unemployment and that continue to struggle in their recovery from the last recession. The larger the exhaustion-to-employment ratio, the more likely workers were to exhaust.

From October 2017 through September 2018, workers in the mining industry were most likely to exhaust unemployment benefits with an exhaustion-to-employment ratio of 3.1. Construction and administrative and support and waste management and remediation services followed as second and third most likely to exhaust (2.0 and 1.6, respectively).

[8] Nonfarm employment does not include farmworkers, private households or non-profit organization employees. Exhaustion totals were not comparable to nonfarm employment totals.

The manufacturing and construction industries accounted for the greatest portion of exhaustions, equally, at 11.5 percent. The manufacturing and construction industry's share of total covered employment was 8.5 percent and 5.7 percent, respectively; the exhaustion-to-employment ratio was 1.4 and 2.0, respectively. Healthcare and social assistance represented 8.5 percent of exhaustions.

Figure 4-4. Unemployment benefit exhaustions by industry, all benefits
Washington state, October 2017 through September 2018
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse; U.S. Bureau of Labor Statistics, Current Employment Statistics

NAICS	Industry sector	Annual exhaustions, **all benefits**	Percent of all exhaustions	Industry share of nonfarm employment	Exhaustions-to-employment ratio
31 - 33	Manufacturing	4,663	11.5%	8.5%	1.4
23	Construction	4,663	11.5%	5.7%	2.0
56	Admin. and support and waste mgmt. and remediation svcs.	3,270	8.1%	5.0%	1.6
62	Healthcare and social assistance	3,461	8.5%	12.4%	0.7
54	Professional, scientific and technical services	3,411	8.4%	5.9%	1.4
44 - 45	Trade	3,281	8.1%	11.5%	0.7
42	Wholesale trade	2,006	4.9%	4.0%	1.2
11	Agriculture, forestry, fishing and hunting	1,878	4.6%	3.2%	1.4
72	Accommodation and food services	1,656	4.1%	8.3%	0.5
51	Information	1,575	3.9%	3.8%	1.0
48 - 49	Transportation and warehousing	1,225	3.0%	2.9%	1.0
52	Finance and insurance	1,237	3.0%	2.9%	1.1
81	Other Services	1,048	2.6%	3.0%	0.9
GOV	Government	963	2.4%	16.9%	0.1
61	Educational services	809	2.0%	1.3%	1.5
53	Real estate, rental and leasing	709	1.7%	1.5%	1.2
71	Arts, entertainment and recreation	535	1.3%	1.6%	0.8
55	Management of companies and enterprises	125	0.3%	1.3%	0.2
21	Mining	124	0.3%	0.1%	3.1
22	Utilities	94	0.2%	0.2%	1.2
	Unknown*	3,842	9.5%	N/A	N/A
	Total	40,575	100.0%	100.0%	N/A

N/A = Nonfarm employment does not include farmworkers, private households or non-profit organization employees. Exhaustion totals were not comparable to nonfarm employment totals.

*The majority of workers in "unknown" industries were a product of out-of-state employers. Washington State Employment Security Department is unable to identify industries where the primary employer is out of state.

Mining and construction industry workers were most likely to exhaust unemployment benefits from October 2017 through September 2018 (3.1 and 2.0 exhaustion-to-employment ratios, respectively).

Exhaustions by occupation

Figure 4-5 examines unemployment benefit exhaustions by occupational group. Management, construction and extraction, and office and administrative support occupations combined accounted for 40.0 percent of all exhaustions. Since total covered employment is reported only by industry and not by occupation, each occupation's percent of total covered employment and exhaustion-to-employment ratio were not available to be included in *Figure 4-5*.

Figure 4-5. Unemployment benefit exhaustions by major occupational groups, all benefits
Washington state, October 2017 through September 2018
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

SOC	Major occupational group	Annual exhaustions, all benefits	Percent of all exhaustions
11	Management	6,780	16.7%
47	Construction and extraction	4,849	12.0%
43	Office and administrative support	4,592	11.3%
51	Production	3,002	7.4%
41	Sales and related	2,590	6.4%
15	Computer and mathematical	2,205	5.4%
53	Transportation and material moving	2,159	5.3%
13	Business and financial operations	2,063	5.1%
45	Farming, fishing and forestry	1,727	4.3%
49	Installation, maintenance and repair	1,481	3.7%
35	Food preparation and serving related	1,319	3.3%
17	Architecture and engineering	1,207	3.0%
37	Building and grounds cleaning and maintenance	908	2.2%
31	Healthcare support	831	2.0%
27	Arts, design, entertainment, sports and media	830	2.0%
29	Healthcare practitioners and technical	699	1.7%
39	Personal care and service	696	1.7%
19	Life, physical and social science	489	1.2%
21	Community and social services	466	1.1%
33	Protective service	535	1.3%
25	Education, training and library	391	1.0%
	Unknown	311	0.8%
23	Legal	230	0.6%
55	Military specific	215	0.5%
	Total	40,575	100.0%

Unemployed workers in management, construction and extraction, and office and administrative support occupations accounted for 40.0 percent of all individuals to exhaust unemployment benefits from October 2017 through September 2018.

Exhaustions by workforce development area

Figure 4-6 presents exhaustions by workforce development area (WDA) for October 2017 through September 2018. To provide further context, the figure also includes each industry's percent of total nonfarm employment[9] and exhaustion-to-employment ratio. The exhaustion-to-employment ratio can be used to identify areas characterized by long-term unemployment and that continue to struggle in their recovery after the last recession. The larger the exhaustion-to-employment ratio, the more likely workers were to exhaust.

From October 2017 through September 2018, workers in the South Central Washington WDA were most likely to exhaust unemployment benefits with an exhaustion-to-employment ratio of 1.6. Pierce County was next most likely to exhaust (1.5).

Seattle-King County and Pierce County accounted for more than one-third of exhaustions at 24.8 and 11.3 percent, respectively. Seattle-King County's and Pierce County's share of total covered employment was 41.2 percent and 9.2 percent, respectively; the exhaustion-to-employment ratio was 0.7 and 1.5, respectively.

Seattle-King County accounted for the largest share of exhaustions and employment but was least likely to exhaust based on the exhaustion-to-employment ratio (0.7).

[9] Nonfarm employment does not include farmworkers, private households or non-profit organization employees. Exhaustion totals were not comparable to nonfarm employment totals.

Figure 4-6. Unemployment benefit exhaustions by workforce development area, all benefits
Washington state, October 2017 through September 2018
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse ; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Workforce development area	Annual exhaustions, **all benefits**	Percent of exhaustions	2017 industry share of nonfarm employment	Exhaustions to employment ratio
Seattle-King County	10,063	24.8%	41.2%	0.7
Out of state	4,654	11.5%	N/A	N/A
Pierce County	4,591	11.3%	9.2%	1.5
Snohomish County	3,919	9.7%	8.6%	1.4
Pacific Mountain	2,607	6.4%	5.5%	1.4
Spokane County	2,514	6.2%	6.6%	1.2
South Central Washington	2,214	5.5%	4.2%	1.6
Southwest Washington	2,267	5.6%	5.9%	1.2
Northwest Washington	1,890	4.7%	4.9%	1.2
North Central Washington	1,722	4.2%	3.7%	1.4
Benton-Franklin	1,686	4.2%	3.7%	1.4
Olympic Consortium	1,538	3.8%	3.6%	1.3
Eastern Washington	910	2.2%	2.2%	1.3
Total	40,575	100.0%	100.0%	

Seattle-King County accounted for the largest share of exhaustions and employment but was least likely to exhaust based on the exhaustion-to-employment ratio (0.7).

Unemployment rate

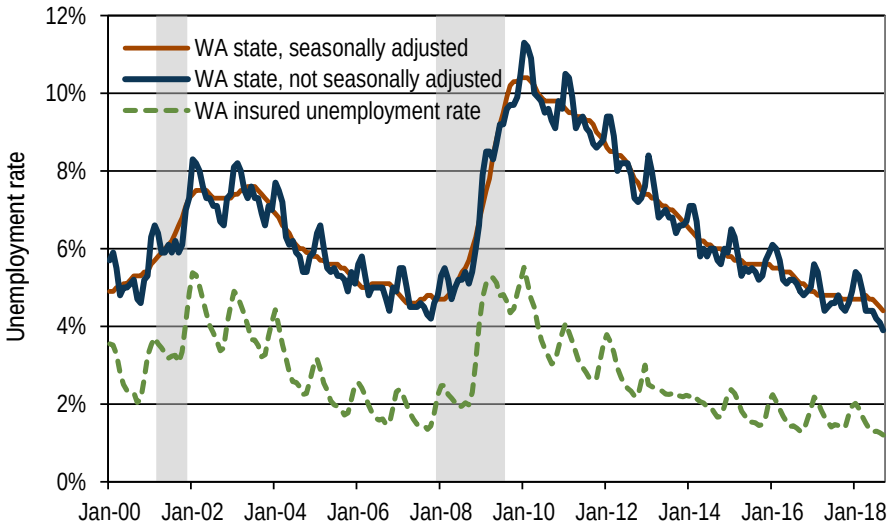
The overall unemployment rate is a ratio of the estimated number of unemployed individuals looking for work divided by the civilian labor force. The labor force is made up of individuals who are employed or who are actively seeking work. This is the most familiar unemployment rate and includes both workers covered by unemployment insurance and those who are not.[10]

Particularly in the context of a discussion about unemployment benefits, the insured unemployment rate can be useful. The insured unemployment rate is a ratio of the number of insured unemployed (those drawing unemployment benefits) divided by the total number of individuals (working and not working) covered by unemployment insurance.

[10] Workers covered by unemployment insurance are unemployed through no fault of their own, as determined by state law. In order to qualify for this benefit program, they must have worked at least 680 hours in covered employment during the past 12 to 18 months. At least some of these hours must have been earned in Washington state. They must also be able to work and be available for work each week that they are collecting benefits.

Figure 4-7 compares the overall and insured unemployment rates for Washington. The rates have basically moved in tandem, with the insured rate historically about half the overall unemployment rate. In late 2008, both measures of unemployment began a dramatic rise, with rates peaking during the first quarter 2010. However, since early 2009, the gap between the overall and insured unemployment rates widened. One of the main causes of the widening gap in Washington state was the depth of the recession. The length and depth of the great recession left many workers unable to find work before their UI benefits ran out. This means there were increasing numbers of unemployed workers not eligible for unemployment benefits.

Figure 4-7. Overall unemployment rate, seasonally and not seasonally adjusted and insured unemployment rate
Washington state, January 2000 through September 2018
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics



Shaded areas are U.S. recession periods.

The gap between unemployed workers who are eligible for unemployment benefits and those who are not widened following recent recessions.

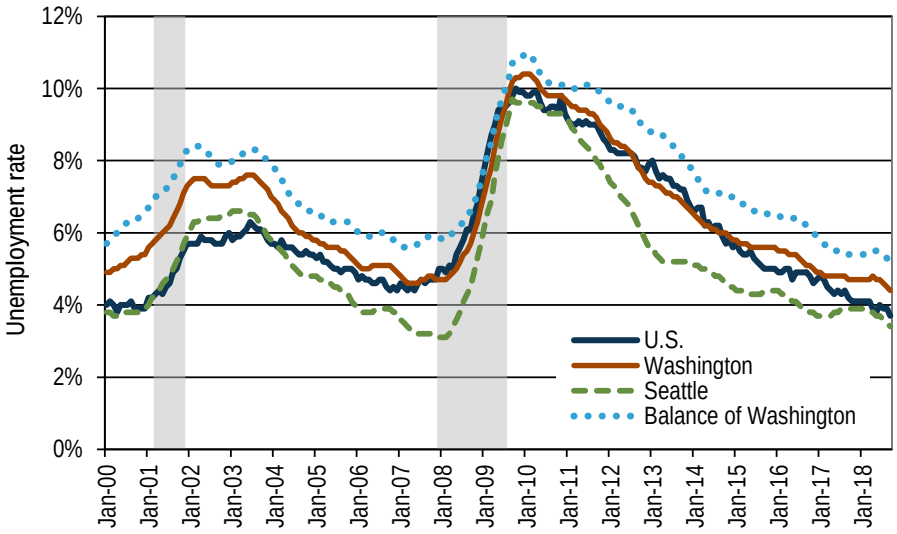
The overall unemployment rate

The overall unemployment rate is widely used in economic analysis as a lagging indicator of the direction of the economy. As noted previously, the unemployment rate is a ratio of the estimated number of unemployed who are seeking work, divided by the labor force. The labor force is limited to individuals who are employed or seeking work.

As shown in *Figure 4-8*, the state unemployment rate peaked in the first quarter 2010. During most of 2010, 2011 and 2012, the unemployment rate for Washington state remained higher than the national rate. Starting in July 2012, the state unemployment rate fell below the national rate and remained below the national rate through August 2014 before rising above the nation in September 2014 at 6.0 percent. For 2017 and 2018, to date, the state remained above the national rate. By September 2018, the state and national rates were at 4.4 and 3.7 percent, respectively.

The Seattle-Bellevue-Everett Metropolitan Division (MD) has reported a lower unemployment rate than the rest of Washington and the nation since 2004. From July 2012 through September 2018, the unemployment rate for the Seattle MD declined by 3.2 percentage points. For comparison, the balance of the state declined by 4.2 percentage points over the same period. The national rate dropped by 4.5 percentage points.

Figure 4-8. Historical U-3 unemployment rates, seasonally adjusted
United States and Washington state, January 2000 through September 2018
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics; National Bureau of Economic Research



Shaded areas are U.S. recession periods.

National and state unemployment rates tracked closely during the recent recession. From July 2012 through September 2018, the Washington state unemployment rate declined more rapidly than the Seattle rate.

Other measures of unemployment

Other measures of unemployment include alternative unemployment rates and the labor force participation rate.

Alternative unemployment rates

The U.S. Bureau of Labor Statistics (BLS) reports six alternative measures of labor underutilization, or unemployment. The commonly used definition of the unemployment rate, shown in *Figure 4-8*, is a ratio of the estimated number of unemployed who are seeking work, divided by the labor force. This is equivalent to what the BLS calls "U-3."

The standard measurement of unemployment (U-3) excludes individuals who are not working and would like to work, but have given up looking for work. The Bureau of Labor Statistics has made available alternative measurements that are progressively more inclusive than the commonly reported unemployment rate. The standard measurement (U-3), along with two of the six alternative measurements, are defined as:

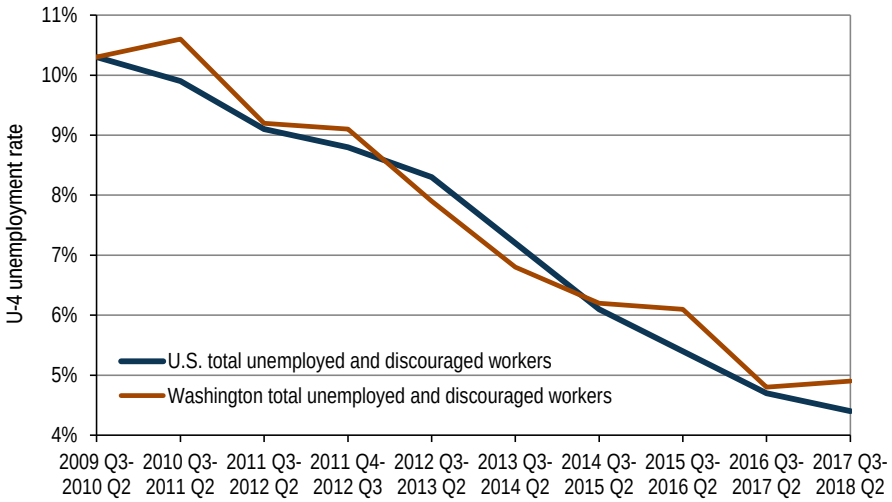
- U-3 – Unemployed as a percent of the labor force.
- U-4 – Unemployed plus discouraged workers,[11] as a percent of the labor force plus discouraged workers.
- U-6 – Unemployed plus all marginally[12] attached workers and employees working part time for economic reasons, all as a percent of the labor force plus all marginally attached workers.

The U-4 measure for Washington state and the U.S. is shown in *Figure 4-9*. The moving average for third quarter 2009 through second quarter 2010 had Washington state and the nation both at 10.3 percent. From fourth quarter 2011 through third quarter 2012, the Washington state rate decreased to 9.1 percent while the nation's rate decreased to 8.8 percent. The Washington U-4 rate is now 4.9 percent and the U.S. rate is 4.4 percent for the period third quarter 2017 through second quarter 2018. Still, the U-4 measure in Washington state and for the country as a whole have followed a relatively similar trend.

[11] Discouraged workers, as defined by the Bureau of Labor Statistics (BLS), are defined as "persons not in the labor force who want and are available for a job and who have looked for work sometime in the past 12 months (or since the end of their last job if they held one within the past 12 months), but who are not currently looking because they believe there are no jobs available or there are none for which they would qualify."

[12] As defined by BLS, marginally attached workers are "persons not in the labor force who want and are available for work, and who have looked for a job sometime in the prior 12 months (or since the end of their last job if they held one within the past 12 months), but were not counted as unemployed because they had not searched for work in the 4 weeks preceding the survey. Discouraged workers are a subset of the marginally attached."

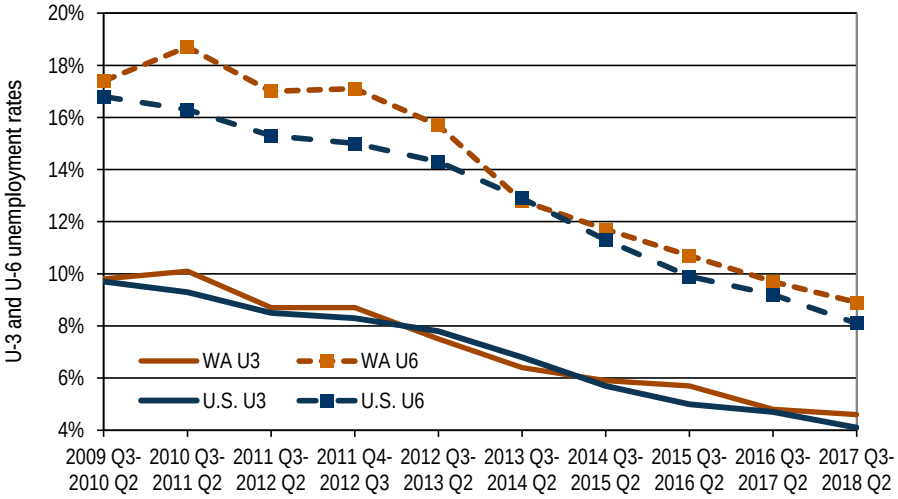
Figure 4-9. U-4 unemployment rate (includes discouraged workers), four-quarter moving average
United States and Washington state, third quarter 2009 through second quarter 2018
Source: U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics



The U-4 measure of unemployment has been declining throughout the recovery. As of June 2018, Washington state's U-4 is currently 4.9 percent and the U.S. is at 4.4 percent.

U-6 is the broadest measure of unemployment. The gap between the U-6 and U-3 rates has narrowed to its lowest level post-recession. This demonstrates the decrease in the ranks of discouraged workers, marginally attached workers and those working part time involuntarily, even more dramatically than the number of unemployed (*Figure 4-10*). This holds true for the state of Washington, where the majority of underutilized workers are in the employed part time for economic reasons category. Washington's U-6 four-quarter moving average remained higher than the nation's from second quarter 2009 until fourth quarter 2013. Most recently, Washington remains 0.80 percentage points above the national rolling average from third quarter 2017 through second quarter 2018.

Figure 4-10. U-3 (standard) and U-6 (includes marginally attached workers and those working part time involuntarily) unemployment rates, four-quarter moving average
United States and Washington state, third quarter 2009 through second quarter 2018
Source: U.S. Bureau of Labor Statistics, Current Population Survey, Local Area Unemployment Statistics



The most broadly defined U-6 measure of unemployment for Washington remains above the national rolling average.

Chapter 5: Employment projections

About the employment, industry and occupational projections

Employment projections provide a general outlook for industry and occupational employment in Washington state. They provide job seekers, policy makers and training providers an idea of how much an industry or occupation is projected to change over time and show the future demand for workers.

On an annual basis, the Employment Security Department (ESD) produces industry employment projections for two, five and 10 years from a base period. For this annual projections report, the base period for the two-year (short-term) projections is second quarter 2017. The base period for the five-year (medium-term) and 10-year (long-term) projections is 2016.

Staffing patterns that show proportional compositions of occupations within each industry are used to convert industry projections into occupational projections.

Industry classifications are based on the North American Industry Classification System (NAICS). However, they have been modified to match the industry definitions used by the U.S. Bureau of Labor Statistics' (BLS) Occupational Employment Statistics (OES) program. These modified industry definitions are called Industry Control Totals (ICTs). The Standard Occupational Classification (SOC) system is used to group occupations. *Appendix 6* contains frequently asked questions relating to projections. *Appendix 7* provides a glossary of terms.

