Introducing Modeled Wage Estimates by grouped work levels

The Modeled Wage Estimates (MWE) provide annual estimates of average hourly wages for occupations by job characteristics and within a given geographical location. These estimates are produced by borrowing from the strength and breadth of the Occupational Employment and Wage Statistics (OES) and National Compensation Survey (NCS) programs to provide more details on occupational wages than either program provides individually. Job characteristics refer to the attributes of workers within an occupation and include worker bargaining status (union and nonunion), work status (part-time and full-time), basis of pay (incentive-based or time-based), and work level (levels 1–15). In this article, we present experimental estimates calculated by grouping work-level data. Grouped level estimates may help researchers, human resources professionals, jobseekers, and other data users to get a better understanding of how pay varies for entry, intermediate, and experienced work levels.

The U.S. Bureau of Labor Statistics (BLS) first introduced Modeled Wage Estimates (MWE) in the 2013 article, “Wage estimates by job characteristic: NCS and OES program data,” and the first set of estimates were produced in 2016. Since then, MWE data have been published annually and provide average hourly wage estimates for occupations by job characteristics and geographical locations. These estimates are produced by combining data from two BLS programs—the Occupational Employment and Wage Statistics (OEWs) and the National Compensation Survey (NCS).

The occupational and geographic wage data from the OEWs are combined with the job characteristics: bargaining status (union and nonunion), work status (part-time and full-time), basis of pay (incentive-based and time-based), and work level wage data from the NCS. By drawing on the strengths of each of the surveys, the MWE provide more information on occupational wages in geographical areas by job characteristics than each survey can provide individually. This article introduces grouped level estimates by providing the methodology used. The full set of experimental grouped work-level estimates including the relative standard errors and a listing of grouped work levels for each occupation and associated break level are available for download. (See source data.)

Work levels

The “Guide for Evaluating Your Firm’s Jobs and Pay” provides an explanation of how the BLS determines work levels in the NCS. Work levels provide insight into differences in compensation due, in part, to four job factors—the knowledge necessary, job controls and complexity, nature and purpose of contacts, and the physical environment for or of the job. Each factor consists of several levels, with an associated description and assigned points. The total points from the four factors are used to determine the work level for occupations. With the exception of the knowledge factor, a common scale is used for all occupations.

Points for job controls and complexity range from 100 to 1,950 points. Work performed at 100 points includes jobs where employees do not deviate from established procedures or direction provided by the supervisor. Tasks are clearly identified and related with little to no choice necessary to perform them. Work consists of simple and repetitive tasks, and the work has minimal impact outside the immediate organizational unit. Work performed at 1,950 points includes jobs where employees work with only administrative and policy direction and must define objectives, plan work, and develop new methods that influence workplace activities.

Points for the nature and purpose of contacts range from 30 to 280 points. Work performed at 30 points includes jobs where employees’ contacts are primarily with coworkers inside the organization unit or visitors to the work area (such as the public), and straightforward information is exchanged. Work performed at 280 points includes jobs where employees’ contacts are somewhat unstructured and primarily with technical individuals (such as scientists and engineers) as well as influential individuals inside and outside of the employing organization (such as elected officials, managers, media representatives, judges, or attorneys), and the nature of the contacts includes defending, negotiating, or resolving long-range issues and problems.

Points for the physical environment range from 10 to 100 points. Work performed at 10 points includes nonstrenuous jobs with low risk. This includes jobs that are primarily sedentary where workers may also walk, stand, or carry light objects. Work performed at 100 points includes strenuous jobs with high risk. This includes jobs required to lift more than 50 pounds or that involve climbing or running. These jobs may also include extreme temperatures, have a likelihood of physical attack, or potential exposure to smoke or fire.

As previously mentioned, points for knowledge do not use a common scale as the other factors, but points are assigned based on job families. The explanation of job guide factors in the “Guide for Evaluating Your Firm’s Jobs and Pay” provides an overview of the job families and a summary of the occupations covered. The occupations within the same job family use a common point scale based on the knowledge and the skill necessary for the job. For example, the knowledge point scale for service jobs, which include cashiers, dishwashers, and concierges, begins at 50 points and corresponds to knowledge of simple, routine, or repetitive tasks, which typically includes following step-by-step instructions. Workers in this job family may also need the skill to operate simple equipment or equipment that requires little or no prior training or experience in food, health, or janitorial occupations. Service jobs have a maximum of 1,250 knowledge points. This includes knowledge of many concepts, principles, and practices in a field. Comprehensive, intensive, and practical knowledge of the job or skill to develop new methods, approaches, or procedures to tailor the goods produced or services provided are necessary. Some executive chefs may match these knowledge criteria for the maximum knowledge points.