Data sets used to develop projections

The following data sets are used to produce projections:

1. Historical employment time series, consisting of U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) data.
2. Employment employment time series, consisting of U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) data.
3. Occupational employment by industries (staffing patterns) based on an OES survey.
4. National data for self-employed ratios, change factors, etc.
5. Independent variables (predictive indicators), which help to project the future direction of the economy, from IHS Global Insight's national forecast.

Use of employment projections

Employment projections are intended for career development over time, not as the basis for budget or revenue projections, or for immediate corrective actions within the labor market.

Employment projections are the basis of the Occupations in Demand (OID) list covering Washington's 12 WDAs and the state as a whole. This list is used to determine eligibility for a variety of training and support programs, but was created to support the unemployment insurance Training Benefits Program. *Appendix 4* contains a technical description of the OID list.

The full OID list is accessible through the "Learn about an occupation" tool located at: **https://esd.wa.gov/labormarketinfo/learn-about-an-occupation#/search**.

This chapter highlights findings on specific aspects of Washington's employment outlook. In the first section, industry projections results, we describe changes in employment by industry from 2016 to 2026. In the next section, occupational projections results, we look at:

- Major occupational groups
- Specific occupations

Detailed information on the projected demand for industry and occupational employment is available in the Employment Projections data files at: **https://esd.wa.gov/labormarketinfo/projections**.

In addition, detailed skills projections information is available in *Appendix 5* of this report.

The formal description of industry and occupational projection processes is presented in the ***2018 Employment Projections Technical Report***. The technical report can be found at the data files link above.

Key findings

The 10-year average annual growth rate for total nonfarm employment for the 2016 to 2026 period is projected to be 1.59 percent. This is an increase from the 1.55 percent average annual growth rate predicted last year for 2015 to 2025.[13]

[13] See: "*2017 Employment Projections*," Washington State Employment Security Department, Workforce Information and Technology Services, *Figure 2*, page 6. Also, please note that all tables contain values that are calculated and then rounded. As a result, details might not always add up to totals.

Industry projections

- The largest increase by share of employment is projected for the professional and business services sector.
- The largest decreases by shares of employment are projected for the manufacturing sector.

Occupational projections

Major occupational groups

- The largest increases by shares of employment are projected for the computer and mathematical occupations.
- The largest decreases by shares of employment are projected for the production and office and administrative support occupations.
- The largest employment shares in 2026, from largest to smallest, are projected for the office and administrative support occupations, sales and related occupations and food preparation and serving-related occupations. As was the case in last year's projections report, the first two occupational groups are projected to have declining employment shares.

Two approaches to occupational job openings

A *separations* approach was calculated using BLS national rates. An *alternative* approach was calculated using job opening rates specific to Washington state. These rates are based on state wage records. The *separations* method does not track job openings created by turnover when workers stay within an occupation, but change employers, while the *alternative* method does track these openings.

This year, two sets of projections results were created; a *separations* set and a *Washington state specific alternative* set. These two occupational estimations were necessary due to a delay in implementing Occupational Employment Statistics (OES) aggregations at the national level. For more details, see the *separations and alternative job openings* section. The *separations* and *alternative* data are available in the Occupational Projections data files at: **https://esd.wa.gov/labormarketinfo/projections**.

Information about the *separations* methodology is available at: **Occupational separations: a new method for projecting workforce needs** and information about the *alternative* methodology is available on our projections landing page at: **https://esd.wa.gov/labormarketinfo/projections**.

- For both methods, the combined food preparation and serving workers, including fast food occupations, are projected to have the largest number of average annual total openings.
- In only one *separations* result, chiropractors, growth openings exceeded turnover openings. For all other *separations* results and for all *alternative* occupations, turnover openings exceeded growth openings.
- Totals of job openings caused by *alternative* turnover are about 21 times greater than openings due to growth, while totals of job openings caused by *separations* turnover are about seven times greater than openings due to growth.

2018 industry projections results

Figure 5-1 presents 2016 estimated employment, 2016 and 2026 employment shares, and changes in employment shares from 2016 to 2026 by industry sector for Washington state and the nation.

The changes in employment shares from 2016 to 2026 showed a high level of similarity between the state and the nation. For example, signs of the changes were consistent with each other for all the industry sectors except mining, transportation and warehousing and information sectors.

The three state sectors with the largest increases in shares are for professional and business services, information, and leisure and hospitality. The three national sectors with the largest increases in shares are for health services and social assistance, professional and business services and construction.

The two sectors with the largest decreases in shares for the state and the nation are close as well. The two state sectors are manufacturing and financial activities, while for the nation, they are manufacturing and retail trade.

Figure 5-1. Base and projected nonfarm industry employment
United States and Washington state, 2016 and 2026
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Industry sector[1]	WA state est. empl. 2016	WA state est. empl. shares 2016	WA state proj. empl. shares 2026	WA state percentage point change in empl. shares 2016-2026	National estimated empl. shares 2016	National projected empl. shares 2026	National percentage point change in empl. shares 2016-2026
Mining[2]	2,500	0.08%	0.07%	-0.01%	0.43%	0.46%	0.03%
Construction	186,600	5.76%	5.87%	0.11%	4.63%	4.86%	0.24%
Manufacturing	289,500	8.94%	7.66%	-1.28%	8.52%	7.46%	-1.06%
Wholesale trade	133,000	4.11%	3.76%	-0.35%	4.05%	3.86%	-0.19%
Retail trade	369,500	11.41%	11.24%	-0.17%	10.91%	10.42%	-0.49%
Utilities	4,700	0.15%	0.13%	-0.01%	0.38%	0.36%	-0.02%
Transportation and warehousing	99,600	3.08%	2.89%	-0.19%	3.44%	3.44%	0.00%
Information	120,600	3.72%	4.51%	0.79%	1.91%	1.81%	-0.10%
Financial activities	150,500	4.65%	4.29%	-0.36%	5.71%	5.63%	-0.09%
Professional and business services	403,000	12.45%	13.45%	1.00%	13.89%	14.32%	0.43%
Education services	57,400	1.77%	1.88%	0.11%	2.46%	2.61%	0.16%
Health services and social assistance	405,000	12.51%	12.90%	0.39%	13.14%	14.80%	1.66%
Leisure and hospitality	323,300	9.98%	10.52%	0.54%	10.77%	10.88%	0.10%
Other services	117,800	3.64%	3.56%	-0.08%	4.42%	4.34%	-0.08%
Federal government	74,500	2.30%	2.02%	-0.28%	1.93%	1.76%	-0.17%
State and local government (incl. educ.)	500,500	15.46%	15.25%	-0.20%	13.40%	12.98%	-0.42%

[1] The sectors presented in the table are based on CES definitions.
[2] For the state, logging is not included in natural resources and mining, so that natural resources and mining match national data.

The largest growth sectors for the state are projected for professional and business services, information and leisure and hospitality.

Historical and projected growth rates

Figure 5-2 shows the historical and projected growth rates for the state and Washington's 12 WDAs. Figure data are sorted on the projected growth rate 2016-2026 column.

Ten of the 12 WDAs have projected growth rates greater than the previous 10 years' growth, and two have projected growth less than the previous 10 years' growth. The statewide projected growth rate is 0.30 percentage points greater than the historical growth rate.

The ten WDAs with projected growth greater than the past are: Olympic, Spokane, Pacific Mountain, Northwest, Seattle-King County, South Central, Southwest, Eastern, Tacoma-Pierce and North Central.

The largest positive difference between historical growth rates and projected growth rates is in the Olympic WDA. For this area, the difference between the historical and projected rates is 1.09 percentage points. In last year's projections report, this same WDA had the largest positive difference with a value of 0.49 percentage points. The main reason for the difference is the lowest historical rate in Olympic WDA for the period 2006 to 2016 of just 0.16 percent. Projected growth rate is more in line with rates in other areas (see *Figure 5-2*).

The two WDAs with projected growth less than the past 10 years are: Benton-Franklin and Snohomish. Even though Benton-Franklin has the largest negative difference between projected and historical rates, of all WDAs and the state, it has the fifth highest projected growth rate of 1.37 percent.

The last column in *Figure 5-2* represents the long-term growth rate on the historical linear trend line on all available history. This is the same growth concept used in our 2018 employment projections technical paper used for analyzing growth after a major breakpoint. The full technical paper is available at: **https://esd.wa.gov/labormarketinfo/2018 employment projections technical paper**.

Variances between long-term trend line rates and projected growth rates show the effects of the most recent changes in local employment trends. These variances may reflect differences in cyclical behavior.

Figure 5-2. Historical and projected total nonfarm employment growth
Washington state and workforce development areas, 1990 to 2016 and 2016 to 2026
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Workforce development area[1]	Historical growth[2] rate 2006-2016	Projected growth rate 2016-2026	Historical trend line growth rate[3] 1990-2016
Seattle-King County	1.45%	1.97%	1.24%
Southwest Washington	1.28%	1.71%	1.74%
Washington state	1.29%	1.59%	1.42%
Tacoma-Pierce	1.23%	1.44%	1.68%
Benton-Franklin	2.49%	1.37%	2.20%
Northwest Washington	0.69%	1.27%	1.72%
North Central Washington	1.23%	1.26%	1.33%
Spokane	0.62%	1.26%	1.23%
Olympic Consortium	0.16%	1.25%	1.09%
South Central Washington	0.73%	1.23%	0.83%
Pacific Mountain	0.65%	1.22%	1.26%
Eastern Washington	0.82%	1.13%	0.96%
Snohomish	2.05%	1.09%	2.09%

[1]Workforce development areas are regions within Washington state with economic and geographic similarities.
[2]Historical growth is based only on covered employment.
[3]Historical trend growth is defined as the growth rate of the linear trend line.

Two of the 12 WDAs have projected growth less than the previous 10 years' growth.

2018 occupation projections results

The detailed state level alternative occupational projections cover 799 occupations, 785 of which are publishable. Fourteen occupations were suppressed due to confidentiality or one of the employment estimations is less than 10. This publication, however, provides only a summary of the top occupations. For a complete list of occupations and projected employment, see the 2018 Employment Projections data files available at: **https://esd.wa.gov/labormarketinfo/projections**.

Major occupational groups

Figure 5-3 shows occupational employment estimates and employment shares for Washington state and the nation.

At the state level, as was the case in last year's report, one occupational group stands out with increases in employment shares from 2016 to 2026. Computer and mathematical occupations are projected to increase employment shares by 1.11 percentage points. The next highest increase in shares is projected for food preparation and serving related occupations, with an increase of 0.41 percentage points.

The three largest decreases in employment shares at the state level are: production occupations, 0.58 percentage points, office and administrative support occupations, 0.57 percentage points and sales and related occupations, 0.54 percentage points.

At the national level, three occupations were close in having the largest increases in employment shares: personal care and service, 0.45 percentage points; healthcare support, 0.42 percentage points; and healthcare practitioners and technical, 0.41 percentage points.

The nation's three largest decreases are the same as the state's but in different order: office and administrative support, 0.93 percentage points; production, 0.65 percentage points; and sales and related, 0.42 percentage points.

By 2026, the top three state occupational groups for shares of employment are projected to be:

1. Office and administrative support occupations (11.62 percent)
2. Sales and related occupations (8.90 percent)
3. Food preparation and serving related occupations (8.39 percent)

By 2026, combined, these three major groups are projected to represent nearly 29.0 percent of total employment shares for the state.

Figure 5-3. Base and projected occupational employment
United States and Washington state, 2016 to 2026
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Occupational Employment Statistics

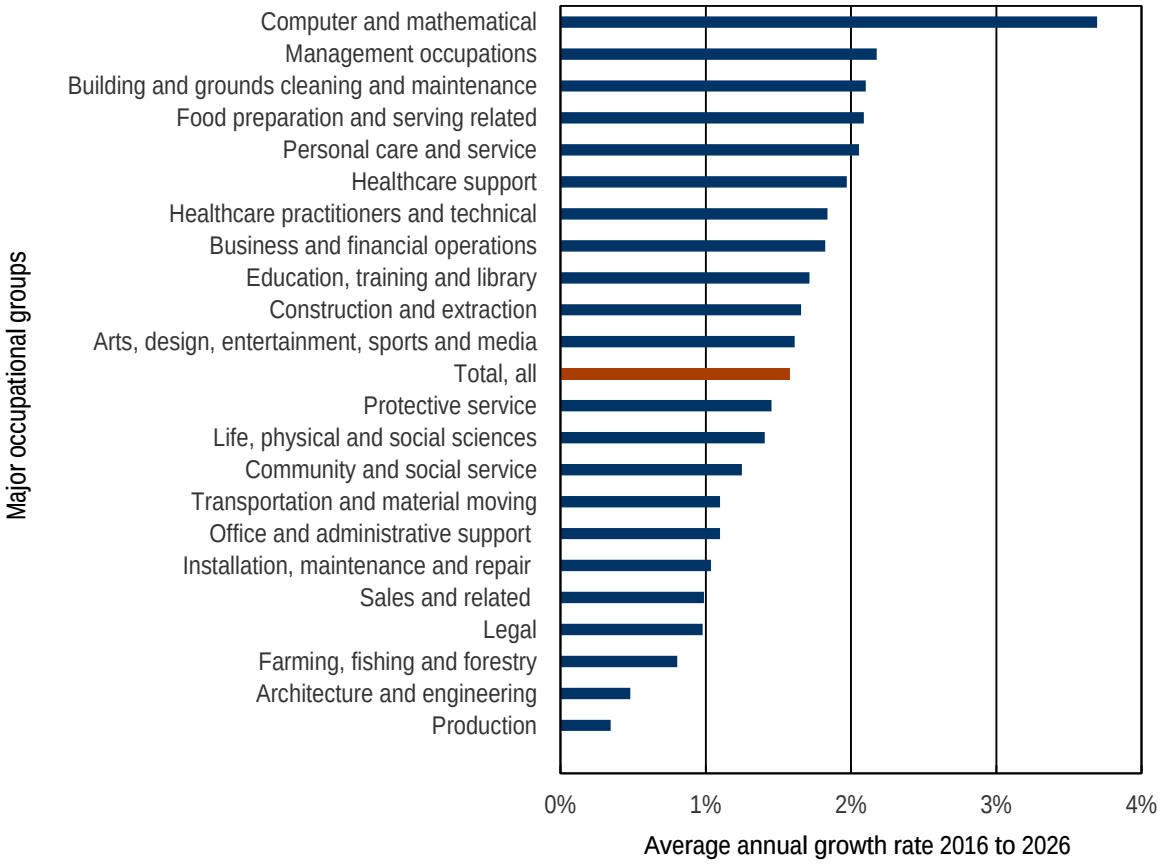
2-digit SOC	Major occupational group	WA state est. empl. 2016	WA state est. empl. shares 2016	WA state est. empl. shares 2026	Nat'l est. empl. shares 2016	Nat'l est. empl. shares 2026	WA state percentage point change in empl. shares 2016-2026	Nat'l percentage point change in empl. shares 2016-2026
11-0000	Management	216,952	5.89%	6.24%	6.11%	6.17%	0.35%	0.06%
13-0000	Business and financial operations	228,590	6.20%	6.35%	5.17%	5.28%	0.15%	0.11%
15-0000	Computer and mathematical	179,134	4.86%	5.97%	2.83%	3.00%	1.11%	0.17%
17-0000	Architecture and engineering	82,456	2.24%	2.01%	1.67%	1.67%	-0.23%	0.00%
19-0000	Life, physical and social sciences	40,046	1.09%	1.07%	0.83%	0.85%	-0.02%	0.02%
21-0000	Community and social services	54,897	1.49%	1.44%	1.65%	1.76%	-0.05%	0.11%
23-0000	Legal	26,967	0.73%	0.69%	0.82%	0.84%	-0.04%	0.01%
25-0000	Education, training and library	216,216	5.87%	5.95%	6.04%	6.16%	0.08%	0.12%
27-0000	Arts, design, entertain., sports and media	67,039	1.82%	1.82%	1.78%	1.75%	0.01%	-0.02%
29-0000	Healthcare practitioners and technical	172,002	4.67%	4.79%	5.61%	6.02%	0.12%	0.41%
31-0000	Healthcare support	90,830	2.47%	2.56%	2.77%	3.18%	0.10%	0.42%
33-0000	Protective service	66,730	1.81%	1.79%	2.25%	2.19%	-0.02%	-0.06%
35-0000	Food preparation and serving related	294,101	7.98%	8.39%	8.46%	8.62%	0.41%	0.15%
37-0000	Building and grounds cleaning and maint.	119,404	3.24%	3.41%	3.62%	3.69%	0.17%	0.06%
39-0000	Personal care and service	159,784	4.34%	4.54%	4.11%	4.56%	0.21%	0.45%
41-0000	Sales and related	347,627	9.44%	8.90%	10.09%	9.67%	-0.54%	-0.42%
43-0000	Office and administrative support	449,204	12.19%	11.62%	14.79%	13.86%	-0.57%	-0.93%
45-0000	Farming, fishing and forestry	97,016	2.63%	2.44%	0.68%	0.63%	-0.19%	-0.05%
47-0000	Construction and extraction	217,574	5.91%	5.95%	4.37%	4.51%	0.04%	0.15%
49-0000	Installation, maintenance and repair	137,850	3.74%	3.55%	3.78%	3.76%	-0.20%	-0.03%
51-0000	Production	185,717	5.04%	4.46%	6.00%	5.34%	-0.58%	-0.65%
53-0000	Transportation and material moving	234,184	6.36%	6.06%	6.58%	6.51%	-0.30%	-0.07%

At the state level, computer and mathematical occupations stand out for their increase in employment shares.

The projected average annual growth rates for the major occupational groups in Washington state are presented in *Figure 5-4*. Computer and mathematical occupations (3.69 percent), management occupations (2.18 percent) and building and grounds cleaning and maintenance occupations (2.10 percent) are projected to grow faster than other occupational groups from 2016 to 2026.

In the long term, five occupational groups are projected to fall below a 1.00 percent average annual growth rate: production (0.34 percent), architecture and engineering (0.48 percent), farming, fishing and forestry (0.80 percent), legal (0.98 percent) and sales and related (0.99 percent).

Figure 5-4. Projected average annual growth rates for major occupational groups
Washington state, 2016 to 2026
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Occupational Employment Statistics



Computer and mathematical, management, and building and grounds cleaning and maintenance occupations are projected to experience the largest growth rates through 2026 (3.69, 2.18 and 2.10 percent, respectively).

Separations and alternative job openings

The Bureau of Labor Statistics (BLS) separations method measures job openings created by workers who leave occupations and need to be replaced by new entrants. In this method, workers who exit the labor force or transfer to an occupation with a different Standard Occupational Classification (SOC) are identified as generating separation openings at the national level. This method does not track turnover within occupations. Turnovers within occupations occur when workers stay in occupations, but change employers. This also means that jobs filled by interstate movement, when workers stay within occupations, are not identified as new jobs.

Beginning with the 2017 projections cycle, ESD created a new Washington state specific *alternative* occupational method to the BLS *separations* method. The objective was to track job openings that occur when workers transfer within occupations. For simplicity we refer to this method as the *alternative* method and to the rates as the *alternative* rates.

While the alternative method can be used for any states that have useable wage files, the *alternative* results are based on Washington state wage records, making them specific to Washington state.

The *alternative* rates track openings created by turnover within occupations (i.e., workers stay within occupations but transfer to different companies) and when workers leave one occupation for another or leave the workforce.

The method consists of three major steps:

1. Estimating the total number of annual industry transfers that include:
    a. Transfers between industries
    b. Transfers inside industries
    c. New individuals in Washington state wage records (wage file)
    d. Exits or individuals who are no longer in the wage file
2. Converting industry transfers to occupational transfers using occupation-to-industry staffing patterns (shares of occupations for each industry).
3. Calculating alternative rates as total transfers, minus growth or decline, divided by estimated occupational employment for a base period.

Information about the *separations* methodology is available at: https://www.bls.gov/opub/mlr/2018/article/occupational-separations-a-new-method-for-projecting-workforce-needs.htm and information about the *alternative* methodology is available at: https://esd.wa.gov/labormarketinfo/projections.

Occupational classification difference for 2018 only

Occupational projections are based on staffing patterns gleaned from occupational employment statistics (OES) surveys. In May 2017, the OES program replaced 21 detailed occupations – found within the 2010 Standard Occupational Classification (SOC) – with 10 new aggregations of those occupations. In April 2018, the BLS published new OES estimations using these 10 new aggregations. OES classification changes are available at: https://www.bls.gov/oes/changes_2017.htm.

For the 2018 projections cycle we used the new OES aggregations for alternative projections in order to maintain consistency with the new OES coding system and to utilize all survey results.

Published *separations* estimations do not use these 10 new aggregations, therefore, the staffing patterns ignored the 21 detailed occupations for one survey cycle as well as the 10 new aggregations. The 21 detailed omissions had a small negative impact on OES staffing patterns due to the benchmarking of survey results to industry employment totals. However, the separations estimations are published to maintain consistency with the coding system used nationwide for the 2016-2026 long-term projections.