Once points have been assigned for each job factor, they are summed. The work level is determined as shown in exhibit 1. Suppose a job in the janitors and cleaners’ occupation was assigned 100 points for job controls and complexity, 75 points for contacts, 40 points for physical environment, and 200 points for knowledge. The 415 points correspond to work level 2. The 2020 MWE publication provided estimates for janitors and cleaners at the national level, 48 states, the District of Columbia, as well as 474...
The MWE work levels provide information about compensation in the national economy by accounting for differences in the knowledge, job controls and complexity, contacts, and the physical environment of occupations. There are 347 estimates available for work level 1 janitors and cleaners, 527 for work level 2, 526 for work level 3, 379 for work level 4, and a single estimate for work level 5. As human resources professionals evaluate their firm’s pay, workers and employers engage in wage negotiations and workers assess differences in pay across the country. When that is done, it is necessary to compare average hourly wages by controlling for attributes that affect pay. Evaluating pay for janitors and cleaners can be reliably performed for work levels 2 and 3; the lack of data for other work levels and characteristics complicates the analysis. Over the years, the NCS program has looked for better ways to present leveling data to help users understand how job factors affect pay.

Why is it important to group levels?

As wages tend to increase along with the progression in work level, stakeholders have expressed interest in understanding the differences in pay for entry, intermediate, and experienced work levels. In the labor market, wage progression resulting from more experience, credentials, or complexity of tasks differs by occupation. Using the individual work levels does not allow for comparison of entry level, intermediate level, and experienced level across occupations. But grouping the work levels and allowing them to vary by occupation allows for these broad comparisons. Even though it is possible for data to be available for 15 levels for a given occupation, it generally does not occur as illustrated by the knowledge point differences by occupational family. That is, work levels may be clustered; for example, leveling data for food preparation workers are concentrated within the 1–5 level range. For electro-mechanical technicians, an occupation that typically requires an associate degree or a postsecondary certificate, leveling data are available in the 4–9 range, and for chief executives the 11–15 range. Given the difference in work-level ranges, the NCS program evaluated grouping work levels to allow for additional evaluation of compensation differences.

How are levels grouped?

The Jenks optimization method is an algorithm that identifies the optimal number of groups from a domain (in this case occupations). To do this, the sum of squared deviations from the average (mean) wages is calculated for grouped work levels based on the cluster that minimize the sum of within-group deviations. To simplify the evaluation of work-level clusters, two (to represent entry and experienced levels) and three groups (to represent entry, intermediate and experienced levels) were generated for each detailed occupation (six-digit 2010 Standard Occupational Classification code). In addition to the Jenks natural breaks, the NCS program evaluated the difference in log wages between groups and share of employment. These additional criteria identified occupations that should not be leveled, as meaningful distinctions between groups could not be determined. It also identified occupations that should be estimated using two or three work-level groups. Occupations like food preparation workers, waiters and waitresses, or nursing assistants could only be grouped into the entry and experienced levels, as additional meaningful wage differences were not found beyond these two groupings. For occupations such as loan officers, meaningful wage distinctions were found when using three groups. In 2019, work levels were available for loan officers from level 6 to level 12. As shown in table 1, the wages for levels 6–8 were very similar as were wages for levels 9 and 10. By grouping the work levels using the Jenks optimization method, users can understand the compensation progression of occupations. The associated relative standard errors provide an indication about the reliability of the estimates. Although comparing the individual work levels would provide more granular information, this is not always possible, especially in more detailed areas. The NCS sample is not sufficiently large to provide wage estimates for each work level. By grouping the work levels, more data are available to produce the estimates.
Table 1. Average hourly wages for loan officers, 2019

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate (in dollars)</th>
<th>RSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grouped levels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entry</td>
<td>25.01</td>
<td>12.99</td>
</tr>
<tr>
<td>Intermediate</td>
<td>36.82</td>
<td>4.01</td>
</tr>
<tr>
<td>Experienced</td>
<td>52.72</td>
<td>4.42</td>
</tr>
<tr>
<td><strong>NCS work levels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>24.45</td>
<td>4.8</td>
</tr>
<tr>
<td>7</td>
<td>25.94</td>
<td>16.3</td>
</tr>
<tr>
<td>8</td>
<td>28.93</td>
<td>5.1</td>
</tr>
<tr>
<td>9</td>
<td>41.01</td>
<td>5.8</td>
</tr>
<tr>
<td>10</td>
<td>43.91</td>
<td>23.2</td>
</tr>
<tr>
<td>11</td>
<td>52.33</td>
<td>3.5</td>
</tr>
<tr>
<td>12</td>
<td>71.33</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Note: RSE = relative standard error.

Using these estimates, chart 1 demonstrates the wage variation by state for entry, intermediate, and experienced levels for accountants and auditors. In 2019, the average hourly wages for entry level accountants and auditors ranged from $21.14 in Indiana to $30.76 in North Carolina. For experienced accountants and auditors, average hourly wages ranged from $44.22 in Florida to $62.27 in New York.