Since the new aggregations had only a small impact on occupational employment estimations, we can still compare them to *alternative* rates.

For a complete list of *separations* and *alternative* projected employment, see: https://esd.wa.gov/labormarketinfo/projections.

Figure 5-5 presents a comparison between *separations* and *alternative* methodologies. Average annual total openings are compared at the two-digit SOC level. *Alternative* openings are on average almost three times larger than *separations* openings. The *alternative* method increase makes sense since it measures openings not tracked by BLS. The *alternative* method measures turnover within occupations, while the BLS method does not. Also, BLS labor force exits measure national exits, but do not track exits from states.

The average ratio for *alternative* to *separations* is 2.92. A ratio above this average means that a worker is more likely to change jobs within a given occupation than to transfer to another occupation.

In *Figure 5-5*, the three largest alternative to separations ratios are for healthcare practitioners and technical (4.27), construction and extraction (3.87) and legal (3.61) occupations.

Figure 5-5. Comparison of separations and alternative methodologies on total openings
Washington state, 2016 and 2026
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

2-digit SOC	Major occupational group	Estimated employment 2016	Estimated employment 2026	Separations average annual total openings 2016-2026	Alternative average annual total openings 2016-2026	Ratio alternative to separations
11-0000	Management	216,952	269,093	23,956	80,835	3.37
13-0000	Business and Financial Operations	228,590	273,814	26,704	76,184	2.85
15-0000	Computer and Mathematical	179,134	257,479	22,008	70,038	3.18
17-0000	Architecture and Engineering	82,456	86,505	6,323	19,018	3.01
19-0000	Life, Physical, and Social Science	40,046	46,050	4,391	11,424	2.60
21-0000	Community and Social Service	54,897	62,145	6,823	16,564	2.43
23-0000	Legal	26,967	29,727	1,964	7,084	3.61
25-0000	Education, Training, and Library	216,216	256,279	24,866	55,971	2.25
27-0000	Arts, Design, Entertain., Sports, and Media	67,039	78,657	8,138	25,040	3.08
29-0000	Healthcare Practitioners and Technical	172,002	206,375	13,198	56,318	4.27
31-0000	Healthcare Support	90,830	110,399	13,225	37,242	2.82
33-0000	Protective Service	66,730	77,079	8,839	20,061	2.27
35-0000	Food Preparation and Serving Related	294,101	361,620	62,930	147,955	2.35
37-0000	Building and Grounds Cleaning and Maint.	119,404	147,019	19,403	54,905	2.83
39-0000	Personal Care and Service	159,784	195,844	28,894	72,375	2.50
41-0000	Sales and Related	347,627	383,531	52,320	128,018	2.45
43-0000	Office and Administrative Support	449,204	501,050	58,613	153,859	2.63
45-0000	Farming, Fishing, and Forestry	97,016	105,112	15,360	48,277	3.14
47-0000	Construction and Extraction	217,574	256,419	27,499	106,505	3.87
49-0000	Installation, Maintenance, and Repair	137,850	152,825	15,156	47,791	3.15
51-0000	Production	185,717	192,217	21,498	51,591	2.40
53-0000	Transportation and Material Moving	234,184	261,217	32,619	89,245	2.74
00-0000	Totals	3,684,320	4,310,456	494,722	1,376,294	2.78

On average, alternative openings are almost three times larger than separations openings.

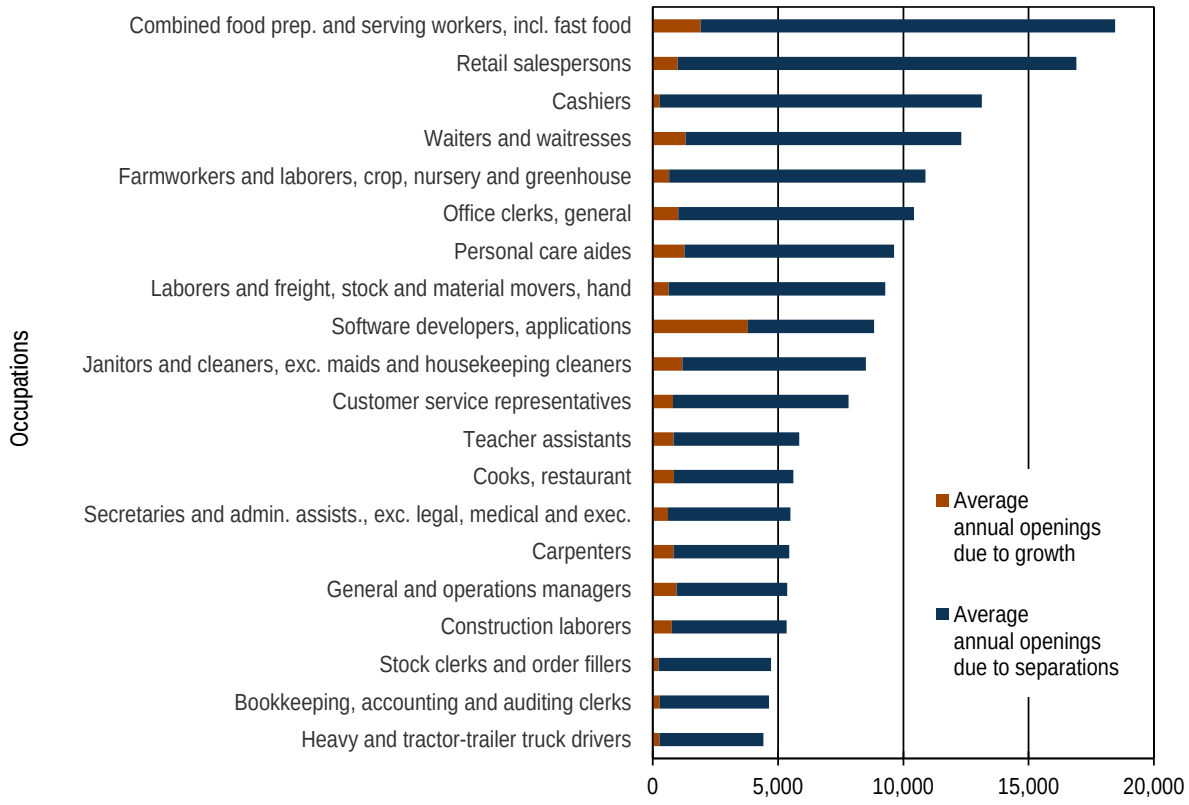
Specific occupations

Figure 5-6 shows the top 20 specific occupations by total openings based on the *separations* methodology. *Figure 5-7* shows the top 20 specific occupations by total openings based on the *alternative* methodology.

The number of openings due to job growth did not exceed openings due to *separations* or *alternative* job turnover in any of top 20 occupations.

For both methodologies, the combined food preparation and serving workers, including fast food occupation, is projected to have the largest number of total openings. Eighteen of the top 20 specific occupations are the same in both methods.

Figure 5-6. Top 20 specific occupations by average annual total openings, separations methodology
Washington state, 2016 to 2026
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Occupational Employment Statistics



In the separations methodology, the number of openings due to job growth did not exceed openings due to separations (job turnover) in any occupations.

Figure 5-7. Top 20 specific occupations by average annual total openings, alternative methodology
Washington state, 2016 to 2026
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Occupational Employment Statistics

In the alternative methodology, the number of openings due to job growth did not exceed openings due to separations (job turnover) in any occupations.

Chapter 6: Income and wages

All income and wage data in this chapter have been adjusted for inflation to 2017 dollars. Data from previous annual reports will differ from figures for corresponding years in this report because of that adjustment.

Household[14] and family income

The Great Recession was characterized in Washington state and the nation by deep employment losses over the course of two years from 2008 to 2010. Since 2010, employment has improved, with the state reaching pre-recession levels in 2013. Employment estimates tell an important part of the story, but the translation of employment into quality of life requires additional investigation. This chapter explores measures related to household incomes and wages earned by Washington workers.

The first part of this chapter describes trends in household income, as published by the U.S. Census Bureau's American Community Survey (ACS). Household income has five sources: earnings from wages, earnings from self-employment, investment income, transfer payments, such as Social Security, and private retirement payments. When reading Census data, consider that each annual observation represents a statistical snapshot of a location. Language about increasing income does not mean that individuals necessarily received pay raises from one year to the next. It does mean that the annual income of a region (whether by pay raises or wealthy neighbors moving in) increased.

In step with widespread employment losses, household incomes fell during the recent recession. Unlike employment, which bottomed out in 2010 and subsequently climbed to pre-recession peak levels in 2013, income recovery has taken much longer to materialize (*Figure 6-1*). According to the U.S. Census Bureau's ACS, the real median household wage in Washington state declined by $4,438 or 6.7 percent from 2008 to 2013. The first green shoots of recovery tentatively appeared in 2014, when the median household income in Washington increased by $2,110. Household income growth has since gained momentum, increasing by about $2,000 each year. From 2013 to 2017, the median household income in Washington rose by 14.3 percent. Family household incomes grew by 11.5 percent and

[14] The U.S. Census Bureau divides households into two types. A family household contains at least two people, and at least one other person in the household is related to the householder by birth, marriage or adoption. A non-family household may contain only one person or additional people that are not related to the householder.

[15] Median household income refers to the value that falls in the middle of the set of observations. We reference median rather than average household income because it is less likely to be influenced by large outliers (i.e., unusually large or small values).

non-family households grew by 14.1 percent over the same time period. For comparison, the national median wage grew by a lesser extent of 8.6 percent over the same period.

Figure 6-1. Median household income in 2017 dollars
United States and Washington state, 2013 through 2017
Source: U.S. Census Bureau, American Community Survey

Household type	2013	2014	2015	2016	2017	Change, 2013 to 2017
All households, U.S.	$55,562	$56,150	$57,622	$58,552	$60,336	8.6%
All households, Washington	$62,107	$64,217	$66,252	$68,195	$70,979	14.3%
Family households	$75,895	$77,640	$79,502	$82,552	$84,594	11.5%
Non-family households	$38,762	$39,898	$41,525	$42,187	$44,213	14.1%

Real median household income increased by 8.6 percent in Washington state from 2013 to 2017.

The following information describes select household statistics for Washington state from the ACS.

According to the ACS (*Figure 6-2*):

- The poverty rate[16] for all Washington residents dropped below pre-recession rates in 2017. The statewide poverty rate peaked in 2013 when it reached 14.1 percent. In 2017, the poverty rate was 11.0 percent. Children tend to have higher poverty rates than the general population. In 2017, 14.3 percent of children under age 18 were living under the poverty threshold. The peak rate of childhood poverty was 18.8 percent observed in 2013.
- The share of households with earnings from a job increased slightly from 2016 to 2017 (from 78.8 percent to 79.1 percent), but remains below pre-recession levels in the 81.0 percent range. The average earnings for households with job-related income increased by $2,016 or 2.1 percent in 2017.
- The proportion of the workforce that reported working in full-time jobs (35 or more hours per week) fell sharply during the recession and began to rebound in 2012. As of 2017, the proportion of full-time job holders was 60.5 percent – higher than rates observed during the recession (the lowest rate was 55.7 percent observed in 2011), but still shy of 61.0 percent range observations prior to 2008. The proportion of part-time workers rose somewhat during the depths of the recession,

16 The U.S. government establishes a poverty threshold every year. The threshold varies based on family size and composition. In 2017, the threshold for a family of two adults and two children under age 18 was $24,858. Thresholds for other family sizes can be found at: www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html

and declined each year from 2011 to 2016. In 2017, 18.5 percent of the working-age population were employed in part-time jobs. This is the lowest observed rate since before 2005.

- The median earnings for all workers in 2017 was $38,437 according to the Census Bureau. This estimate amounts to a jump of $1,756 or 4.8 percent over the year. From 2016 to 2017, full time year-round workers' earnings increased by $2,264 or 4.3 percent. Within that estimate, male full-time workers' earnings rose 2.0 percent to $60,893 and female full-time workers' wages increased by 4.8 percent to $47,681.
- An estimated 5.7 percent of the workforce identified as primarily self-employed in their own not-incorporated business in 2017; this is down from 5.8 percent observed in 2016 and much lower than the 7.2 percent observed in 2007, on the eve of the recession.
- The percentage of households with a Social Security beneficiary has been increasing steadily over the past several years. It increased from 28.1 percent in 2013 to 29.4 percent in 2017; this comes as no surprise as the baby boomer generation has begun to enter retirement.
- The proportion of households receiving private pension payments has also increased. In 2013, 18.2 percent of Washington households received payments from private pensions. In 2017, that proportion had increased to 19.1 percent. The average monthly payout in 2017 was $2,263.
- Just under 5.0 percent of Washington households had members who received Supplemental Security Income (largely for people with disabilities) in 2017, with an average payout of $839 per month – a slight increase in the average payment of $828 per month observed in 2013.
- The share of households receiving welfare dropped from 4.0 percent in 2013 to 3.0 percent in 2017. The proportion of Washington households receiving welfare payments reached a peak of 4.6 percent in 2010 – at the height of the jobs recession, and has fallen since then. The average benefit in 2017 was about $203 per month. This is down from $247 observed in 2013.
- The share of households receiving food stamps dropped from 12.6 percent in 2016 to 12.3 percent in 2017. Prior to the Great Recession, the portion of households receiving food stamps was in the 8.0 percent range. The proportion jumped

above 11.0 percent in 2009 and has not fallen below that threshold. Although rates have recently declined, the longer-term trend shows a proportional increase.

- The portion of households with health insurance coverage increased from 2013 to 2017. The proportion of Washington state residents without health insurance dropped from 14.0 percent in 2013 to 6.0 percent in 2016 – a decrease of nearly 532 thousand residents over a three-year period. In 2017, the proportion of uninsured households remained virtually unchanged. Private sector health insurance coverage increased from 68.5 percent to 71.4 percent over the same four-year period, changing little from 2016 to 2017, and the number of people relying exclusively on public health insurance rose from 17.2 percent to 20.3 percent, increasing slightly to 20.7 percent in 2017.
- The homeownership rate in Washington state plummeted from 66.1 percent in 2007 to 61.7 percent in 2014. Since 2014, the homeownership rate has increased each year. In 2017, the homeownership rate was 62.8 percent; well below pre-recession levels.
- The federal government considers any household paying more than 30.0 percent of its income towards housing costs to be under duress. The percent of households in economic distress due to high housing costs rose in the first few years of the recession, but then declined through the foreclosure process as homeowners transitioned to renters. The percentage of renters exceeding that threshold increased during the recession, reaching 48.4 percent in 2010. By 2017, that proportion decreased to 45.2 percent. Homeowners with a mortgage paying more than 30.0 percent of their income toward housing rose in the lead up to the recession, exceeding 40.0 percent from 2007 to 2010. Over the course of the recovery, that proportion has shifted downward, in part due to an overall decline of home ownership. By 2017, the proportion was down to 28.8 percent.

Figure 6-2. Selected household statistics
Washington state, 2013 through 2017
Source: U.S. Census Bureau, American Community Survey

Household statistic	2013	2014	2015	2016	2017
Median household income	$61,478	$63,522	$66,010	$68,400	$70,979
Median family income	$75,010	$76,846	$79,500	$82,766	$84,594
Poverty rate, all individuals	14.1%	13.2%	12.2%	11.3%	11.0%
Poverty rate, children under 18	18.8%	17.5%	15.5%	13.7%	14.3%
Households with earnings from a job[1]	78.5%	78.6%	78.5%	78.8%	79.1%
Average household earnings from a job[2]	$83,802	$85,435	$89,985	$93,900	$95,916
Full-time workers, percent of population aged 16-64[3]	57.1%	57.6%	58.2%	59.5%	60.5%
Part-time workers, percent of population aged 16-64	19.2%	19.1%	18.8%	18.7%	18.5%
Median earnings for all workers	$34,228	$34,571	$35,918	$36,681	$38,437
Median earnings for full-time, year-round workers	$52,858	$52,492	$52,899	$52,824	$55,088
Median earnings for male full-time, year-round workers	$55,639	$55,820	$57,220	$59,713	$60,893
Median earnings for female full-time, year-round workers	$44,024	$42,924	$45,384	$45,497	$47,681
Percent of workers who are self-employed	5.9%	5.9%	5.9%	5.8%	5.7%
Households receiving Social Security	28.1%	28.5%	29.0%	29.6%	29.4%
Households receiving private pension payments	18.2%	18.6%	19.2%	19.7%	19.1%
Avg. mo. payout for households receiving private pensions	$2,083	$2,132	$2,147	$2,274	$2,263
Households receiving Supplemental Security Income (SSI)[1]	4.6%	4.9%	4.9%	4.8%	4.8%
Average monthly payout for those receiving SSI	$828	$821	$843	$851	$839
Households receiving welfare cash payments[1]	4.0%	3.6%	3.5%	3.1%	3.0%
Average monthly payout for welfare recipients	$247	$238	$238	$235	$203
Households receiving food stamps[1]	14.8%	14.1%	13.4%	12.6%	12.3%
Residents without health insurance	14.0%	9.2%	6.6%	6.0%	6.1%
Number of residents without health insurance	959,991	642,654	467,967	428,092	446,106
Residents with private health insurance	68.5%	70.3%	71.1%	71.4%	70.8%
Residents relying solely on public health insurance	17.2%	20.1%	19.9%	20.3%	20.7%
Renters paying more than 30 percent of income for housing	48.0%	47.1%	45.4%	44.9%	45.2%
Homeownership rate	61.9%	61.7%	62.4%	62.5%	62.8%
Homeowners with a mortgage paying more than 30 percent of income for housing	34.1%	31.5%	29.5%	29.2%	28.8%

[1] Households may fall into more than one of these categories.
[2] Includes earnings from all members in the household.
[3] Full-time workers usually worked at least 35 hours per week (but may not be year-round workers).

In 2017, a number of indicators about the well-being of households in Washington showed continued improvement.

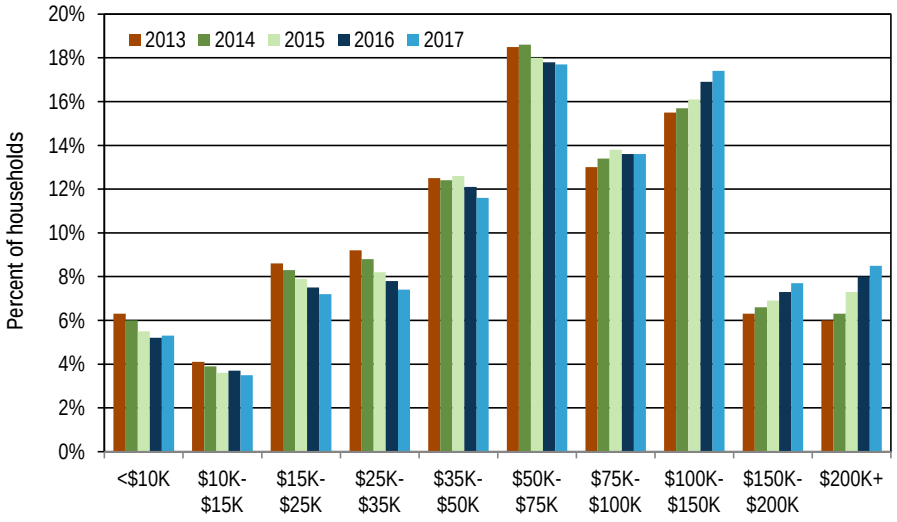
Many of the metrics presented in *Figure 6-2* tell the story of a gradual recovery; however, in many cases the recovery appears to have gained momentum in the last two years. *Figure 6-3* illustrates the share of households that fell within certain income ranges in 2017 dollars. Examining household income ranges allows for a more nuanced view of how the economic recovery differs socioeconomically.

Over the past five years, the proportion of households with $35,000 or less income annually has steadily decreased. Households with income ranges less than $35,000 accounted for about 28.0 percent of all households in 2013. By 2017, the share was closer to 23.0 percent.

Middle income households declined slightly at the lower end and remained fairly steady at the upper end. Overall, this is the household income range that experienced the least change proportionally. From 2013 to 2017, the share of households with incomes between $35,000 and $100,000 barely changed, decreasing from 44.0 percent in 2013 to about 43.0 percent by 2017.

Upper and upper-middle income households, meanwhile, increased as a share of total Washington households over the past five years. Households earning more than $100,000 per year increased as a share of total households each year from 2013 through 2017. Over that time period, the share of households with incomes exceeding $100,000 per year expanded from about 28.0 percent in 2013 to nearly 34.0 percent in 2017.

Figure 6-3. Percent of households by income range, 2017 dollars
Washington state, 2013 through 2017
Source: U.S. Census Bureau, American Community Survey



The share of households in upper income brackets rose in 2017.

Wages

All data in this section has been adjusted for inflation to 2017 constant dollars, except where explicitly noted.

Wages have been in the economic news frequently over the past several years. For example:

- The Federal Reserve Bank has been carefully watching the average wage as a gauge of full employment and whether an increase in inflation is in the cards.
- The distribution of wages and income, along with the rapid rise in CEO compensation, have been the subject of numerous analyses.
- Twenty-nine states and three U.S. colonies have raised their minimum wage above the federal minimum, reigniting a long-standing debate about the impact of an increase on employment.