Although wages generally increase with work-level progression, there are instances when this does not occur. This is illustrated in North Carolina between entry and intermediate grouped work levels. Other job characteristics (e.g., work status, basis of pay, and bargaining status) may contribute more to the wage difference than the work levels. To produce uniform grouped work levels across geographic areas, the grouped work levels were determined at the national level. It is also possible that there are differences in job requirements, such as education, training, and experience requirements, within different geographic areas that may also contribute to the pay factors.

Another way of evaluating the inversion between entry level and intermediate grouped levels is to use the standard error to assess the reliability of the estimates. The entry group level relative standard error (RSE) was 12.96, whereas the intermediate group level one was 5.91 percent. Though the RSE indicates almost twice as much variability in the entry group level as compared with the intermediate level, users can also construct confidence intervals to evaluate whether the estimates are reliable for their intended purpose.

A 90-percent level of confidence interval for each grouped work level published for North Carolina accountants and auditors is calculated as follows:

**Entry level**

\[30.76 \times 0.1296 = 3.99\]

Lower bound estimate = $30.76 - (3.99 \times 1.645) = $24.20

Upper bound estimate = $30.76 + (3.99 \times 1.645) = $37.32

**Intermediate level**

\[29.79 \times 0.0591 = 1.76\]

Click legend items to change data display. Hover over chart to view data.
Lower bound estimate = $29.79 – (1.76 x 1.645) = $26.89

Upper bound estimate = $29.79 + (1.76 x 1.645) = $32.67

Even though the differences between the estimates are not statistically significant, users may evaluate these estimates and their corresponding confidence intervals to engage in salary negotiations and align compensation packages based on geographic area.

Accountants and auditors as well as loan officers are part of the business and financial occupational group. The entry level for these occupations includes work levels 1 to 7, the intermediate level consists of levels 8 and 9, and experienced includes levels 10 to 15. Entry-level wages for accountants and auditors were $25.21, and wages for loan officers were $25.01. Intermediate-level wages for accountants and auditors were $34.98 and wages for loan offices were $36.82, and at the experienced level, wages were $52.83 and $52.72, respectively. (See chart 2.)

Table 2. Average hourly wages and relative standard errors for occupations with the same grouped work levels, 2019

<table>
<thead>
<tr>
<th>Occupational code</th>
<th>Occupation</th>
<th>Entry level average hourly wage</th>
<th>Entry level RSE</th>
<th>Intermediate average hourly wage</th>
<th>Intermediate RSE</th>
<th>Experienced average hourly wage</th>
<th>Experienced RSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>131041</td>
<td>Compliance officers</td>
<td>$23.37</td>
<td>4.88</td>
<td>$30.64</td>
<td>4.14</td>
<td>$49.44</td>
<td>2.04</td>
</tr>
<tr>
<td>131031</td>
<td>Claims adjusters, examiners, and investigators</td>
<td>$23.36</td>
<td>0.92</td>
<td>$34.86</td>
<td>0.79</td>
<td>$50.49</td>
<td>0.95</td>
</tr>
<tr>
<td>131071</td>
<td>Human resources specialists</td>
<td>$21.09</td>
<td>3.56</td>
<td>$32.16</td>
<td>2.65</td>
<td>$51.25</td>
<td>3.91</td>
</tr>
<tr>
<td>172051</td>
<td>Civil engineers</td>
<td>$26.81</td>
<td>4.69</td>
<td>$37.96</td>
<td>2.22</td>
<td>$54.94</td>
<td>2.31</td>
</tr>
<tr>
<td>211201</td>
<td>Child, family, and school social workers</td>
<td>$18.22</td>
<td>2.37</td>
<td>$28.3</td>
<td>2.35</td>
<td>$32.44</td>
<td>5.53</td>
</tr>
<tr>
<td>273031</td>
<td>Public relations specialists</td>
<td>$20.33</td>
<td>3.11</td>
<td>$33.06</td>
<td>3.44</td>
<td>$45.68</td>
<td>4.94</td>
</tr>
</tbody>
</table>

Note: RSE = relative standard error.

For production occupations, the grouped work levels may be considered analogous to the apprentice (entry), journey (intermediate), and master (experienced) levels. In conjunction with the four factors used to determine the work levels, production occupations may include on-the-job training, which further contributes to the knowledge and skills of workers. As indicated in the Occupational Outlook Handbook, moderate-term on-the-job-training is needed for assemblers and long-term on-the-job training is needed for power plant operators.