In this section, we'll examine wage trends in Washington along a number of different measures, and in the process touch on each of these three issues.

First, let's take a look at employment and hours worked. For the state, 2017 was yet another good year for job growth. The total number of jobs covered by unemployment insurance (with the exclusions noted in (*Figure 6-4*) increased by 2.9 percent. These are based on average monthly counts of jobs, with full-time and part-time work getting equal weight. When jobs were weighted by the number of hours worked (full-time equivalent, or FTE, jobs[17]), job growth was slightly higher (3.0 percent), indicating a small increase in the average work week.

[17] In this analysis, jobs are weighted by the number of hours worked, with one full-time equivalent (FTE) job equaling 2,080 hours of work in a typical year. A job that lasts 208 hours, for example, would be counted as 0.1 FTE.

Figure 6-4. Covered employment vs. FTE employment – Federal employment, NAICS 814 and DSHS/COPES employment excluded
Washington state, 2007 through 2017
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Year	Covered employment	Change from previous year	FTE employment	Change from previous year	Ratio of FTE to covered employment
2007	2,818,891	2.8%	2,308,857	3.8%	81.9%
2008	2,840,394	0.8%	2,323,831	0.6%	81.8%
2009	2,717,769	-4.3%	2,206,818	-5.0%	81.2%
2010	2,677,104	-1.5%	2,163,882	-1.9%	80.8%
2011	2,714,756	1.4%	2,214,431	2.3%	81.6%
2012	2,764,548	1.8%	2,265,153	2.3%	81.9%
2013	2,831,442	2.4%	2,316,485	2.3%	81.8%
2014	2,906,183	2.6%	2,380,649	2.8%	81.9%
2015	2,996,031	3.1%	2,457,393	3.2%	82.0%
2016	3,090,010	3.1%	2,528,274	2.9%	81.8%
2017	3,180,537	2.9%	2,603,441	3.0%	81.9%

FTE employment has been stable as a percent of total covered employment, indicating average hours per job has little changed.

Figure 6-5 shows the most recent available data on national and state hourly wages from three different sources.

- Every month, the Bureau of Labor Statistics (BLS) publishes the average hourly wage for nonfarm private sector employers, based on the average wage for all employers in their monthly survey. Data is available for the nation, states, territories and metropolitan areas.
- Averages can be heavily influenced by what's happening at the top of the wage scale, so at the national (but not the state) level, BLS tracks the average hourly wage for production and nonsupervisory workers – those who aren't supervisors or managers.
- Employment Security Department's quarterly wage files for the state of Washington include hours worked and wages earned for any worker covered by the state unemployment insurance system. There are well over three million records for each quarter. In this analysis, records were weighted by the number of hours worked and converted to full-time equivalent, or FTE, jobs.[18]

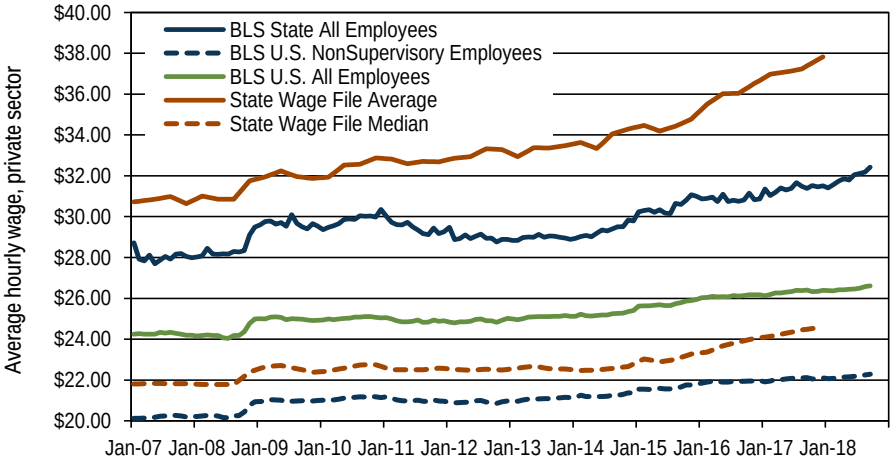
[18] In most years, one full-time equivalent (FTE) job equals 2,080 hours of work. A job that lasted 208 hours, for example, would be counted as 0.1 FTE.

According to BLS, the average hourly wage in Washington has consistently been about 20.0 percent higher than the comparable national figure over the past decade. The average for nonsupervisory workers has been 16.0 percent lower than the one for all workers, but has generally followed the same trend.

Using the same industry base, private sector nonfarm employment, the statewide average hourly wage calculated from the wage file was substantially higher than from the BLS survey. The state median hourly wage (again using the private nonfarm definition) was closer to the BLS average for nonsupervisory workers, and trended closely to that measure from 2007 through 2015. This makes sense, because if the average for all workers has been pushed up by more rapid gains among managers, excluding them will make the remainder more similar to the median.

What *Figure 6-5* does tell us is, first, that regardless of the measure, Washington jobs on average have paid significantly more than jobs nationally. Second, while hourly wages began to pick up nationally and in Washington in 2015, gains have been more rapid here. From December 2013 to December 2017, the U.S. all-employees average rose by 5.1 percent, while the state average jumped by 9.1 percent. The U.S. nonsupervisory employee average was up by 4.6 percent, while the state median calculated from the quarterly wage files increased by 5.1 percent. Then from December 2017 to September 2018, the state all-employees average gained another 2.9 percent, while nationally wages were up only 0.8 percent.

Figure 6-5. Average hourly wage, all private sector nonfarm employees, in 2017 dollars U.S. and Washington state, January 2007 through September 2018
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse; U.S. Bureau of Labor Statistics



According to the BLS, inflation adjusted hourly wages were considerably higher in the state of Washington than nationally, and have been increasing at a faster rate.

It's important to remember that when we're comparing what employers pay at different time periods, we're talking about a different set of workers in each time period. Some workers from an earlier time period will have withdrawn from the state workforce for a variety of reasons – retirement, caring for family members, moving out of state, etc., – while for similar reasons, the later time period will contain workers not in the earlier period. So if we ask whether average wages have gone up faster in the state than nationally, does this mean that individual workers have (on average) been doing better here as well? The answer is not necessarily. The average may have been pushed up, for example, because new jobs paid above the average. However, it turns out to be true in this case.

The Federal Reserve Bank (Fed) of Atlanta's Wage Growth Tracker[19] measures the median over-the-year change in wages for nonfarm workers. In 2017, their estimate was that individual full-time workers enjoyed a 3.5 percent increase in hourly wages, not adjusted for inflation.[20] Using a similar set of workers – individuals who worked at least 1,560 hours (the equivalent of three-quarters of the year) in both 2016 and 2017, in industries other than agriculture – the figure for Washington was substantially higher at 5.4 percent (3.7 percent if adjusted for inflation). As the Atlanta Fed notes, the individuals in their national dataset were somewhat older, more educated, and more likely to work as a professional than the general population, due to the requirement for continuous employment; those same characteristics were likely true for the comparable state dataset.

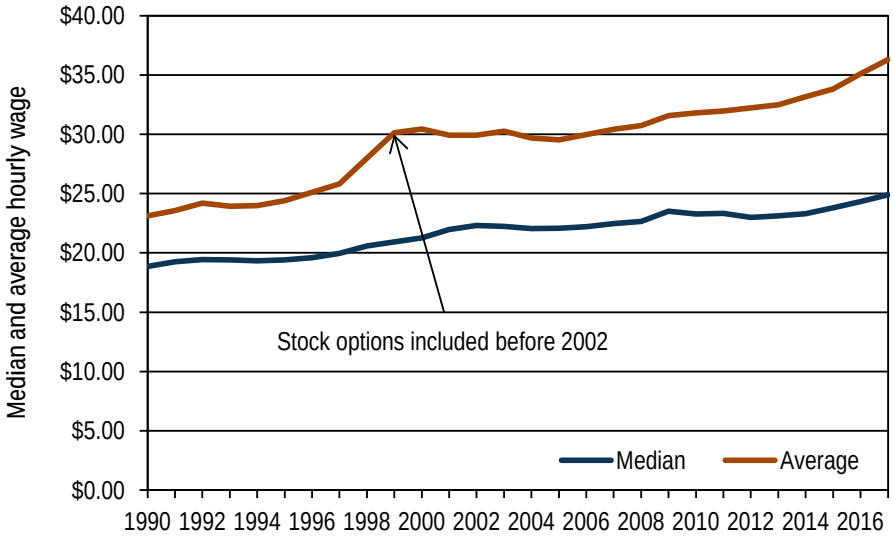
Now that we've established that on both a jobs and worker basis, average wage gains were higher in Washington than the nation, let's take a deeper dive to see how equitable those gains were. For this part of the analysis, agricultural employment will be included, along with state and local government, while household employers (NAICS 814) and state-reimbursed home healthcare (part of NAICS 624120) were excluded due to data quality issues.

The average hourly wage for non-federal jobs in Washington was $36.30, a 3.4 percent increase from 2016. The median hourly wage rose 2.3 percent to $24.89. *Figure 6-6* shows that while both the median and average have been trending upward over the past three decades, the gap between the two has widened considerably. In 1990, the median was 82 percent of the average. By 2017, it was only 69 percent. The widening gap indicates that wage inequality has been increasing. Note that during the 1998 to 2002 period, stock options were included as part of wages and heavily influenced the average.

[19] www.frbatlanta.org/chcs/wage-growth-tracker

[20] Adjustment for inflation would have lowered the gain to about 1.8 percent.

Figure 6-6. Median and average hourly wage, in 2017 dollars
Washington state, 1990 through 2017
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse



The median hourly wage increased by 2.3 percent in 2017, reaching an all-time high; the average hourly wage increased at a faster rate, indicating an increase in wage inequality.

At a more granular level, in 2017 wages went up fastest for the lowest-paid 10 percent of jobs in the state, as shown in *Figure 6-7*. The increase in the minimum wage (from an inflation-adjusted $9.64 in 2016 to $11.00 in 2017 across most of the state; the minimum wage ranged from $11.00 to $15.00 in the city of Seattle, depending on the size of the employer and the benefits offered to employees) along with a tight labor market, helped boost wages at the bottom by 7.8 percent. The second-lowest 10 percent of jobs also had a greater than average gain of 5.0 percent. The past two years have brought the two largest percentage increases in wages in this slice of the labor market since the data became available in 1990. Gains in the next seven deciles were smaller, but have been consistently around 2.0 percent for three years running, something that hasn't happened since the 1996 to 1999 period, the last time the state had low unemployment. For example, the median hourly wage increased by 6.8 percent from 2014 to 2017, second only to the 1996 to 1999 gain of 6.9 percent.

Figure 6-7. Measuring the wage gap, 2017 dollars
Washington state, 2001 through 2017
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

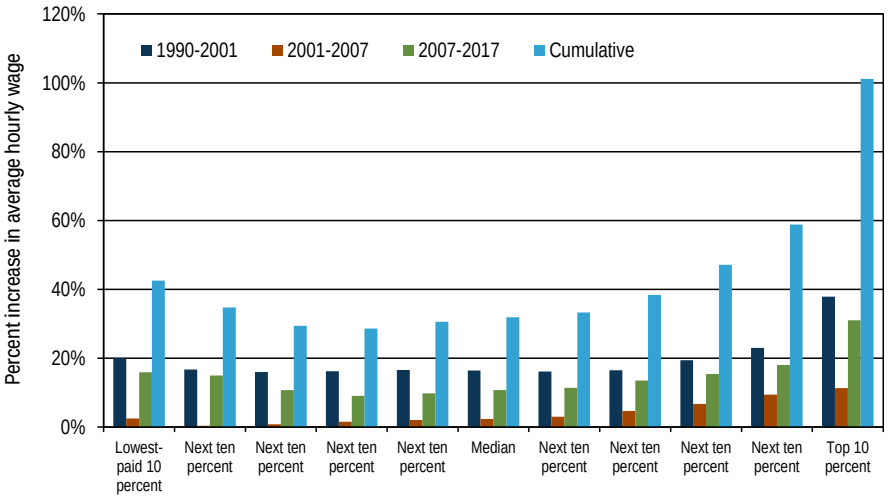
Hourly wages	2001	2007	2010	2015	2016	2017	Percent change 2016-2017
Median hourly wage	$21.96	$22.48	$23.29	$23.81	$24.33	$24.89	2.3%
Average hourly wage for:							
All jobs	$29.92	$30.42	$31.80	$33.82	$35.11	$36.30	3.4%
Lowest-paid 10 percent of jobs	$9.50	$9.73	$9.93	$10.22	$10.47	$11.28	7.8%
Second-lowest 10 percent of jobs	$12.08	$12.13	$12.32	$12.77	$13.28	$13.95	5.0%
Third-lowest-paid 10 percent of jobs	$14.66	$14.78	$15.16	$15.44	$15.87	$16.37	3.1%
Fourth-lowest-paid 10 percent of jobs	$17.40	$17.66	$18.18	$18.40	$18.79	$19.26	2.5%
Fifth-lowest-paid 10 percent of jobs	$20.36	$20.78	$21.49	$21.84	$22.26	$22.81	2.5%
Fifth-highest 10 percent of jobs	$23.74	$24.45	$25.49	$26.12	$26.66	$27.24	2.2%
Fourth-highest 10 percent of jobs	$27.97	$29.28	$25.53	$31.88	$32.53	$33.23	2.2%
Third-highest 10 percent of jobs	$33.79	$36.06	$38.42	$40.03	$40.81	$41.62	2.0%
Second-highest 10 percent of jobs	$42.13	$46.09	$49.27	$51.99	$53.26	$54.40	2.1%
Highest-paid 10 percent of jobs	$95.82*	$93.53	$98.91	$110.86	$117.61	$122.53	4.2%
Ratio of highest 10 to lowest 10	10.1	9.6	10.0	10.8	11.2	10.9	NA
Ratio of highest 10 to median	4.4	4.2	4.2	4.7	4.8	4.9	NA
Ratio of median to lowest 10	2.3	2.3	2.3	2.3	2.3	2.2	NA
*Boosted by stock options. Without stock options, the average would have been about $84.00.							

The gap between the highest- and lowest-paid jobs closed slightly from 2016 to 2017.

In 2017, the average for the best-paid 10 percent of jobs rose by 4.2 percent, following a 6.1 percent gain in 2016. This continued a long-term trend of the top decile outpacing the bottom 90 percent. One way to quantify the widening inequality is to compare the average wage for the top 10 percent of jobs to the average wage for the lowest 10 percent of jobs. That ratio was 7.6 in 1990, climbed to 10.0 in 2010 and reached 11.2 in 2016 slipping back to 10.9 in 2017.[21]

[21] The upper 10-percent paying jobs does not include many corporate officers (generally the highest-paid employees) and wages do not include income from capital gains nor, since 2002, stock options.

Figure 6-8. Percent increase in the average hourly wage by decile and median, 2017 dollars
Washington state, 1990 to 2017
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse



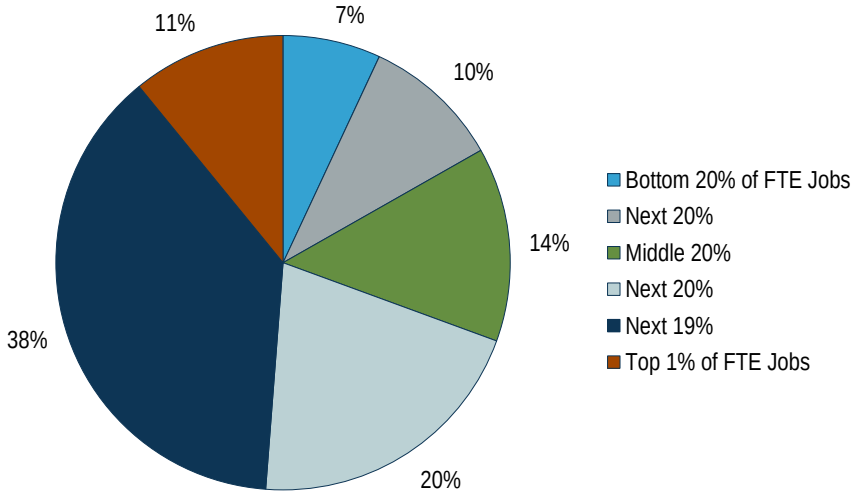
Wage gains were low in the 2001 to 2007 period; for 1990 to 2017, the average for the top 10 percent of jobs doubled.

Since 1990, the state has experienced a long expansion in the 1990s, a relatively mild recession in 2001 followed by a short bubble-fueled expansion from 2002 to 2007, a deep recession and the long recovery and expansion that began in 2010. *Figure 6-8* shows the distribution of wage gains during the past three business cycles. The 1990 to 2001 increases were distributed fairly equitably (between 16.0 and 23.0 percent) across the wage spectrum, with the exception of the upper 10.0 percent (+38.0 percent). During the 2002 to 2007 expansion, wages were stagnant in the bottom half of the spectrum, with the median wage increasing by only 2.4 percent over the five-year period. Wage gains were larger on the upper third of the distribution, with the top 10.0 percent of jobs rising by 11.0 percent and the next decile by 9.0 percent. The most recent recovery and expansion more closely resembles the 1990s, especially as the labor market has tightened over the past three years. Since 2007, the average hourly wage for the lowest-paid 10.0 percent of jobs rose by 16.0 percent, and the next decile by 15.0 percent. The lower-middle 40.0 percent of jobs were up between 9.0 and 11.0 percent. The gains accelerated from there: 14.0 percent, 15.0 percent, 18.0 percent and then 31.0 percent for the top decile.

From the longer-term (1990 to 2017) perspective, wages in the state have generally moved upward, but much more so at the upper end. The median hourly wage increased by 32.0 percent, and the lower-middle six deciles within the wage spectrum was close to that (29.0 to 34.0 percent). Wages at the bottom rose faster (43.0 percent). Wages at the upper end grew much more rapidly, with the average wage for the top 10.0 percent of jobs more than doubling, and wages in the second-highest tier increased by 60.0 percent.

From another angle, the bottom 20.0 percent of FTE jobs took home 7.0 percent of total payroll in 2017 – less than the top 1.0 percent, which captured 11.0 percent of total wages. As shown in *Figure 6-9*, the top 20.0 percent of jobs accrued almost half of total payroll. The share garnered by the top 1.0 percent and the next 19.0 percent both increased by 3.8 percentage points from 1990 to 2017. When looking at the higher end of the wage scale, it's important to remember that the unemployment insurance dataset does not include many of the highest paid salaries in the state, since tens of thousands of corporate officers have opted out of the unemployment insurance system.

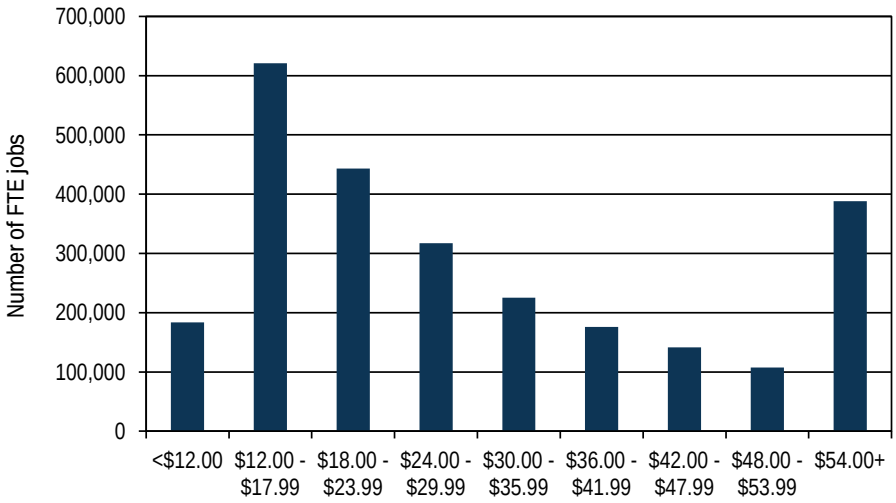
Figure 6-9. Share of total payroll earned by quintile of FTE jobs, 2017 dollars
Washington state, 2017
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse



The best-paid 1.0 percent of FTE jobs paid more than the lowest-paid 20.0 percent, and the best-paid 20.0 percent of FTE jobs earned half the total payroll in the state in 2017.

A different way of presenting wage data – jobs grouped by the range of hourly wage paid in 2017 – is shown in *Figure 6-10*, with the wage spectrum being divided into nine wage ranges. The first three wage ranges contain the majority of jobs: 7.1 percent paid below $12.00 per hour, 23.9 percent paid from $12.00 to $17.99 per hour and 17.0 percent paid from $18.00 to $23.99 per hour. Almost 15.0 percent paid $54.00 per hour or more.

Figure 6-10. FTE jobs by hourly wage range, 2017 dollars
Washington state, 2017
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse



Over 400,000 jobs had annualized pay in at least six figures in 2017, on an FTE basis.