Chart 3 shows the average hourly wages for production occupations, where the average hourly wages for machinists were $18.90 and for aircraft structure, surfaces, rigging, and systems assemblers, wages were $25.48 at the apprentice (entry) grouped levels. These two occupations have the same grouped work levels for apprentice (entry: levels 1 to 4), journey level (intermediate: levels 5 to 6), and master (experienced: levels 7 to 15).
The grouped work levels for machinists, tool die makers, and power plant operators are slightly different, since apprentice includes levels 1 to 5, journeyman is level 6, and master includes levels 7 to 15.

Conclusion

BLS provides a variety of wage data through programs such as the OEWS, Current Population Survey (CPS), the Current Employment Statistics survey (CES), and the NCS. The average hourly wages by work levels provided by the MWE further allows users to examine the compensation factors of workers in the U.S. economy. The addition of grouped work levels helps compare average hourly wages by facilitating the identification of occupations with similar factors. The NCS program continues to evaluate the usefulness and availability of the MWE. These grouped work levels represent an initial attempt to provide grouped work levels based on the Jenks optimization method.

Looking ahead, the NCS program will reevaluate the grouped work levels for each occupation, in particular because of the Modeled-Based Estimation Methodology (referred to as MB3) and 2018 SOC implementation by the OEWS and MWE. In addition, another set of experimental estimates will be published through a factsheet on the MWE website before adding them into the annual production process. This will allow users to provide feedback on the grouped work levels and allow the NCS to consider approaches to publish more data.

ACKNOWLEDGMENT: We are grateful to Nathan F. Modica, David H. Oh, and Jesus Ranon for their contributions to this project. We also thank Laura Train for her helpful comments.

SUGGESTED CITATION:

Notes
1 For more information about the MWE program, see www.bls.gov/mwe; the published estimates were for the 2014 and 2015 reference years, see www.bls.gov/mwe/tables; see Michael K. Lettau and Dee A. Zamora, "Wage estimates by job characteristics: NCS and OES program data," Monthly Labor Review, August 2013, www.bls.gov/opub/mlr/2013/article/lettau-zamora.htm.
2 For more information on the OEWS and NCS programs, see www.bls.gov/oes and www.bls.gov/ncs.
3 Work levels are determined by assigning points to four job factors. The leveling guide provides information on the basis for assigning points to the knowledge, job controls and complexity, contacts, as well as the physical environment of selected occupations, see the "National Compensation Survey: Guide for Evaluating Your Firm's Jobs and Pay," May 2013, www.bls.gov/ncc/ocs/wp/ncbr0004.pdf.
4 Ibid.
5 Ibid., p. 63.
6 Ibid., p. 65.
7 Ibid., p. 67.


The industry composition for occupations may inform differences in average hourly wages. The OEWS provides research estimates by state and industry which may assist with this analysis at the state level. See www.bls.gov/oes/2020/may/oes_research_estimates.htm.

Future research is necessary to evaluate state-wide or more detailed area variation in grouped work levels. The outcome of this research may be used to inform enhancements to the grouped work-level approach.


The grouped level estimates for apprentice tool and die makers and power plant operators did not pass publication criteria.

For information on the various BLS compensation measures see the Compensation Matrix tool, beta.bls.gov/comparison-matrix/.


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Related Articles
Revisiting the dilemma of review for modeled wage estimates by job characteristic, Monthly Labor Review, September 2015.
Wage estimates by job characteristic: NCS and OES program data, August 2013.

Related Subjects
Survey methods
Productivity
Statistical programs and methods
Compensation

Source Data
What is driving the labor force participation rate lower?

Summary written by: Richard Hernandez

The U.S. labor market was severely affected by the coronavirus disease 2019 (COVID-19) pandemic as the unemployment rate increased to 14.7 percent in April 2020 from 3.6 percent in April 2019. As 2020 continued, the labor market began to improve and the unemployment rate started to fall. The labor force participation rate, however, did not recover as fast. This low participation rate during COVID-19 has been attributed to several factors, such as dependent care demands, increased unemployment benefits, or people afraid of getting sick from the COVID virus. In their working paper, “Has the willingness to work fallen during the COVID pandemic?” (Federal Reserve Bank of Chicago, Working Paper 2022-08, February 2022), authors R. Jason Faberman, Andreas I. Mueller, and Ayşegül Şahin examine how people’s desire to work has changed from 2013 to 2021 to better understand why labor force participation has remained low.

The authors use job search supplement data from the Survey of Consumer Expectations (SCE) to understand how people’s employment situation, work preference, and job search behavior have changed over time. To measure labor market underuse, the authors use the Current Population Survey and SCE data to calculate an individual’s desired work hours to the actual hours worked to get an “aggregate hours gap.” This calculation is an alternative measure of understanding labor market tightness.

The authors found that most workers are on their labor supply curve (actual hours worked equal their desired hours). They also found that during the pandemic (2020–21), workers in jobs that required moderate or more levels of social contact wanted to work less hours (between 0.8 hours and 4.0 hours), whereas workers with less social contact wanted to work more hours (between 0.3 and 1.3 hours). Regardless of the social contact requirement of jobs, all workers wanted an increase in pay. In addition, individuals out of the labor force reduced job searches during the pandemic because of the lack of job opportunities and fears of contracting the virus in 2020. However, by the end of 2021, people’s desired work hours returned to normal levels.

In conclusion, Faberman and his coauthors deduce that people have an overall lower willingness to work (“desired work hours reduced the aggregate hours gap by 2.5 percentage points”) that has kept labor force participation down. The willingness to work also predates the pandemic. This desire is driven mainly by people out of the labor force and part-time workers because they choose not to work more hours.
STEM education and regional economic development


In this book, author Fran Stewart begins by recalling a 2016 controversy stirred by the then-newly-elected governor of Kentucky, who proposed a shift of public resources toward college education that promotes “things people want.” This was the governor’s shorthand for saying “yes” to science, technology, engineering, and mathematics (STEM) education and “no” to liberal arts. This opinion permeates American society, and Stewart uses this anecdote to demonstrate the current cultural dominance of STEM education. Indeed, we often see STEM education as a one-way ticket to personal riches and national economic stability. But Stewart also uses Kentucky’s example as a starting point to question whether this belief is based in reality. Throughout the book, she critically examines the efficacy of STEM education as a sole driver of economic development.

To carry out her analysis, Stewart relies on data from the Occupational Information Network, a federal database that contains information on the knowledge, skills, and abilities (KSAs) required for a given occupation. This information is collected through a survey asking respondents to rate the importance of different KSAs in the performance of their jobs. Stewart groups these KSAs into “STEM” and “soft” skill categories and distinguishes between jobs with high- and low-level skill demands.

Combining these dimensions, she arrives at four occupational skill sets: High STEM/High Soft, High STEM/Low Soft, Low STEM/High Soft, and Low STEM/Low Soft. These categories are then used to compare economic performance across regions, with the aim of identifying the kinds of jobs that can generate the most economic growth.

Examining regional variations is key to Stewart’s analysis, which looks at metropolitan statistical areas (geographic areas where people live, work, and commute) to compare the economic effects of STEM and liberal arts education. This regional focus has several advantages. First, it avoids the fallacy of one-size-fits-all policies that Stewart claims often beguile our elected officials. Second, by considering geography alongside occupational skill level in discussing education policy, it suggests that no matter the supply of jobs, the demand for certain occupations must be there first. For example, as noted in the book, if more than half of a region’s employment is composed of Low STEM/Low Soft jobs, simply dropping engineers from the sky will not generate economic activity. Finally, discussing regional variations is important because young college graduates in STEM disciplines tend to be more geographically mobile.

In examining regional economic performance, Stewart focuses on the following five measures: median wage, growth in gross regional product (GRP), total factor productivity, per capita income, and the poverty rate. This relatively broad set of metrics reflects the idea that economic well-being goes beyond wages and employment. Stewart finds that regions with a higher concentration of High STEM/High Soft occupations have a higher median wage and total factor productivity, but lower GRP growth. Regions with High STEM/Low Soft occupations have the second-highest median wage, followed by regions with Low STEM/High Soft occupations and regions with Low STEM/Low Soft occupations. Stewart’s results also imply that areas with a high concentration of Low STEM/Low Soft jobs are least economically developed, suggesting that local officials in those areas should devise plans for addressing issues such as negative GRP growth and make efforts to attract jobs with higher STEM- and soft-skill requirements.

Occupations in the bottom third of the STEM- and soft-skill continuums account for 34.1 percent of U.S. employment, and Stewart rightly points out that these occupations will not disappear overnight and should be accommodated by long-term regional policy.

Throughout the book, Stewart maintains that STEM education is not the only—or even the most likely—path to economic development. In the United States, more than 50 percent of all workers are employed in jobs in the lower half of the STEM- and soft-skill continuums. For every High STEM job, there are 2.6 Low STEM jobs. Stewart points out that there simply are not enough High STEM jobs, so giving everyone an engineering degree is not the panacea for regional economic problems. Moreover, she finds that the focus on STEM education is too narrow. Regions whose employment is dominated by High Soft jobs have higher median wages and higher productivity, irrespective of the level of STEM skills involved. Overall, Stewart advocates for an education policy model that favors responding to labor demand over what she calls the “blunt, supply-based proxy of educational attainment.”