Figure 6-11 shows some of the stark differences between wages in different industries. Just under 41.0 percent of all jobs in limited-service eating places (which includes "fast-food" restaurants, coffee bars and buffets) paid below $12.00 per hour. Similarly low wages exist in childcare services, where almost a third of jobs paid below $12.00, a figure that will be impacted as the minimum wage continues to increase in the coming years. Meanwhile, four of the top five high-wage industries were tech-related, with 83.0 percent of jobs in software publishing paying in the highest wage category. In terms of numbers, four industries accounted for a third of high-wage jobs: software publishing (13.0 percent), aerospace (8.0 percent), electronic shopping (7.0 percent) and computer systems design (5.0 percent).

Figure 6-11. High-wage and low-wage industries with at least 10,000 FTE jobs
Washington state, 2017
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

NAICS	Industry	FTE jobs	Median wage	Percent of FTE jobs paying below $12.00	Percent of FTE jobs paying $54.00 or greater
	All industries	2,603,441	$24.89	7.1%	14.9%
	Lower-wage industries:				
722513-15	Limited-service eating places	63,453	$12.65	40.9%	0.4%
448	Clothing and clothing accessories stores	12,617	$14.91	29.8%	1.9%
6244	Child daycare services	13,835	$13.96	29.1%	0.4%
445	Food and beverage stores	49,825	$15.66	23.7%	2.2%
115	Support activities for agriculture and forestry	23,120	$13.50	23.2%	1.3%
	Higher-wage industries				
5112	Software publishers	60,158	$78.34	0.1%	82.9%
519	Other information services	16,251	$69.24	0.3%	66.3%
4541	Electronic shopping and mail-order houses	46,049	$64.73	0.3%	62.8%
523	Securities, commodity contracts and investments	11,423	$43.42	0.7%	39.4%
5415	Computer systems design and related services	50,343	$46.71	0.8%	39.4%

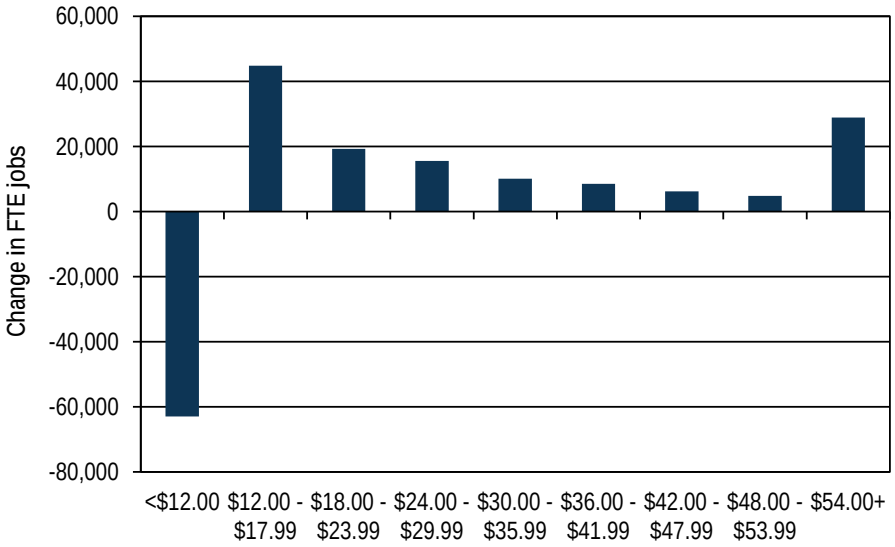
Almost 83.0 percent of software publishing jobs paid $54.00 or more, while almost 41 percent of FTE jobs in limited-service eating places paid below $12.00 per hour.

Job growth by hourly wage for 2017 in terms of total jobs added is shown in *Figure 6-12*. Overall, there was faster job growth in higher-wage categories in 2017.

- The number of jobs paying below $12.00 per hour declined by a huge amount (-62,987, or -25.5 percent). Again, the higher minimum wage and a tight labor market played a role.
- There were 44,815 more jobs paying $12.00 to $17.99 per hour. In isolation, this wage range had the largest numerical increase, a faster than average growth rate (7.8 percent, vs. 2.9 percent for all jobs) and accounted for more than a third of net new jobs for the year. More broadly, there was clearly bracket creep from the lowest wage range to this range, as well as jobs leaving this range and moving up to the next: jobs paying below $18.00 per hour declined by 18,172 (2.2 percent).
- In the next six wage ranges stretching from $18.00 to $23.99 per hour to $48.00 to $53.99 per hour, the number of jobs grew by roughly 5.0 percent. Most industry sectors gained jobs in every one of these wage ranges.

- At the top of the wage distribution, jobs paying $54.00 or more increased by almost 29,000 (8.0 percent). Every major industry added high-wage jobs except aerospace (for the second year in a row). Also for the second year in a row, e-commerce was the single largest source, with information services a close second.

Figure 6-12. Change in FTE jobs by hourly wage range, 2017 dollars
Washington state, 2016 to 2017
Source: Employment Security Department/LMEA; Unemployment Insurance Data Warehouse



Job gains were largest in two wage ranges in 2017: the highest and the next to lowest.

Shifting to a longer-term outlook, *Figures 6-13* and *6-14* show the total change and percentage change in jobs in the nine wage ranges from to 2001 to 2017. Over that time period, the number of high-wage jobs ($54.00 and higher) grew by 147.0 percent. Many of these net new jobs were in industries well known for higher-wage jobs (e.g., software, healthcare, electronic shopping, aerospace and computer systems design). Other industries were also major sources:

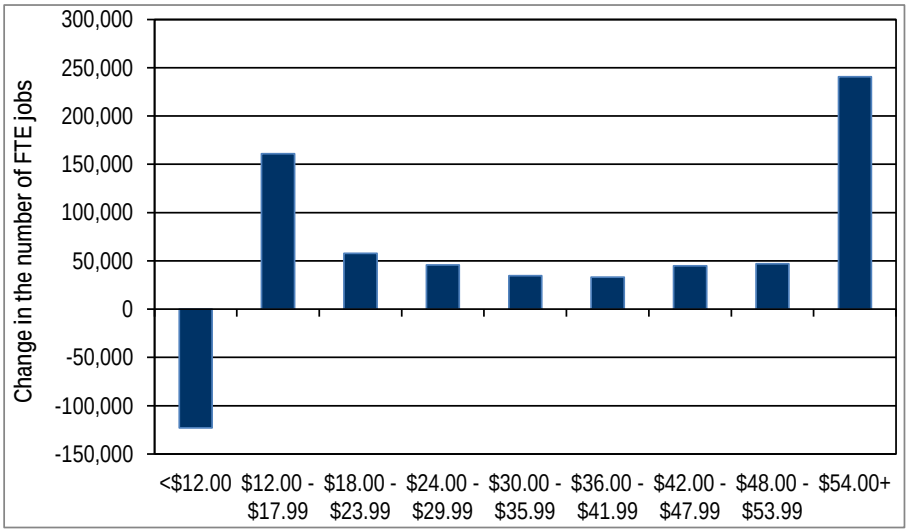
- Information services other than software, like telecommunications and internet services;
- Local government excluding education – cities, counties and other local districts; and
- Wholesale trade.

In summary, wages improved in 2017 with across-the-board gains and a slight increase in wage inequality. The median hourly wage hit an all-time high. Since 2001, there has been a marked shift towards

more higher-wage jobs. While total FTE employment grew by 22.7 percent, the number of jobs paying below $42.00 per hour increased at a slower pace, while jobs paying above that mark grew much faster.

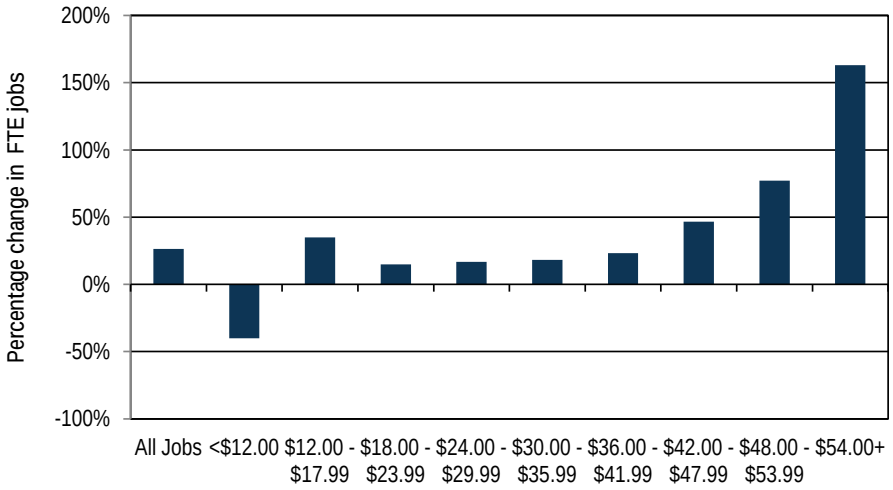
A final note: the median hourly wage increased in all but three counties in 2017. Five counties saw their median increase by at least 3.0 percent: Klickitat (4.9 percent), Grant (3.8 percent), Okanogan (3.7 percent), Asotin (3.7 percent) and Walla Walla (3.5 percent). Only Lewis County suffered a significant decline (-1.8 percent), due to job losses in manufacturing.

Figure 6-13. Change in FTE employment by hourly wage range, 2017 dollars
Washington state, 2001 to 2017
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse



Net employment growth was heavily weighted on the higher end of the wage scale.

Figure 6-14. Percent change in FTE employment by hourly wage range, 2017 dollars
Washington state, 2001 to 2017
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse



The number of high-wage jobs doubled and then some from 2001 to 2017.

Personal and per capita income[22]

Personal income is the sum of earned income (from owning a business or holding a job), investment income and transfer payments chiefly from government programs such as Social Security, Medicare and Medicaid, welfare, food stamps, Supplemental Security Income (SSI) and unemployment benefits. Per capita personal income is the total personal income of an area divided by the population of the area. Since per capita income is an average, it is influenced by factors such as relative concentration of high-income households, family size and the number of retirees in an area.

Per capita income, as shown in *Figure 6-15*, dropped in 2013 before beginning a strong recovery, gaining 5.2 percent in 2014, 4.1 percent in 2015, 2.1 percent in 2016 and 2.5 percent in 2017. The latter was fifth fastest among the fifty states. Total personal income was estimated at $429 billion in 2017, or $57,896 on a per capita basis. Historically the state's per capita income has been 5.0 to 8.0 percent above the U.S. but the margin has widened over the past four years from 7.6 percent to 12.1 percent in 2017.

Changes in income over the past few years can be clarified by disaggregating income into its three major components.

[22] All data on personal and per capita income are produced by the U.S. Bureau of Economic Analysis; inflation adjustment provided by Employment Security Department/LMEA.

First, total *earned income*, which makes up almost two thirds of total income, rose by 5.2 percent in 2017, the fourth year in a row of strong growth. Earnings increased substantially faster than the other two components. Growth of per capita earnings increased from 2016's 2.5 percent to 3.4 percent, reaching $36,546. Earned income accounted for 70.0 percent of total personal income in 2000 but since then its share has declined to 63.0 percent. It will likely continue to ebb over the next decade due in large part to the aging population.

Investment income correlates strongly with the stock market and secondarily with interest rates. It usually drops sharply in recessions (as it did in 2009 and 2010) and then stages strong recoveries before moderating during economic expansions. Thus, there was double-digit growth in 2011 and 2012, a slight decline in 2013, boom years in 2014 and 2015, and moderation the next two years. In 2017, investment income topped $96 billion, which worked out to $12,980 on a per capita basis. Investment income is highly concentrated in upper income households.[23]

From 1982 to 2007, total *transfer payments* grew along with the economy, consistently comprising about 13.0 percent of personal income. That share rose to 18.0 percent during the depths of the recession, as income maintenance payments and unemployment benefits increased, and has stayed higher at 15.0 percent during the recovery.

Figure 6-16 shows how transfer payments have changed over the long run, and since the depths of the recession in 2010. First, transfer payments have grown almost twice as fast as total personal income overall. Second, this has primarily been due to the increase in medical benefits – Medicare and Medicaid now comprise 41.0 percent of transfer payments, more than Social Security's 34.0 percent. Third, the growth in unemployment insurance benefits and family assistance (TANF) payments has been relatively modest over time. Both, along with Supplemental Nutrition Assistance (a.k.a. food stamps) expanded during the recession and contracted during the recovery.

[23] According to the Federal Reserve Bank's 2016 Survey of Consumer Finances, the top 10.0 percent of families own two-thirds of the financial assets controlled by families, and the bottom 60.0 percent own less than 10.0 percent.

Figure 6-15. Personal income including transfer payments, in 2017 dollars
Washington state, selected years, 1990 to 2017
Source: Employment Security Department/LMEA; U.S. Bureau of Economic Analysis

Type of income	1990	2001	2007	2012	2013	2014	2015	2016	2017
Total personal income (billions)	$165.51	$264.82	$323.26	$348.93	$351.56	$374.26	$395.64	$411.36	$428.77
Earned income	$208.70	$196.70	$196.70	$203.80	$216.40	$219.60	$227.70	$239.50	$250.10
Investment income	$72.20	$62.10	$58.80	$63.80	$72.10	$71.20	$80.30	$87.90	$88.00
Transfer payments	$44.60	$50.30	$54.60	$53.20	$52.30	$52.50	$56.30	$57.20	$59.70
Social Security/retirement	$16.50	$18.10	$18.50	$18.80	$19.70	$20.40	$21.00	$22.00	$22.40
Medicare and Medicaid	$16.00	$17.20	$18.10	$18.60	$18.90	$19.10	$22.70	$22.10	$24.10
Welfare, food stamps, SSI*	$4.40	$5.80	$6.40	$6.00	$5.70	$5.60	$5.40	$5.50	$5.50
Unemployment benefits	$1.40	$4.20	$4.70	$3.40	$2.60	$1.90	$1.10	$1.00	$1.00
Per capita personal income (dollars)	$49,595	$46,359	$45,986	$47,020	$49,420	$49,262	$51,651	$53,698	$54,579
Earned income	$31,803	$29,504	$29,165	$29,868	$31,379	$31,518	$32,279	$33,443	$34,315
Investment income	$10,998	$9,312	$8,717	$9,356	$10,453	$10,213	$11,385	$12,270	$12,078
Transfer payments	$6,793	$7,542	$8,104	$7,796	$7,590	$7,531	$7,987	$7,985	$8,186
Social Security/retirement	$2,515	$2,709	$2,749	$2,749	$2,852	$2,923	$2,979	$3,070	$3,078
Medicare and Medicaid	$2,434	$2,575	$2,690	$2,726	$2,739	$2,737	$3,219	$3,087	$3,305
Welfare, food stamps, SSI*	$669	$877	$945	$882	$833	$800	$770	$766	$754
Unemployment benefits	$212	$627	$698	$500	$378	$268	$160	$145	$140
Veterans' benefits	$219	$244	$272	$282	$298	$331	$339	$363	$362

*SSI = Supplemental Security Income.

Earned income has shown strong growth over the past four years.

Figure 6-16. Per capita transfer payments in 2017 constant dollars, and components as a percent of total
Washington state, 1969, 2010 and 2017
Source: U.S. Bureau of Economic Analysis; inflation adjustment by Employment Security Department/LMEA

Type of transfer payment	1969	2010	2017	1969	2010	2017
Total transfer payments (billions)	$5.7	$55.6	$62.0	-	-	-
Percent of total personal income	8%	18%	15%	-	-	-
Total per capita transfer payments	$1,707	$8,250	$8,371	100%	100%	100%
Social Security	$695	$2,404	$2,829	41%	29%	34%
Other federal government retirement	$131	$381	$339	7%	5%	4%
Medical benefits	$279	$2,742	$3,437	16%	33%	41%
Medicare	$162	$1,467	$1,736	9%	18%	21%
Medicaid	$110	$1,206	$1,644	6%	15%	20%
Income Maintenance	$179	$960	$727	10%	12%	9%
Supplemental Nutrition Assistance (food stamps)	$14	$237	$194	1%	3%	2%
Family assistance (AFDC/TANF)	$114	$433	$257	7%	5%	3%
Unemployment benefits	$94	$710	$138	6%	9%	2%
Veterans' benefits	$192	$277	$377	11%	3%	4%
All other	$137	$766	$544	8%	9%	7%

Over the past 48 years, the dollar amount and share of transfer payments going to medical benefits has exploded, while the share going to Social Security, family assistance, unemployment insurance benefits and veterans' benefits has declined.

Chapter 7: Economic comparisons with other states

This chapter presents several tables of economic data, comparing Washington to the nation as a whole as well as other states and the District of Columbia. Minimum wage, unemployment rate, job growth, annual exports, per capita income, privately owned building permits and median single-family home cost are presented as economic indicators for comparison as well as a current ranking for Washington state.

- *Figure 7-1* shows the growth of the minimum wage in Washington state compared to other states. Currently, Washington state has the second highest minimum wage of $11.50 per hour with only the District of Columbia with a higher rate of $13.25.
- *Figure 7-2* depicts the unemployment rate for Washington compared to other states and the nation. In 2017, Washington state tied with California in 38th place.
- *Figure 7-3* shows the average annual job growth rate of each state. As of 2017, Washington state had an average annual job growth rate of 1.13 percent, placing 9th in the nation.
- *Figure 7-4* ranks annual exports for each state. In 2017, Washington continues to maintain 4th place with over $76 billion in annual exports. These figures are specifically tied to the exports directly from ports and terminals, and only reflects the amount of goods flowing through Washington state and not necessarily produced within the state.
- *Figure 7.5* compares per capita income and average annual growth rate by state for 2007 and 2017. Washington ranks 10th for both.
- *Figure 7-6* covers the number of building permits for 2007 and 2017. Washington ranked 8th for 2017, however this is a reduction of 3.38 percent from 2007.
- *Figure 7-7* shows median single-family house prices in metropolitan statistical areas (MSAs) as well as the rate of change between 2015 and 2017. Several MSAs in Washington are included in this list with the Seattle-Tacoma-Bellevue area listed as the 8th highest with a median house price of $465,800 and a 22.7 percent rate of change between 2015 and 2017. The Kennewick-Richland MSA, Spokane-Spokane Valley MSA and Yakima MSA also included in 51, 66, and 83rd place respectively.

Minimum Wage

Figure 7-1 States[1] with minimum wage higher than federal minimum wage, based on 2018 ranking[2]
United States and Washington state, 2008, 2013 and 2018
Source: U.S. Department of Labor

Rank	State	2008	2013	2018
	United States	$5.85	$7.25	$7.25
1	District of Columbia	$7.00	$8.25	$13.25
2	Washington	$8.07	$9.19	$11.50
3	California	$8.00	$8.00	$11.00
3	Massachusetts	$8.00	$8.00	$11.00
4	Oregon	$7.95	$8.95	$10.75
5	Arizona	$6.90	$7.80	$10.50
5	Vermont	$7.68	$8.60	$10.50
6	New York	$7.15	$7.25	$10.40
7	Colorado	$7.02	$7.78	$10.20
8	Connecticut	$7.65	$8.25	$10.10
8	Hawaii	$7.25	$7.25	$10.10
8	Maryland	$6.15	$7.25	$10.10
8	Rhode Island	$7.40	$7.75	$10.10
9	Maine	$7.00	$7.50	$10.00
10	Alaska	$7.15	$7.75	$9.84
11	Minnesota	$6.15	$6.15	$9.65
12	Michigan	$7.15	$7.40	$9.25
13	Nebraska	$5.85	$7.25	$9.00
14	South Dakota	$5.85	$7.25	$8.85
15	West Virginia	$6.55	$7.25	$8.75
16	New Jersey	$7.15	$7.25	$8.60
17	Arkansas	6.25	$6.25	$8.50
18	Montana	$6.25	$7.80	$8.30
18	Ohio	$7.00	$7.85	$8.30
19	Delaware	$7.15	$7.25	$8.25
19	Florida	$6.79	$7.79	$8.25
19	Illinois	$7.50	$8.25	$8.25
19	Nevada	$6.33	$8.25	$8.25
20	Missouri	$6.65	$7.35	$7.85
21	New Mexico	$6.50	$7.50	$7.50

[1]Includes District of Columbia.
[2]Rates applicable to all employers.