The STEM Dilemma draws heavily on data to reveal the optimal way to structure education policy. It tells us that, before choosing to rely solely on STEM education as a policy tool, we must ensure that the opportunity cost of doing so is worth it and that there are other, more efficient ways to increase overall economic activity. It should be noted that Stewart’s book was published in 2017, and its analyses do not capture the effects of the coronavirus pandemic. How would these analyses differ now that working from home has become more common? Would regional differences still matter as much given that people with college education have increased their participation in the work-from-home economy? And have advanced soft skills become more coveted in an age of online meetings? These are long-term questions that will only be answered years removed from the pandemic, but Stewart has laid the groundwork that could guide future research and serve as a baseline for detecting significant change.
ABOUT THE REVIEWER

Michael Daniel Levinstein
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With the coronavirus disease 2019 (COVID-19) pandemic came a change in the workforce. In “‘Great Resignations’ are common during fast recoveries” (Economic Letter, Federal Reserve Bank of San Francisco, April 4, 2022), Bart Hobijn examines how the fast-paced COVID-19 labor market recovery compares with previous rapid recoveries. He analyzes historical quits rate data, provided by the U.S. Bureau of Labor Statistics Job Openings and Labor Turnover Survey (JOLTS), Current Population Survey (CPS), and the Manufacturing Labor Turnover Survey (MLTS), to support his findings.

Workers have been quitting their jobs at record levels—a withdrawal referred to as the “Great Resignation.” Although many people deem this “wave of resignations to be driven by people reconsidering their career prospects and work-life balance,” Hobijn argues otherwise. He states that the Great Resignation is driven by “young and less-educated workers in industries and occupations that were most adversely affected by the pandemic” and that it is not an irregularity but a pattern seen in previous recoveries. The MLTS was discontinued in 1981 and JOLTS began in 2000, and despite the gap in time, Hobijn creates a proxy to show the patterns of economic uncertainty, recessions, and workers quitting their jobs. The MLTS and JOLTS data do not include characteristics of the workers quitting, so he pairs the CPS data with the JOLTS data to reveal who is quitting and why.

Using the CPS data, Hobijn outlines four findings about the COVID-19 pandemic recovery: (1) high-quits industries also saw rapid job growth in 2021, (2) this growth pattern is also evidenced across occupations—those with high quits later saw high employment growth, (3) quitters are not shifting to new occupations or industries, and (4) the workers who are quitting are largely young, with less education. The latter conclusion “is reflective of a normal cyclical pattern in which the quits rate of younger workers responds more to business cycle conditions and drives a large part of the movements in the overall quits rate.” The pandemic presented a cycle of quitting but also a cycle of mass layoffs that led to many vacancy postings. These vacancies were available to those laid off and unemployed as well as to those employed and looking for new opportunities. On the basis of offers presented and job status, workers have been able to negotiate for better wages, benefits, or arrangements at their current employer or to quit and move on to other jobs with higher wages. Hobijn relabels the “Great Resignation” as a “Great Renegotiation.”

In conclusion, the “Great Resignation” is not an irregularity and fast recoveries are often characterized by waves of quits. Hobijn provides historical evidence to support his argument that the recent wave of quits are not driven “by people reconsidering their career prospects and work-life balance” but instead are driven by younger and less-educated workers in industries that were heavily affected by the COVID-19 pandemic.
Beyond BLS briefly summarizes articles, reports, working papers, and other works published outside BLS on broad topics of interest to MLR readers.

SEPTEMBER 2022

Great Resignation or Great Reallocation? A tale of two industries

Summary written by:

After the effects of the coronavirus disease 2019 (COVID-19) pandemic appeared in the nation’s labor force statistics, a new “great” was added to the economic lexicon: the “Great Resignation.” The premise of the “Great Resignation,” though not officially defined, is based on larger-than-normal numbers of workers quitting their jobs in response to the COVID-19 pandemic and its effects on working conditions. In “The Great Resignation vs. the Great Reallocation: industry-level evidence” (Economic Synopses, Federal Reserve Bank of St. Louis, March 4, 2022), authors Serdar Birinci and Aaron Amburgey challenge the term “Great Resignation” in referring to the quits that occurred during the pandemic. In doing so, they look at 2021 U.S. Bureau of Labor Statistics data from the Job Openings and Labor Turnover Survey and the Current Population Survey. As a result of their analysis, they propose a new term, the “Great Reallocation.”

Talk of the Great Resignation tends to focus on workers who quit their jobs during the pandemic, which risks missing potentially important distinctions. Quits are a type of job separation—an end of employment for a particular person at a particular job. Unlike other types of job separations, quits, however, are defined as worker initiated. That is, a quit is when a worker decides to stop working at a particular job. But as Birinci and Amburgey point out, a worker quitting his or her job does not necessarily mean that the worker will become unemployed, especially for a lengthy period, nor that the worker has left the labor force, neither working nor looking for work. In short, the workers who quit their jobs during the pandemic or its aftermath might not be as “resigned” as the “Great Resignation” terminology seems to suggest. Birinci and Amburgey also question what has happened to a worker who has quit but has not become unemployed or is not out of the labor force. That worker has obtained another job, undergoing what the authors call a “job-to-job transition.”