Figure 7-2. Highest and lowest state* unemployment rates, not seasonally adjusted, based on 2017 ranking
United States and Washington state, 2007, 2012 and 2017
Source: U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics

Unemployment Rates

Rank	State	2007	2012	2017
	United States	4.6%	8.9%	4.9%
1	Hawaii	2.8%	6.0%	2.4%
2	North Dakota	3.1%	3.1%	2.6%
3	New Hampshire	3.5%	5.5%	2.7%
4	Colorado	3.7%	7.9%	2.8%
5	Nebraska	3.0%	4.0%	2.9%
6	Vermont	4.0%	5.0%	3.0%
7	Iowa	3.7%	5.0%	3.1%
8	Idaho	3.1%	7.2%	3.2%
8	Utah	2.6%	5.4%	3.2%
9	Maine	4.7%	7.5%	3.3%
9	South Dakota	2.8%	4.3%	3.3%
9	Wisconsin	4.9%	7.0%	3.3%
10	Indiana	4.6%	8.3%	3.5%
10	Minnesota	4.6%	5.6%	3.5%
31	Delaware	3.4%	7.2%	4.6%
31	Michigan	7.0%	9.1%	4.6%
31	New Jersey	4.3%	9.3%	4.6%
31	North Carolina	4.7%	9.3%	4.6%
35	Connecticut	4.5%	8.3%	4.7%
35	Georgia	4.5%	9.2%	4.7%
35	New York	4.6%	8.5%	4.7%
38	California	5.4%	10.4%	4.8%
38	Washington	4.7%	8.1%	4.8%
40	Arizona	3.9%	8.3%	4.9%
40	Kentucky	5.4%	8.2%	4.9%
40	Pennsylvania	4.4%	7.8%	4.9%
43	Illinois	5.0%	9.0%	5.0%
43	Nevada	4.5%	11.2%	5.0%
43	Ohio	5.6%	7.4%	5.0%
46	Louisiana	4.3%	7.1%	5.1%
46	Mississippi	6.1%	9.0%	5.1%
48	West Virginia	4.6%	7.5%	5.2%
49	District of Columbia	5.5%	9.0%	6.1%
50	New Mexico	3.8%	7.1%	6.2%
51	Alaska	6.3%	7.1%	7.2%

*Includes District of Columbia.

Nonfarm Employment

Figure 7-3. Highest and lowest state* average annual job growth rates, nonfarm employment
United States and Washington state, 2000 to 2017
Source: U.S. Bureau of Labor Statistics, Current Employment Statistics

Rank	State	Average annual growth rate
	United States	0.62%
1	Utah	1.85%
2	North Dakota	1.62%
3	Nevada	1.58%
4	Texas	1.52%
5	Idaho	1.29%
6	Arizona	1.25%
7	District of Columbia	1.15%
8	Florida	1.15%
9	Washington	1.13%
10	Montana	1.11%
11	Colorado	1.08%
12	Hawaii	1.00%
40	Wisconsin	0.23%
41	Rhode Island	0.21%
42	Indiana	0.20%
43	New Jersey	0.19%
44	Louisiana	0.16%
45	Maine	0.13%
46	West Virginia	0.07%
47	Illinois	0.02%
48	Mississippi	-0.02%
49	Connecticut	-0.04%
50	Ohio	-0.10%
51	Michigan	-0.40%

*Includes District of Columbia.

Figure 7-4. Highest and lowest state[1] annual exports, based on 2017 ranking
United States and Washington state, 2007, 2012, 2017
Source: U.S. Department of Commerce, Office of Trade and Economic Analysis

Annual Exports

Rank[2]	State	2007	2012	2017
	United States	$1,148,198,722,191	$1,545,820,839,892	$1,546,272,961,061
1	Texas	$168,228,620,315	$264,664,928,203	$264,541,375,151
2	California	$134,318,906,761	$161,757,310,648	$172,012,424,917
3	New York	$71,115,801,477	$81,337,507,054	$77,914,558,985
4	Washington	$52,089,477,068	$75,654,307,226	$76,413,737,305
5	Illinois	$48,896,249,905	$68,157,880,309	$65,186,967,352
6	Michigan	$44,555,349,131	$57,051,460,900	$59,870,398,343
7	Louisiana	$30,318,911,145	$62,868,766,110	$57,005,306,097
8	Florida	$44,858,050,410	$66,222,522,916	$54,914,286,865
9	Ohio	$42,562,233,016	$48,818,903,140	$50,102,778,107
10	Pennsylvania	$29,195,435,464	$38,851,915,248	$38,701,910,724
43	Idaho	$4,703,433,247	$6,119,917,408	$3,864,104,256
44	New Mexico	$2,585,121,373	$2,957,808,347	$3,609,592,546
45	Vermont	$3,684,920,270	$4,139,192,306	$2,775,987,127
46	Maine	$2,750,326,347	$3,047,876,076	$2,711,926,781
47	Rhode Island	$1,648,709,556	$2,365,686,090	$2,391,706,418
48	Montana	$1,133,672,004	$1,575,986,341	$1,616,011,724
49	Dist. of Columbia	$1,082,135,647	$2,014,104,361	$1,483,077,078
50	South Dakota	$1,509,876,310	$1,557,347,169	$1,359,713,826
51	Wyoming	$802,170,915	$1,439,194,146	$1,196,386,455
53	Hawaii	$560,071,275	$731,679,354	$952,418,785

[1] Includes District of Columbia
[2] Annual exports represent the value of goods flowing through ports/terminals. These goods may originate from places other than the port-state and thus export values do not necessarily reflect the health of the economy in the state where the port(s) are located.

Personal Income

Figure 7-5. Highest and lowest state[1] per capita personal income,[2] in 2017 dollars,[3] based on 2017 ranking
United States and Washington state, 2007 and 2017
Source: U.S. Bureau of Economic Analysis

Rank	State	2007	2017	Average annual growth rate[4]
	United States	$39,821	$50,392	2.4%
1	District of Columbia	$60,325	$76,986	2.5%
2	Connecticut	$57,919	$70,121	1.9%
3	Massachusetts	$50,417	$65,890	2.7%
4	New Jersey	$50,570	$62,554	2.1%
5	New York	$47,467	$60,991	2.5%
6	Maryland	$47,365	$59,524	2.3%
7	California	$43,692	$58,272	2.9%
8	New Hampshire	$45,199	$57,574	2.4%
9	Wyoming	$44,719	$56,724	2.4%
10	Washington	$43,192	$56,283	2.68%
42	Utah	$32,965	$42,043	2.5%
43	Arizona	$35,751	$41,633	1.5%
44	Arkansas	$30,972	$40,791	2.8%
45	Idaho	$32,580	$40,507	2.2%
46	South Carolina	$31,956	$40,421	2.4%
47	Alabama	$32,581	$39,976	2.1%
48	Kentucky	$31,583	$39,393	2.2%
49	New Mexico	$31,703	$39,023	2.1%
50	West Virginia	$29,323	$37,924	2.6%
51	Mississippi	$29,237	$36,346	2.2%

[1] Includes District of Columbia.
[2] Per capita personal income is total personal income divided by total mid-year population.
[3] All dollar estimates are in current dollars (not adjusted for inflation).
[4] Last updated: March 22, 2018 – new estimates for 2017; revised estimates for 2010-2016.

Figure 7-6. Highest and lowest states[1] in number of authorized privately owned building permits,[2] based on 2007 ranking
United States and Washington state, 2007 and 2017
Source: U.S. Census Bureau

Building Permits

Rank	State	2007 building permits	2017 building permits	Percent change 2007 to 2017
	United States	1,398,415	1,281,977	-8.3%
1	Texas	176,992	175,112	-1.1%
2	California	110,073	114,780	4.3%
3	Florida	102,551	122,719	19.7%
4	North Carolina	85,777	67,047	-21.8%
5	Georgia	73,165	51,240	-30.0%
6	New York	54,059	39,350	-27.2%
7	Arizona	49,642	39,472	-20.5%
8	Washington	47,397	45,794	-3.38%
9	Illinois	43,020	24,992	-41.9%
10	South Carolina	40,631	35,521	-12.6%
42	South Dakota	5,112	5,407	5.8%
43	West Virginia	4,795	2,719	-43.3%
44	New Hampshire	4,561	3,625	-20.5%
45	Wyoming	4,555	1,926	-57.7%
46	Montana	4,153	4,932	18.8%
47	North Dakota	3,360	3,411	1.5%
48	Vermont	2,056	1,749	-14.9%
49	Rhode Island	1,938	1,153	-40.5%
50	Dist. of Columbia	1,910	6,037	216.1%
51	Alaska	1,706	1,539	-9.8%

[1]Includes District of Columbia
[2]New privately owned housing units authorized

Home Prices

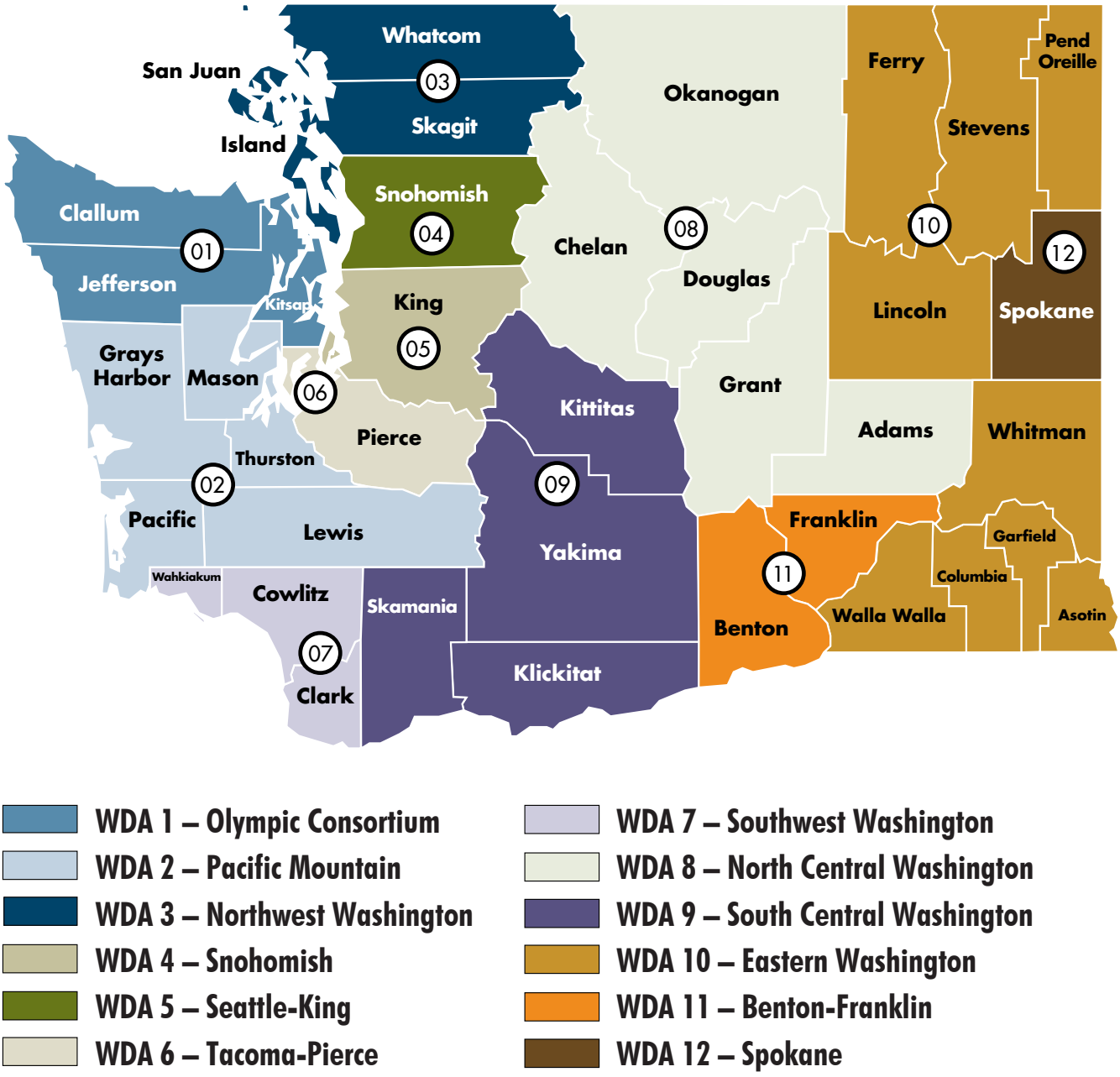
Figure 7-7. Median single-family house prices in thousands, based on 2017 ranking
Selected U.S. metropolitan areas, 2015 and 2017
Source: National Association of Realtors

Rank	Metropolitan area	2015	2017	Percent change 2015 to 2017
	United States	$223,900	$248,800	11.1%
1	San Jose-Sunnyvale-Santa Clara, CA	$940,000	$1,180,000	25.5%
2	San Francisco-Oakland-Hayward, CA	$781,000	$900,000	15.2%
3	Anaheim-Santa Ana-Irvine, CA	$700,400	$780,000	11.4%
4	Urban Honolulu, HI	$707,700	$757,300	7.0%
5	San Diego-Carlsbad, CA	$529,500	$599,000	13.1%
6	Boulder, CO	$454,100	$566,100	24.7%
7	Los Angeles-Long Beach-Glendale, CA	$480,100	$550,800	14.7%
8	Seattle-Tacoma-Bellevue, WA	$379,700	$465,800	22.7%
9	Nassau County-Suffolk County, NY	$422,700	$462,000	9.3%
10	Bridgeport-Stamford-Norwalk, CT	$448,100	$455,900	1.7%
18	Portland-Vancouver-Hillsboro, OR-WA	$312,100	$381,800	22.3%
37	Salem, OR	$210,300	$265,500	26.2%
51	Kennewick-Richland, WA	$199,300	$243,600	22.2%
66	Spokane-Spokane Valley, WA	$191,900	$223,400	16.4%
83	Yakima, WA	$166,800	$204,100	22.4%
172	Erie, PA	$118,700	$115,700	-2.5%
173	Wichita Falls, TX	$98,800	$114,900	16.3%
174	Elmira, NY	$105,500	$110,400	4.6%
175	Binghamton, NY	$113,000	$109,600	-3.0%
176	Decatur, IL	$94,300	$94,400	0.1%
177	Cumberland, MD-WV	$81,100	$90,700	11.8%
178	Youngstown-Warren-Boardman, OH-PA	$81,500	$86,100	5.6%

Appendices

Appendix 1. Washington's workforce development areas

Appendix figure A1-1. Washington state workforce development aeas (WDAs)



Appendix 2: Seasonal, structural and cyclical industry employment

Theoretical base for employment decomposition

We used R's advanced decomposition models for time series.

Decomposition of employment for each point in time (months, in our case) is:

Employment = (trend + cycle) + seasonal + irregular

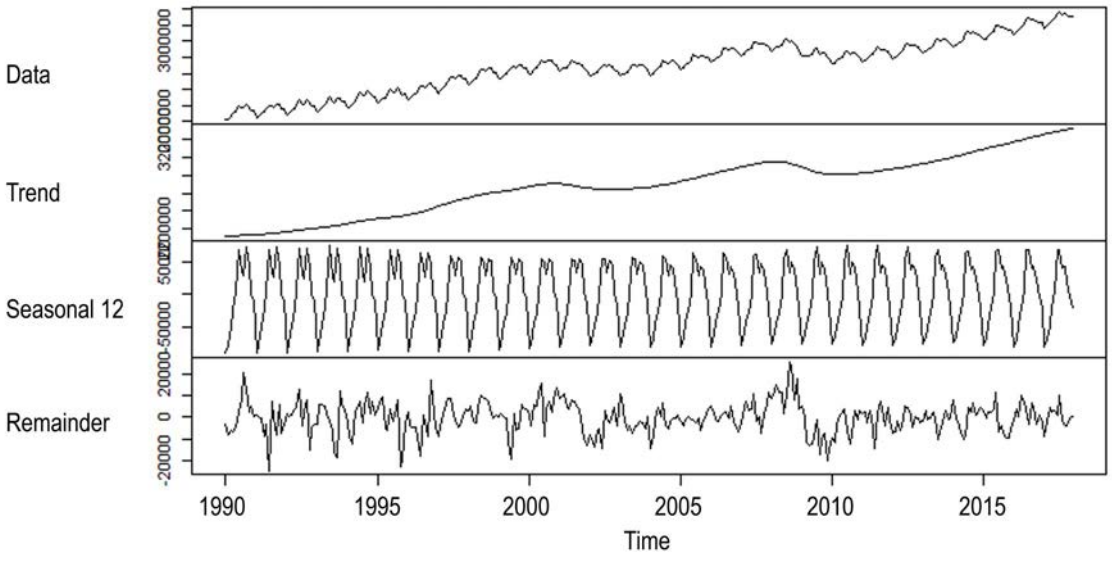
Within the decomposed employment components, trends are a result of structural changes.

There are two steps in the process of time series decomposition:

1. We split the series between; combined trend (which includes trend + cycle), seasonal and irregular components.
2. We split the combined trend (trend + cycle) into trend and cyclical components.

Appendix figure A2-1 represents the main components of decomposition for total employment. The trend component in the figure is the result of the first step of decomposition and represents the combination of trend plus cycle. The trend plus cycle component is used in further processing steps later in the decomposition process.

Appendix figure A2-1. Total employment time series and its main components
Washington state, 1990 to 2017
Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages



We used a state space model with auto selection of model variations (types of error, trend and seasonality). Model variations can be additive, multiplicative, none, etc. The software also includes the choice of 30 exponential smoothing variations. The main advantage of this type of approach lies in the fact that the types of models are not predefined and thus can vary for different series. In standard U.S. Census Bureau ARIMA models, parameters are estimated for each series, but models are predefined and remain the same for all series.

The software selects the model that minimizes the Akaike's Information Criteria (AIC).

The state space approach allows for the optimized selection of models for each individual series. This entails the selection of the best[1] model and then parameters are subject to change as time periods change. This is a major difference from classical regression where estimated parameters (states) remain fixed over time. In addition, under the new approach, regardless of the selection of seasonal or irregular models (additive or multiplicative), the sum of decomposition components (combined trend, seasonal and irregular) remains equal to initial series for each month.

In step two, we used the combined trend series from step one for our analyses of the contributions of structural and cyclical components to growth. To accomplish this, we used the Hodrick-Prescott (HP) filter. This filter is a smoothing method that is widely used among macroeconomists to obtain a smooth estimate of the long-term trend component of a series.

Technically, the HP filter is a two-sided linear filter that computes the smoothed series s of y by minimizing the variance of y around s, subject to a penalty that constrains the second difference of s. That is, the HP filter chooses s to minimize:

$$\sum_{t=1}^{T}(y_t - s_t)^2 + \lambda * \sum_{t=2}^{T-1}[((s_{t+1} - s_t) - (s_t - s_{t-1})]^2$$

The penalty parameter λ controls the smoothness of the series s. The larger the λ, the smoother the s. As $\lambda=\infty$, s approaches a linear trend.

[1] Best can be defined in various ways depending on the results of model performance on training samples.

We used default value λ=14,400 for monthly frequency of the data. This default value was defined by dividing the number of months per year by four raised to a power (default value 2)[2] and multiplying by 1,600. For our purpose, for all series regardless of the model selected, the HP filter chooses s to minimize:

$$\sum_{t=1}^{T}(y_t - s_t)^2 + 14{,}400 * \sum_{t=2}^{T-1}[((s_{t+1} - s_t) - (s_t - s_{t-1})]^2$$

Industry seasonality levels

The level of employment seasonality for an industry is defined as an average of absolute values of the seasonal component divided by the initial series (mean (|seasonal|/employment)). The levels are presented in column three of *Appendix figure A2-2*. A larger level value indicates a larger seasonality value for the industry. To interpret the seasonal factors, arbitrary thresholds were established. Industries with a seasonal factor value of up to 1.0 percent were identified as non-seasonal. Industries with a factor value greater than 1 and up to 2.0 percent were identified as having low levels of seasonality. Industries with a factor value greater than 2 and up through 4.0 percent were identified as having moderate levels of seasonality, while industries with a factor value greater than 4.0 percent were considered to have high levels of seasonality. The results are listed in column four.

Structural and cyclical contributions to industry employment changes

Relative contributions to monthly employment change are calculated as the average for all months of absolute differences (one-month difference) for specific factors (presented in columns five and six of the table in *Appendix figure A2-2*). The percentages of relative contributions for trend (structural) and cycle components are presented in columns seven and eight. The industry that had the lowest cyclical component contribution (15.3 percent) was ambulatory healthcare services, while support activities for mining had the highest cyclical component contribution (65.0 percent). The structural component accounted for the dominant share of change in total employment (77.4 percent), while the cyclical component accounted for the residual (22.6 percent).

To view all columns in one table see: **2018_full_structural_cyclical_table_only.xlsx**

[2] We stayed with the power of two for this analysis, but the other possibility is to use four for the power.