Birinci and Amburgey analyze the numbers of quits and job-to-job transitions from January 2021 to November 2021 in two industries: manufacturing and construction (combined) and leisure. They find that job quitters are sometimes part of a pandemic-induced worker reallocation, not a worker resignation. They report that the number of quits increased in both industries. Quits were up 27 percent in manufacturing and construction and 43 percent in leisure. When looking at the number of job-to-job transitions in these two industries, however, they find a striking difference. In manufacturing and construction, the increase in job-to-job transitions significantly lagged behind the growth in quits. In comparison, the number of job-to-job transitions in leisure increased along with the number of quits. Thus, the authors claim that most of the quits in manufacturing and construction were just quits, whereas quits in the leisure industry were more likely to be from job switching.

Many job quitters look for higher wages when considering a job-to-job transition. Birinci and Amburgey find that wages in manufacturing and construction increased during the study period by about 4 percent, while wages in the leisure industry increased by nearly 13 percent. In real terms (adjusting for inflation), wages in manufacturing and construction decreased slightly, while wages in leisure increased 6 percent. The authors maintain that the higher wage growth in leisure is consistent with the increase in job-to-job transitions in that industry.

Birinci and Amburgey recognize that talking about the Great Resignation may be common in the economy as a whole. The authors conclude, however, that although speaking of worker “resignation” in one industry may be correct, speaking of worker “reallocation” in another is equally valid.
Oil, budgets, migration, and retirees: Alaska’s 2015–18 recession

Alaska experienced a local recession from March 2015 to April 2018. Falling oil prices combined with the state government’s dependence on oil revenue contributed to job losses throughout the economy. Unemployment did not increase mainly because Alaska’s population is aging rapidly and leaving the labor force through retirement.

The national economic expansion from 2009 to 2020 was the longest recorded in the history of the United States. The unemployment rate fell dramatically, and real gross domestic product (GDP) steadily increased. However, many petroleum-producing states experienced local recessions during this period because of declining oil prices. One of these states was Alaska, which was in a recession from March 2015 to April 2018. This article explores the dynamics, causes, and results of this recession.

The first section of this article explores the trends of employment and GDP in Alaska during the recession. Employment dropped 4 percent overall and 30 percent in mining and logging, which is mainly oil and gas. Real GDP fell 4 percent, and real mining GDP fell 17 percent.

The second section of this article looks at falling oil prices and other factors connected to oil that contributed to the 2015–18 Alaskan recession. The mining, quarrying, and oil and gas extraction sector was 22 to 40 percent of Alaska’s economic output every quarter from 2005 through 2014. By comparison, this sector was 2 to 3 percent of total U.S. output during this period.

When Alaska’s oil price fell 81 percent from April 2011 to February 2016, the mining and logging sector was hit first. Falling oil prices also hurt the state government, which relied on petroleum (oil and gas) for 92 percent of its total revenue in 2011. Ultimately, most industries lost jobs. Declining federal spending in Alaska, spending which is particularly important to the state’s economy, also contributed to the recession. In 2014, the year before the recession, Alaska had the fourth-highest proportion of federal jobs to total nonfarm jobs among U.S. states.

The final section describes the effects of the recession. The unemployment rate did not increase greatly, which was largely a result of a declining labor force participation rate. This decline in turn was a result of a high retirement rate caused by Alaska’s aging population. A large wave of young people migrated to Alaska in the 1970s and ’80s to work on pipeline projects, and those who stayed are now reaching retirement age.

Defining the timeframe of the recession

I needed to decide on a timeframe for the recession before I could analyze it. The National Bureau of Economic Research (NBER) sets official start and end dates for U.S. recessions, but there are no official dates for state-level recessions. State-level recessions usually coincide with national ones but in states like Alaska they often do not. For example, Alaska actually gained jobs during every U.S. recession between 1960 and 2019. It also experienced major job losses in 1977 and 1986 to 1987, both of which occurred during U.S. economic expansions. This article uses a time series of employment data from the Current Employment Statistics (CES) program to determine the start and end dates for Alaska’s recession. Employment alone is not generally used for recession dating, but it was ultimately the best option in this case. Using real GDP yielded recession dating that was out of line with other economic indicators, such as employment, personal income, and unemployment.

The Bry-Bochan method of finding peaks and troughs (local highs and lows) in a time series was run on smoothed seasonally adjusted total nonfarm employment data. A peak is the start of a recession, and a trough is the start of an expansion. A peak or trough is only identified if there are at least 15 months between any two peaks and between any two troughs, and at least 6 months between each peak and trough. See the appendix for more information on the recession dating methodology used in this article.