Appendix figure A2-2. Employment decomposition components
Washington state, 1990 to 2017
Source: Employment Security Department/LMEA; Bureau of Labor Statistics, Quarterly Census of Employment and Wages

NAICS	Industry	Seasonal factor	Level of seasonality	Trend (average number)	Cycle (average number)	Trend (percent)	Cycle (percent)
000	Total covered employment	1.52%	Low	4,171	1,220	77.4%	22.6%
111	Crop production	36.75%	High	92	160	36.6%	63.4%
112	Animal production	2.91%	Moderate	8	9	47.3%	52.7%
113	Forestry and logging	3.16%	Moderate	20	13	61.6%	38.4%
114	Fishing, hunting and trapping	7.94%	High	6	7	49.3%	50.7%
115	Support activities for agriculture and forestry	15.38%	High	53	45	54.2%	45.8%
212	Mining (except oil and gas)	3.79%	Moderate	10	6	62.2%	37.8%
213	Support activities for mining	8.77%	High	1	2	35.0%	65.0%
221	Utilities	1.17%	Low	8	9	47.4%	52.6%
236	Construction of buildings	3.34%	Moderate	161	67	70.5%	29.5%
237	Heavy and civil engineering construction	8.76%	High	48	27	63.5%	36.5%
238	Specialty trade contractors	3.71%	Moderate	407	154	72.5%	27.5%
311	Food manufacturing	4.84%	High	39	30	56.9%	43.1%
312	Beverage and tobacco product manufacturing	4.57%	High	21	8	73.1%	26.9%
313	Textile mills	1.77%	Low	2	2	43.3%	56.7%
314	Textile product mills	1.53%	Low	8	6	57.5%	42.5%
315	Apparel manufacturing	2.38%	Moderate	14	10	59.3%	40.7%
316	Leather and allied product manufacturing	4.19%	High	1	2	43.8%	56.2%
321	Wood product manufacturing	1.28%	Low	52	38	57.6%	42.4%
322	Paper manufacturing	0.94%	Not seasonal	28	14	66.2%	33.8%
323	Printing and related support activities	0.80%	NS	27	14	66.1%	33.9%
324	Petroleum and coal products manufacturing	1.93%	Low	4	6	41.7%	58.3%
325	Chemical manufacturing	0.70%	NS	14	10	59.5%	40.5%
326	Plastics and rubber products manufacturing	1.18%	Low	25	14	62.9%	37.1%
327	Nonmetallic mineral product manufacturing	2.50%	Moderate	20	12	62.7%	37.3%
331	Primary metal manufacturing	0.75%	NSl	39	20	66.0%	34.0%
332	Fabricated metal product manufacturing	1.00%	NS	44	29	59.8%	40.2%
333	Machinery manufacturing	0.72%	NS	48	31	60.6%	39.4%
334	Computer and electronic product manufacturing	0.48%	NS	84	55	60.2%	39.8%
335	Electrical equipment, appliance and component manufacturing	1.28%	Low	27	24	53.2%	46.8%
3364	Aerospace product and parts manufacturing	0.99%	NS	390	294	57.0%	43.0%
3366	Ship and boat building	0.66%	NS	45	26	64.0%	36.0%
336*	Other transportation equipment manufacturing	1.00%	NS	25	23	52.3%	47.7%
337	Furniture and related product manufacturing	1.37%	Low	24	14	63.1%	36.9%
339	Miscellaneous manufacturing	1.22%	Low	19	13	59.1%	40.9%

NAICS	Industry	Seasonal factor	Level of seasonality	Trend (average number)	Cycle (average number)	Trend (percent)	Cycle (percent)
423	Merchant wholesalers, durable goods	0.54%	NS	115	54	67.9%	32.1%
424	Merchant wholesalers, nondurable goods	1.80%	Low	44	28	60.9%	39.1%
425	Wholesale electronic markets and agents and brokers	1.07%	Low	62	25	71.0%	29.0%
441	Motor vehicle and parts dealers	1.16%	Low	72	34	68.1%	31.9%
442	Furniture and home furnishings stores	1.83%	Low	23	18	55.7%	44.3%
443	Electronics and appliance stores	2.52%	Moderate	23	25	47.8%	52.2%
444	Building material and garden equipment and supplies dealers	3.67%	Moderate	56	27	67.7%	32.3%
445	Food and beverage stores	1.54%	Low	72	64	52.8%	47.2%
446	Health and personal care stores	1.30%	Low	14	17	45.1%	54.9%
447	Gasoline stations	1.87%	Low	16	13	55.7%	44.3%
448	Clothing and clothing accessories stores	4.58%	High	54	49	52.1%	47.9%
451	Sporting goods, hobby, book and music stores	3.67%	Moderate	32	23	58.0%	42.0%
452	General merchandise stores	3.70%	Moderate	148	73	66.9%	33.1%
453	Miscellaneous store retailers	1.90%	Low	55	17	76.7%	23.3%
454	Nonstore retailers	1.82%	Low	168	46	78.6%	21.4%
481	Air transportation	0.93%	NS	40	19	68.0%	32.0%
483	Water transportation	3.62%	Moderate	5	5	50.3%	49.7%
484	Truck transportation	2.42%	Moderate	37	24	60.9%	39.1%
485	Transit and ground passenger transportation	3.12%	Moderate	12	9	57.7%	42.3%
486	Pipeline transportation	1.55%	Low	1	1	40.8%	59.2%
487	Scenic and sightseeing transportation	18.67%	High	3	5	36.8%	63.2%
488	Support activities for transportation	1.04%	Low	35	29	55.0%	45.0%
491	Postal service	0.96%	NS	25	12	67.1%	32.9%
492	Couriers and messengers	4.67%	High	41	29	59.0%	41.0%
493	Warehousing and storage	3.29%	Moderate	29	27	51.4%	48.6%
5112	Software publishers	0.95%	NS	166	44	79.0%	21.0%
511*	Other publishers	0.66%	NS	36	18	67.3%	32.7%
512	Motion picture and sound recording industries	4.37%	High	13	13	50.1%	49.9%
515	Broadcasting (except internet)	0.96%	NS	6	8	44.8%	55.2%
5171	Wired telecommunications carriers	0.94%	NS	44	30	60.0%	40.0%
5172	Wireless telecommunications carriers (except satellite)	1.80%	Low	47	28	62.6%	37.4%
517*	Other telecommunications	2.91%	Moderate	27	18	59.0%	41.0%
518	Data processing, hosting and related services	1.50%	Low	41	29	58.4%	41.6%
519	Other information services	3.82%	Moderate	56	24	69.5%	30.5%
521	Monetary authorities-central bank	1.03%	Low	1	1	48.1%	51.9%
522	Credit intermediation and related activities	0.32%	NS	100	76	56.7%	43.3%
523	Securities, commodity contracts, and other financial investments and related activities	0.50%	NS	26	17	59.6%	40.4%
524	Insurance carriers and related activities	0.42%	NS	51	37	58.0%	42.0%

NAICS	Industry	Seasonal factor	Level of seasonality	Trend (average number)	Cycle (average number)	Trend (percent)	Cycle (percent)
525	Funds, trusts, and other financial vehicles	5.93%	High	5	5	50.5%	49.5%
531	Real estate	1.44%	Low	59	25	70.4%	29.6%
532	Rental and leasing services	2.46%	Moderate	34	13	72.7%	27.3%
533	Lessors of nonfinancial intangible assets (except copyrighted works)	3.53%	Moderate	3	2	57.0%	43.0%
541	Professional, scientific and technical services	0.41%	NS	332	150	68.9%	31.1%
551	Management of companies and enterprises	0.50%	NS	94	47	66.7%	33.3%
561	Administrative and support services	3.17%	Moderate	382	189	66.9%	33.1%
562	Waste management and remediation services	0.92%	NS	31	29	51.7%	48.3%
611	Educational services	4.90%	High	346	100	77.6%	22.4%
621	Ambulatory healthcare services	0.35%	NS	249	45	84.7%	15.3%
622	Hospitals	0.32%	NS	184	63	74.6%	25.4%
623	Nursing and residential care facilities	0.40%	NS	72	33	68.7%	31.3%
624	Social assistance	1.19%	Low	275	230	54.5%	45.5%
711	Performing arts, spectator sports and related industries	9.14%	High	21	17	55.3%	44.7%
712	Museums, historical sites and similar institutions	3.67%	Moderate	7	6	53.2%	46.8%
713	Amusement, gambling and recreation industries	4.58%	High	77	52	59.9%	40.1%
721	Accommodation	5.71%	High	44	34	56.4%	43.6%
722	Food services and drinking places	2.06%	Moderate	357	100	78.2%	21.8%
811	Repair and maintenance	1.02%	Low	35	23	60.3%	39.7%
812	Personal and laundry services	1.13%	Low	40	15	72.9%	27.1%
813	Religious, grantmaking, civic, professional, and similar organizations	2.22%	Moderate	41	19	68.0%	32.0%
814	Private households	7.73%	High	329	231	58.7%	41.3%
901	Federal government (other)	1.59%	Low	58	59	49.7%	50.3%
902	State government (other)	1.06%	Low	57	49	53.8%	46.2%
903	Local government (other)	2.12%	Moderate	212	78	73.1%	26.9%

* Wild card symbol indicates the component of an economic subsector (3-digit NAICS) without the component of its industry groups (4-digit NAICS) that are listed separately in this figure.

NS = Not seasonal

Theoretical base to identify relations between industry and total employment

The Granger causality test is a technique for determining whether one time series is useful in forecasting another. Put another way, this test answers the question of whether a time series "X" causes time series "Y." Also, it tests to see how much of the current "Y" values can be explained by past values of the same series, and then to see whether adding lagged values of "X" can improve the explanation of the values of Y.

In our case, the question is whether employment in specific industries "Granger-causes" total employment.

Granger causality does not imply true causality. If both series "X" and "Y" are driven by a common third process (variable, series), but with different lags, there would be Granger causality in both directions. However, the changes in one series would not have a significant effect on the other. To address this issue, we estimated Granger causality in both directions. We estimated the impact of specific industry employment on total employment and the impact of total employment on specific industry employment.

Results of industry and total employment analysis

Appendix figure A2-3 represents an attempt to connect employment time series for specific industries with time series of total covered employment. The third column represents correlations of series of monthly employment between industries and total employment, while the fourth column represents correlations of the first differences (monthly changes) for the same series.

The fifth column represents an attempt to identify the industries for which monthly employment could help in predicting the next month's total employment. F-statistics from the Granger causality test for time series, with a lag of one month, are presented in this column. The value of "F" indicates the significance of the impact of employment in the industry on the next month's total employment. Larger values indicate effects that were more significant. Probabilities for the rejection of the hypotheses of significance, associated with F-statistics, are listed in the sixth column. A lower probability indicates higher confidence that the effect is significant. To address the issue of possible mutual causality we also tested inverse causality of total employment on specific industries. As previously noted, if both direct and inverse causality are significant, it means that an industry employment series might not be a good indicator for the next month's total employment. The last column of *Appendix figure A2-3* indicates if significant direct causality of industry on total

employment without significant inverse causality exists (indicator "yes"). All other cases have an indicator of "no". The cutoff for such definitions was the following: p-value for direct test is not more than 0.01, but for inverse test not less than 0.1. Only 9 of 97 industries have the indicator "yes."

The combination of predictive abilities (indicator "yes") and correlation with total employment can be used to identify the main industries that can be used as coincidental and leading (i.e., one-step-ahead) economic indicators. In addition, this combination can be used for the one-step-ahead prediction of employment changes. The industries identified by this process are food services and drinking places; professional, scientific and technical services; building material and garden equipment and supplies dealers; food and beverage stores; heavy and civil engineering construction and crop production.

Appendix figure A2-3. Relationships between industry and total employment
Washington state, 1990 to 2017
Source: Employment Security Department/LMEA; Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)

NAICS	Industry	Coorelation with total employment	Coorelation of first differences	F-statistic Granger test (one-month lag)	Probability	Signficant one-way impact
000	Total covered employment	100.0%	100.0%	NA	NA	NA
111	Crop production	30.7%	73.2%	13.35	0.00	Yes
112	Animal production	81.1%	59.6%	0.41	0.52	No
113	Forestry and logging	-85.7%	50.0%	12.47	0.00	No
114	Fishing, hunting and trapping	-82.3%	-3.5%	0.88	0.35	No
115	Support activities for agriculture and forestry	87.3%	60.3%	7.94	0.01	No
212	Mining (except oil and gas)	-53.0%	54.2%	3.10	0.08	No
213	Support activities for mining	-37.1%	26.6%	4.10	0.04	No
221	Utilities	-62.1%	11.6%	0.94	0.33	No
236	Construction of buildings	62.2%	68.2%	1.85	0.17	No
237	Heavy and civil engineering construction	40.3%	71.3%	11.28	0.00	Yes
238	Specialty trade contractors	87.3%	73.3%	0.18	0.67	No
311	Food manufacturing	-18.0%	55.3%	16.08	0.00	Yes
312	Beverage and tobacco product manufacturing	81.0%	62.9%	2.96	0.09	No
313	Textile mills	-84.3%	23.6%	2.24	0.14	No
314	Textile product mills	-63.7%	40.0%	0.94	0.33	No
315	Apparel manufacturing	-80.6%	40.4%	2.92	0.09	No
316	Leather and allied product manufacturing	-80.7%	-2.4%	0.12	0.73	No
321	Wood product manufacturing	-80.3%	49.7%	1.09	0.30	No
322	Paper manufacturing	-88.5%	24.3%	6.13	0.01	No

NAICS	Industry	Coorelation with total employment	Coorelation of first differences	F-statistic Granger test (one-month lag)	Probability	Signficant one-way impact
323	Printing and related support activities	-81.1%	48.0%	2.92	0.09	No
324	Petroleum and coal products manufacturing	59.3%	31.4%	0.02	0.89	No
325	Chemical manufacturing	64.4%	20.7%	1.72	0.19	No
326	Plastics and rubber products manufacturing	26.7%	47.4%	0.03	0.87	No
327	Nonmetallic mineral product manufacturing	79.3%	65.6%	0.01	0.92	No
331	Primary metal manufacturing	-79.8%	13.8%	0.49	0.48	No
332	Fabricated metal product manufacturing	82.5%	48.5%	1.86	0.17	No
333	Machinery manufacturing	75.7%	28.4%	1.80	0.18	No
334	Computer and electronic product manufacturing	-58.1%	24.8%	0.71	0.40	No
335	Electrical equipment, appliance and component manuf.	91.8%	-4.6%	4.39	0.04	No
3364	Aerospace product and parts manufacturing	-39.0%	8.1%	0.01	0.93	No
3366	Ship and boat building	21.9%	-2.9%	1.46	0.23	No
336*	Other transportation equipment manufacturing	-38.5%	17.9%	0.15	0.70	No
337	Furniture and related product manufacturing	-37.6%	43.6%	0.67	0.41	No
339	Miscellaneous manufacturing	57.5%	34.0%	4.08	0.04	No
423	Merchant wholesalers, durable goods	75.7%	54.1%	0.02	0.88	No
424	Merchant wholesalers, nondurable goods	74.2%	74.9%	29.19	0.00	No
425	Wholesale electronic markets and agents and brokers	77.4%	28.6%	2.42	0.12	No
441	Motor vehicle and parts dealers	77.3%	50.9%	2.59	0.11	No
442	Furniture and home furnishings stores	49.0%	17.4%	6.18	0.01	No
443	Electronics and appliance stores	62.3%	2.6%	4.93	0.03	No
444	Building material and garden equipment and supplies dealers	91.7%	62.7%	31.71	0.00	Yes
445	Food and beverage stores	50.5%	53.8%	10.30	0.00	Yes
446	Health and personal care stores	86.0%	25.1%	23.16	0.00	No
447	Gasoline stations	-59.1%	55.6%	1.06	0.30	No
448	Clothing and clothing accessories stores	8.2%	23.3%	66.71	0.00	Yes
451	Sporting goods, hobby, book and music stores	42.1%	26.7%	50.05	0.00	No
452	General merchandise stores	91.5%	20.0%	9.43	0.00	No
453	Miscellaneous store retailers	57.6%	37.9%	5.91	0.02	No
454	Nonstore retailers	80.7%	27.4%	2.57	0.11	No
481	Air transportation	-14.6%	24.0%	0.14	0.71	No
483	Water transportation	54.6%	47.2%	0.45	0.50	No
484	Truck transportation	84.6%	72.2%	5.90	0.02	No
485	Transit and ground passenger transportation	93.4%	24.0%	2.67	0.10	No
486	Pipeline transportation	-58.1%	3.5%	0.31	0.58	No

NAICS	Industry	Coorelation with total employment	Coorelation of first differences	F-statistic Granger test (one-month lag)	Probability	Signficant one-way impact
487	Scenic and sightseeing transportation	-29.2%	12.0%	0.54	0.46	No
488	Support activities for transportation	96.2%	27.8%	8.77	0.00	No
491	Postal service	-38.6%	14.5%	5.73	0.02	No
492	Couriers and messengers	69.0%	17.5%	13.10	0.00	No
493	Warehousing and storage	11.6%	47.7%	8.94	0.00	Yes
5112	Software publishers	96.2%	28.8%	5.32	0.02	No
511*	Other publishers	-58.8%	31.9%	1.70	0.19	No
512	Motion picture and sound recording industries	81.6%	12.1%	10.33	0.00	No
515	Broadcasting (except internet)	-84.4%	24.8%	11.26	0.00	No
5171	Wired telecommunications carriers	-58.0%	-2.4%	0.32	0.57	No
5172	Wireless telecommunications carriers (except satellite)	75.2%	1.0%	0.01	0.93	No
517*	Other telecommunications	-41.0%	8.9%	0.73	0.39	No
518	Data processing, hosting and related services	67.9%	-2.0%	2.31	0.13	No
519	Other information services	85.2%	-4.9%	5.57	0.02	No
521	Monetary authorities-central bank	-72.4%	7.4%	3.57	0.06	No
522	Credit intermediation and related activities	29.3%	15.9%	0.21	0.65	No
523	Securities, commodity contracts and other financial investments and related activities	94.0%	21.3%	2.38	0.12	No
524	Insurance carriers and related activities	79.5%	29.9%	0.02	0.88	No
525	Funds, trusts and other financial vehicles	-91.2%	15.4%	9.61	0.00	No
531	Real estate	97.2%	64.9%	5.09	0.02	No
532	Rental and leasing services	-15.0%	53.1%	1.53	0.22	No
533	Lessors of nonfinancial intangible assets (except copyrighted works)	8.8%	0.1%	0.13	0.72	No
541	Professional, scientific and technical services	96.4%	18.9%	12.16	0.00	Yes
551	Management of companies and enterprises	86.9%	-4.9%	5.44	0.02	No
561	Administrative and support services	97.7%	72.5%	0.52	0.47	No
562	Waste management and remediation services	37.2%	35.4%	0.62	0.43	No
611	Educational services	86.4%	16.8%	5.66	0.02	No
621	Ambulatory healthcare services	94.4%	39.9%	5.83	0.02	No
622	Hospitals	95.2%	23.9%	4.63	0.03	No
623	Nursing and residential care facilities	94.8%	36.5%	2.83	0.09	No
624	Social assistance	87.7%	9.5%	5.98	0.02	No
711	Performing arts, spectator sports and related industries	43.4%	46.7%	2.24	0.14	No
712	Museums, historical sites and similar institutions	96.0%	19.3%	12.43	0.00	No
713	Amusement, gambling and recreation industries	91.6%	33.8%	7.94	0.01	No
721	Accommodation	86.2%	57.1%	0.63	0.43	No

NAICS	Industry	Coorelation with total employment	Coorelation of first differences	F-statistic Granger test (one-month lag)	Probability	Signficant one-way impact
722	Food services and drinking places	98.1%	72.2%	15.37	0.00	Yes
811	Repair and maintenance	66.2%	52.3%	1.35	0.25	No
812	Personal and laundry services	94.3%	65.7%	5.43	0.02	No
813	Religious, grantmaking, civic, professional and similar organizations	96.7%	46.6%	2.51	0.11	No
814	Private households	25.1%	-0.5%	0.28	0.60	No
901	Federal government (other)	41.1%	21.6%	0.07	0.79	No
902	State government (other)	84.2%	23.7%	0.40	0.53	No
903	Local government (other)	94.5%	30.9%	0.81	0.37	No

Significant, direct causality of industry on total employment, displays a “Yes” indicator in the last column.

*Wild card symbol indicates the component of an economic subsector (3-digit NAICS) without the component of its industry groups (4-digit NAICS) that are listed separately in this figure.

Appendix 3. Use and misuse of employment projections

Employment Projections are intended for career development over time, not as the basis for budget or revenue projections, or for immediate corrective actions within the labor market.

Employment projections provide a general outlook for industries and occupations in Washington state. Occupational projections show how many job openings are projected due to occupational employment growth and replacement needs (*separations and alternative*).[2] For technical details see: ***2018 Employment Projections Technical Report***.

For the *separations* method, replacement includes openings created by retirements and occupational separations. It does not measure turnover within occupations, i.e., when workers stay within the same occupation, but change employers. For the *alternative* method, replacement includes normal turnover as workers go from one employer to another while staying in the same occupation. *Separations*' total openings from occupational projections do not represent total demand, but can be used as an indicator of demand. *Alternative* total openings for occupational projections do represent total demand. Total demand may be filled by new entrants to the state market. New entrants can be workers from other states or nations, and new entrants can also be graduates from this state, other states or nations. In addition, occupations can be filled by workers already within the market, within a given occupation or from another occupation. Available job openings cannot be reserved for any of these categories since the majority of jobs are open and competitive.

Occupational details for employment (with at least 10 jobs) are presented for the state and all workforce development areas in our employment projections data files available online at **https://esd.wa.gov/labormarketinfo/projections**.

[2] This is discussed in the 2018 Employment Projections Technical Report at: https://esd.wa.gov/labormarketinfo/projections. Due to the non-additive for calculating total openings, in this round of projections we calculated total openings for aggregated occupations as a total for detailed occupations. As a result, the aggregated level of total openings might not equal the total of growth plus replacement.

Observed and predicted extremes in employment growth and other indicators, such as fastest-growing occupations and shortage of skills, can be used for placement and short-term training decisions. However, these should be limited for use when developing long-term education programs. There are two main reasons for this limitation:

1. First, with more education targeting occupations with skills shortages, there is a higher probability that this will cause an oversupply in those occupations and skills sets.[3]

2. Second, the general development of transferable skills is much more productive than trying to catch up with a skills shortage.

The U.S. Bureau of Labor Statistics cautions on using Office of Management and Budget (OMB) classifications: "The 2010 SOC was designed solely for statistical purposes. Although it is likely that the 2010 SOC also will be used for various non-statistical purposes (e.g., for administrative, regulatory, or taxation functions), the requirements of government agencies or private users that choose to use the 2010 SOC for non-statistical purposes have played no role in its development, nor will OMB modify the classification to meet the requirements of any non-statistical program.

Consequently, the 2010 SOC is not to be used in any administrative, regulatory, or tax program unless the head of the agency administering that program has first determined that the use of such occupational definitions is appropriate to the implementation of the program's objectives."[4]

Different programs use different SOC coding systems. Combining the employment projections with other data sources generally requires a case-by-case analysis; an understanding of the differences of each program should be clearly explained and properly handled.

[3] Occupational projections are the basis of the Occupations in Demand list. This list is used for determining eligibility for a retraining program (Training Benefits), as well as other education and training programs. See: https://esd.wa.gov/labormarketinfo/LAAO.

[4] See: www.bls.gov/soc/soc_2010_user_guide.pdf, pages xxv-xxvi.

Appendix 4. Occupations in Demand (OID) methodology

Employment projections are the basis of the Occupations in Demand (OID) list covering Washington's 12 workforce development areas and the state as a whole. This list is used to determine eligibility for a variety of training and support programs, but was initially created to support the unemployment insurance Training Benefits Program.

The full OID list is accessible through the "Learn about an occupation" tool located at: **https://esd.wa.gov/labormarketinfo/LAAO**.

All occupations in the list have demand indication definitions. The definitions come in three forms; in demand, not in demand or balanced. These definitions indicate the probability of a job seeker gaining employment in a given occupation. The term in demand indicates a greater probability of gaining employment. The term not in demand indicates a lesser probability, and balanced indicates an uncertain probability between success and failure in gaining employment.

The definitions are created through a four-step process.

The data sources for the OID list:

The 2018 list is based on projections with state specific alternative rates used for turnover openings:

- Five-year projections for 2016 to 2021, using average annual growth rates and total job openings.
- Ten-year projections for 2016 to 2026, using average annual growth rates and total job openings.
- A combination of two-year (second quarter 2017 to second quarter 2019) and ten-year (2016 to 2026) projections, using average annual growth rates and total job openings.

All of these time frames use unsuppressed occupations with employment in a base year (2016), consisting of 50 or more employees, for the state and workforce development areas (WDAs).

In addition to projections, the OID list is created using supply and demand data:

- Supply data: annual counts of unemployment claimants for WDAs for the period April 2017 to April 2018.
- Demand data: annual counts of job announcements from Help Wanted OnLine (HWOL) mid-monthly time series for the period April 2017 to April 2018.

Step one: *Identify initial "in demand" and "not in demand" categories for each period.*

- For each time frame, occupations with average annual growth rates of at least 90 percent of their respective geographic area's (statewide or WDA) total average annual growth rates and a share of total openings of at least 0.08 percent are defined as in demand.
- Occupations with average annual growth rates less than 70 percent of their respective geographic area's total growth rates and a share of total openings of less than 1.0 percent are defined as not in demand.

Step two: *Identify provisional occupational categories.*

- If within any of the three projection time frames (five-year, 10-year and two-/10-years combined), an occupation is categorized as being in demand, it receives the first provisional identification as in demand.
- If within any of the three projection time frames, an occupation is categorized as not in demand, it receives a second provisional identification of not in demand.

Step three*: Create final projections definitions.*

- If an occupation has only one provisional definition, it equals the final projections definition.
- If an occupation has two provisional definitions of in demand and not in demand, it gets identified as balanced.
- All other occupations, without provisional definitions (i.e., not meeting the thresholds from step one), are identified as balanced.

Step four: *Create final adjustment definitions.*

The projections definitions are now put through an adjustment process, using current labor market supply/demand data which compares online job announcements to information on unemployment insurance (UI) claimants.

Adjustments are applied when current supply/demand data significantly contradicts the model-based projections definitions.

The adjustment methodology

- Supply/demand data are used for adjustments if they are significant. Significant supply/demand data exist when the largest values between announcements and UI claimants/job seekers are greater than 100, or are between 50 and 100, and these values are more than 10 percent of annual job openings for the period 2016 to 2026.
- If the projections definition is in demand or balanced but the ratio of supply to demand is more than 2.5, then the adjusted definition is not in demand.
- If the projections definition is in demand and the ratio of supply to demand is not larger than 2.5, but more than 1.5, then the adjusted definition is balanced.
- If the projections definition is not in demand or balanced, but the ratio of supply to demand is less than 0.4, then the adjusted definition is in demand.
- If the projections definition is not in demand and the ratio is at least 0.4, but less than 0.6, then the adjusted definition is balanced.

The final list: Local adjustments

The Employment Security Department's Workforce Information and Technology Services division uses the methodology outlined above to prepare the initial lists for the state as a whole and by workforce development area. Those lists are then given to local workforce development councils to review, adjust and approve based on their local on-the-ground experience.

Appendix 5. Skill projections

Within the skills process, occupational projections are converted into skills projections. We rely on the content of employers' job postings rather than predefined, general O*NET skills.

Data sources

The main source for this analysis was a download of the top 100 hard skills for each detailed (six-digit SOC) occupation for Washington state from WANTED Analytics. The downloaded files represent extracted hard skills for each occupation from online job announcements, posted in the last three years (from July 2014 to June 2017).[5] Only a maximum of 100 skills are available for each occupation. Each skill is displayed with the number of job announcements from which it was extracted. The extracted skill numbers constitute a vector, up to a count of 100, for each occupation. A skill drawn from a greater number of job announcements is relatively more important. The number of job announcements is summed for each occupation. Some occupations contain very few, if any, listed skill components and thus the summation value for a given occupation can be very small or nonexistent.

For creating skills-to-occupations matrices, we included occupations that satisfy the following conditions only:

1. Total skill counts are greater than five.
2. Total skill counts are greater than two percent of base year employment.

Each included occupation's vector of skill numbers was normalized (i.e., scaled) to totals of one.

By combining these vectors, we created skills-to-occupations matrices. These matrices were used to convert occupational estimations and projections into comparable numbers expressed as hard skills.

The skills/occupational matrices are similar in structure and function to normalized matrices used for occupational/industries staffing patterns. The skills matrices were based on statewide data and were used to convert occupational projections for the state and all WDAs into skills projections.[6]

[5] Occupational In last year's projections report we used a sample for the period May 2014 to April 2017.

[6] WANTED Analytics data might include duplicated job announcements. Normalization of the matrices eliminates these inflated totals, but bias is still possible.

After conversion, we deleted all records where estimated or projected employment numbers were below five. We consider estimations below five as unreliable. As a result of filtering out missing skill/occupation vectors and removing results below five, only a portion of the occupational employment estimates were converted into skills.

The conversion size of occupational employment to skills employment, calculated on base year employment (second quarter 2017), varies between 91.61 percent for the Seattle-King County WDA to a low of 72.39 percent for the North Central WDA. The combined ratio for all WDAs is 87.70 percent and for the state is 88.61 percent.

Some results

The skills to occupational matrices have different dimensions for the state's areas based on data availability. As a result, the largest number of detailed skills were 3,643 for Washington State, followed by Seattle-King County WDA at 3,072. The lowest number was for Eastern Washington at 1,241 skills.

The top six detailed hard skills for the state and all areas, based on projected numbers of openings and available number of jobs in 2017Q2, are relatively stable between areas (order may vary). The top six skills based on projected numbers of job openings for the state are: Food preparation, Bilingual, Forklifts, Mathematics, Quality Assurance and Freight+. These are the same top six skills listed in last year's report, but in slightly different order. The stability among areas is no surprise since the same statewide matrix was used for all areas. The combined top six skills represent 15.26 percent of total openings for the state.

For the state and Seattle-King County, the fastest skill growth, for all periods, is projected for skills related to information technology (IT). The IT skills are very specific, vary from area to area, and the majority, individually, are not large in terms of employment and job openings. The top 47 skills at the state level, with annual openings of at least 100, with the largest annual average growth rates, from 2016 to 2026 are related to IT. The top six of these IT skills are: Scala, Spark, Asynchronous JavaScript and XML, Selenium, Spring and AngularJS.

However, for all WDAs and the state, the combined totals for these fastest growing six detailed occupations represents an insignificant share, less than 0.1 percent of total openings represented in the skill projections.

At the state level only, these fastest growing top 47 skills (all IT related), combined, represent 1.29 percent of total state skill-forecast openings. For total job openings, 22.38 percent have IT skills as the primary skill.

The top 20 detailed skills for Washington state based on a combined (average) rank of annual average openings and growth rates for 2016 to 2026 are presented in *Appendix figure A3-1*.

Appendix figure A5-1. Top 20 skills ranked by combined average annual openings and growth
Washington state, 2016 to 2026
Source: Employment Security Department/LMEA; WANTED Analytics

Combined rank	Hard skill titles	Estimated hard skill employment numbers 2016	Projected hard skill employment numbers 2026	Average annual growth rate 2016-2026	Total average annual openings
1	Java	7,689	11,122	3.76%	2,953
2	JavaScript	3,607	5,439	4.19%	1,467
3	C#	4,474	6,538	3.87%	1,709
4	C/C++	4,757	6,793	3.63%	1,732
5	Web services	5,955	8,224	3.28%	2,299
6	Linux	5,590	7,767	3.34%	2,083
7	Agile Software Development	3,723	5,384	3.76%	1,491
8	Python	6,278	8,593	3.19%	2,255
9	Big Data	5,009	6,846	3.17%	1,886
10	Systems Development Life Cycle	3,169	4,587	3.77%	1,250
11	Amazon Web Services	2,189	3,335	4.30%	892
12	Structured query language	18,990	24,774	2.69%	6,866
12	Hypertext markup language	4,112	5,628	3.19%	1,618
14	Cloud Computing	6,165	8,185	2.87%	2,368
15	User Experience design	2,138	3,223	4.19%	880
16	Cascading Style Sheets	2,388	3,494	3.88%	977
17	Scrum agile methodology	3,203	4,528	3.52%	1,280
18	Microsoft SQL Server	3,665	5,065	3.29%	1,383
19	Graphical User Interface design	3,709	5,038	3.11%	1,433
19	Distributed system	1,822	2,756	4.23%	729

All of the top 20 skills are related to information technology.

The top 20 occupations represent 3.1 percent of total openings in the skills forecast. Sixteen of the top 20 skills are identical to last year.

The majority of skills, especially related to information technology (IT) and high-tech, are very specific and their numbers are dispersed among all occupations. As a result, these detailed skills normally do not represent a significant share of total numbers.

Information technology

In the skills forecast, at the state level and for the majority of WDAs, the largest group of skills, based on job openings only, are IT related. Only the North Central and South Central WDAs had production skills in first place with IT in second place.

At the state level, IT skills represent 22.38 percent of average annual total openings for the period 2016 to 2026 and have the highest growth rate of 2.02 percent. Food preparation and service skills came in second with a growth rate of 2.0 percent.

It is interesting to note that out of a total of 633 occupations converted to skills at the state level, IT skills are present in 583 occupations. For 238 of these occupations, IT skills comprise more than one-quarter of total numbers and for 86 they comprise more than one-half of total numbers.

IT skills naturally dominate shares in computer-related occupations, but also have a very high share in occupations whose primary occupational focus is not computers. The top 15 occupations, with high computer skill requirements, based on IT shares (with IT skill numbers more than 100) are presented in *Appendix Figure A3-2*.

Appendix figure A5-2. Occupations, not primarily computer related, with the largest shares of computer skill requirements
Washington state, 2017 second quarter occupational estimations (June 2014 to May 2017 sample, skills/occupations matrices)
Source: Employment Security Department/LMEA; WANTED Analytics

SOC	Occupation	Share of skills that are IT
271022	Fashion Designers	0.849
492095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	0.814
271014	Multimedia Artists and Animators	0.807
193011	Economists	0.776
439111	Statistical Assistants	0.773
191029	Biological Scientists, All Other	0.766
254011	Archivists	0.760
271013	Fine Artists, Including Painters, Sculptors, and Illustrators	0.752
152011	Actuaries	0.736
271024	Graphic Designers	0.728
131161	Market Research Analysts and Marketing Specialists	0.724
271021	Commercial and Industrial Designers	0.716
152041	Statisticians	0.700
152031	Operations Research Analysts	0.689
131111	Management Analysts	0.688

Thirteen of the current 15 occupations are the same as in last year's report.

Skill based related occupations

Skills–to-occupations matrices allow us to create a tool for defining related occupations, based on common skills. To achieve this, we calculated a matrix of correlations based on skills between occupations. The results are presented in the macro-enabled file, reloccup_skills_2018.xlsm. The matrix in the file's "main" tab is symmetric around the main diagonal. The main diagonal has all 1s in it. There are two ways of using the file's data when opened with the enabled-macros feature:

1. You can select an occupational title of interest, from a column heading, in the "main" tab and then sort the numbers below the title of interest from largest to smallest. Starting from row 3 in column B you would see the sorted list of related occupations (row 2 will be the same occupation as selected). To restore the original sort-configuration, sort the key-column (column A) from smallest to largest.
2. You can select an occupation of interest, from a column heading, in the "main" tab and then click the Ctrl and A keys simultaneously. This will execute a macro. The macro opens a table in a "table" tab. In the table, you will find a list of the top 15 occupations related to your occupation of interest.

An example of a list for software developers, applications is in *Appendix figure A5-3*.

Appendix figure A5-3. Top 15 occupations related to software developers, applications
Washington state, 2018
Source: Employment Security Department/LMEA; WANTED Analytics

SOC	151132-Software Developers, Applications
151131-Computer Programmers	0.820
151134-Web Developers	0.759
151199-Computer Occupations, All Other	0.753
151133-Software Developers, Systems Software	0.585
151111-Computer and Information Research Scientists	0.567
151121-Computer Systems Analysts	0.558
191029-Biological Scientists, All Other	0.414
439111-Statistical Assistants	0.413
172061-Computer Hardware Engineers	0.400
113021-Computer and Information Systems Managers	0.400
151141-Database Administrators	0.382
251021-Computer Science Teachers, Postsecondary	0.378
151142-Network and Computer Systems Administrators	0.346
119041-Architectural and Engineering Managers	0.340
271027-Set and Exhibit Designers	0.336

Numbers in the table represent coefficients of correlations for normalized vectors of skill shares

The related occupations tool may be useful for job seekers. The results are specific for Washington state since the skills come from job announcements in this state.

Conclusions

Our view is that it is more important to connect education and training programs with real world skill requirements than with generic occupational skills definitions.

Some skills with large projected numbers of openings are well defined and can be linked to different levels of training. Examples of skills with the largest numbers of projected openings are: Bilingual (with a separate skill in bilingual Spanish), Mathematics, Food preparation, Forklifts, etc.

A second significant group of skills which for the most part are well defined in terms of primary activities, but which require significant secondary skills related to information technology are: Quality Assurance, Quality control, Risk assessment, Lean Manufacturing, Lean Six Sigma and different engineering skills. These types of skills are much more dispersed than the first group. Relating this second skill group to training is more complicated. While primary fields are relatively stable and well defined, IT skill sets are constantly changing. IT skills are concentrated mainly in software, algorithms, some hardware and in web applications. Since required IT skill sets change frequently, specific software applications should be given a secondary emphasis in training.

Though IT skills are a very large group, they are highly dispersed amongst detailed skills and are subject to frequent changes. Some specific skills, like those in *Appendix figure A3-1* are important and help graduates enter the labor market or move to higher paid jobs. However, in the long run, it might be worth giving priority to foundational academic subjects like math and formal logic, multidimensional design, and foundational concepts in object oriented programing. In other words, foundational abilities to learn, develop and implement new knowledge and technology in the long run should take priority for career preparation.

Future possibilities

Skill forecasts at this time are still in an experimental phase. Improvements in web scraping techniques will allow us to improve our skills products. It will also continue to be important to establish a direct connection between specific skills required by employers and education and training programs.

Appendix 6. Frequently asked questions

Q: **What are the steps in industry projections?**

A: There are two major steps in industry projections. The first step is developing aggregated statewide industry projections using the Global Insight model. The second step produces detailed industry projections. The principal data source for industry projections is a detailed covered employment time series of four-digit NAICS data for all Washington counties, specifically, the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW).

Q: **Why are the detailed industry projections not comparable with U.S. Bureau of Labor Statistics, Current Employment Statistics (CES) definitions?**

A: Industry projections are disaggregated according to U.S. Bureau of Labor Statistics, Occupational Employment Statistics (OES) definitions, which are somewhat different from CES.

Q: **What is the source for occupational/industry ratios?**

A: The primary source for occupational/industry ratios is the OES survey. However, this survey uses different area designations than the state's workforce development areas (WDAs) and has limited industry coverage (agriculture, non-covered employment, private households and self-employment are excluded) necessitating the use of other staffing patterns as well.

Q: **Why can the ratio for industry and occupational projections differ from the OES survey outputs?**

A: We use raw sample and limited numbers of imputations while standard OES processing using significant share of imputations. We also use extra information from WEB job announcements. In cases when sample is weak or missing, we use substituted area (state staffing patterns) or combined areas (King and Snohomish counties).

Q: **Why can occupational/industry ratios differ between the base year and projected years?**

A: This is due to the use of change factors, which predict changes in the occupational shares for each industry over time.

Q: **Why can't projections be benchmarked or verified?**

A: There are no administrative records for employment by occupation; therefore, the data cannot be reliably benchmarked or verified by non-survey means.

Q: **How are occupational projections used?**

A: Occupational projections are the only data source for the statewide and WDA-specific occupational outlook. Projections are also the foundation for developing the Occupations in Demand list, which is used to determine eligibility for a variety of training and support programs, but was created to support the unemployment insurance Training Benefits Program.

Q: **How are industry projections used?**

A: Industry projections can be used by policy makers, job seekers, job counselors and economic analysts. For any policy decisions, the projections should be supplemented with other available data sources (e.g., unemployment insurance claims, educational data, job announcements, etc.)

Q: **Which occupational codes are used?**

A: The 2010 Standard Occupational Classification (SOC) system was used for this round of projections. Some aggregation were made to reflect recent changes in the Occupational Employment Statistics (OES) program, which replaced 21 detailed occupations with 10 new aggregations.

Q: **Can the SOC be used for administrative purposes?**

A: According to BLS, the 2010 SOC was designed solely for statistical purposes. To use SOC for administrative programs, the head of an agency considering using SOC must first determine if the use of SOC definitions is appropriate for a program's objectives.

Q: **Why don't the occupational totals by WDA equal the state total?**

A: The totals are not additive due to the use of local staffing patterns for projections by WDA, which differ from the statewide staffing pattern.

Q: **What is the difference between the Bureau of Labor Statistics separations rate and alternative state specific rate methodologies?**

A: The separations method measures job openings created by workers who leave occupations and need to be replaced by new entrants. In this method, workers who exit the labor force or transfer to an occupation with a different Standard Occupational Classification (SOC) are identified as generating separations openings at the national level. This means that jobs filled by workers within the same occupations, are not identified as new jobs.

The alternative rates track openings created by turnover within occupations (i.e., workers stay within occupations but transfer to different companies) and when workers leave one occupation for another or leave the workforce. In contrast to separation methodology alternative openings represent total job openings. The rates are specific for Washington state.

Appendix 7. Glossary of terms

Industries

A classification of business establishments based on their specific economic activity.

North American Industry Classification System (NAICS)

North American Industry Classification System (NAICS) is the system used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing and publishing statistical data related to the U.S. business economy. NAICS was developed under the authority of the U.S. Office of Management and Budget.

Occupation

A job or profession, a category of jobs that are similar with respect to the work performed and the skills possessed by the workers.

Occupational projections

Industry projections converted to occupations, based on occupational/industry ratios.

Standard Occupational Codes (SOC)

Standard Occupational Classification (SOC) is the system used by federal statistical agencies in classifying workers into occupational categories for the purpose of collecting, calculating or disseminating data. All workers are classified into their occupational definitions which are structured at four levels of aggregation. SOC was developed under the authority of the U.S. Office of Management and Budget.

Total occupational estimations and projections

Total occupational estimations and projections are calculated to describe employment in the base year and future time periods.