Industry employment

Employment data used to calculate dates for the recession, as well as examine its dynamics, are from the CES program, which measures people on establishment payrolls. U.S. total nonfarm employment fell 5 percent between December 2007 and June 2009, the period of the Great Recession. As shown in chart 1, although Alaskan employment did experience a decline between December 2008 and June 2009, it grew by 1,000 jobs (less than 1 percent) over the entire recessionary period. The state’s subsequent economic expansion saw employment growing by 20,700 jobs (6 percent) from June 2009 to March 2015. During Alaska’s following recession, lasting from March 2015 to April 2018, employment fell by 13,700 jobs (4 percent). Alaska lost jobs in every quarter from the second quarter of 2015 through the fourth quarter of 2017. After the Alaskan recession, employment started growing again and was up 4,700 jobs (1 percent) by September 2019.
Chart 2 shows the number of jobs gained or lost by industry during both the expansion (June 2009 to March 2015) and the local recession (March 2015 to April 2018). All industries with job losses in the local recession lost more than they gained during the prior expansion, except for trade, transportation, and utilities.

The industries with the most job losses during the recession are closely tied with petroleum (oil and gas). These industries were hit hardest by declining oil prices. Mining and logging—mostly oil and gas drilling, extraction, and support activities—recorded the largest number of jobs lost and the largest percentage of jobs lost (30 percent). Construction had the second most job losses by percentage (16 percent) as well as the third largest number of jobs lost. This makes sense because among oil-producing states like Alaska, construction employment tends to be very sensitive to oil prices. The construction sector builds well foundations, sets up oil rigs, builds and maintains pipelines, and builds well equipment.

The Alaskan state government is also highly dependent on oil revenue, so when oil prices fell the state’s budget shrank substantially. Ten percent of state government workers were therefore laid off. Seasonally adjusted data are not available for the components of state government, but one alternative is to use annual averages. Of 2,200 state government jobs lost between 2015 and 2018, 900 were in education.

In contrast to other industries in Alaska, federal government employment in the state dropped by 15 percent during the Alaskan expansion and rose by 2 percent during the Alaskan recession. Declining federal spending in Alaska has been cited as a secondary cause of the recession.

Total nonfarm employment can be divided into three categories: goods-producing industries, private service-providing industries, and government employment. As shown in chart 3, the goods-producing industry (which includes oil and gas extraction) closely follows Alaska’s business cycle, growing by 6,000 jobs during the expansion and losing 10,000 during the recession. The private service-providing industry is more stable, growing during the expansion and falling slightly during the recession. Finally, Alaska’s combined federal, state, and local government employment has been declining since the early 2010s.
State gross domestic product

Alaska’s gross domestic product does not track the state’s business cycle as closely as employment does, but it did fall leading up to and during the recession. Gross domestic product is the total market value of finished goods and services produced by a national or a local economy within its borders over a specific period. Alaskan GDP is dominated by revenue from natural resources, particularly oil and gas. In the decade leading up to the recession (2005 through 2014), the mining sector (mainly oil and gas extraction) made up 30 percent of total Alaskan GDP.

Chart 4 shows that the trend of nonmining GDP reflects little of the fluctuations of total GDP, meaning that the mining sector drives the volatility of the state’s GDP. Employment in mining is only about 3 to 5 percent of total nonfarm employment. However, oil revenue spills over into the rest of the economy and makes up most of the state government budget too.

Real and nominal GDP trends differ in Alaska largely because oil prices have a major role in the price deflator used to convert nominal to real. Mining GDP causes almost all the fluctuation in both real and nominal GDP in Alaska, so oil prices greatly affect the trend of real GDP.

Given that the difference between nominal and real GDP in Alaska is largely driven by oil prices, both real and nominal GDP tell part of the story. When real GDP remains steady but nominal GDP increases because of increased oil prices, the dollar value of the oil revenue and taxes collected is higher without an increase in the price for the basket of goods and services that the state government, oil companies, oil company employees, and oil company shareholders usually purchase. Real GDP, on the other hand, is better at showing quantity and quality of goods and services produced. Real GDP for mining tracks oil production quantity more closely than it tracks oil revenue.

Alaskan GDP fell substantially leading up to and during the recession. As shown in chart 4, real total Alaskan GDP fell 11 percent between its peak in the second quarter of 2012 and subsequent trough in the first quarter of 2019. Nominal total GDP fell 15 percent between its peak in the fourth quarter of 2011 and subsequent trough in the first quarter of 2016.

Chart 4 shows that nominal nonmining GDP (total GDP minus mining GDP) is very stable compared with total GDP. Nonmining GDP grows steadily prior to 2015 then flattens out during the recession before increasing again in 2017. On average, nonmining GDP grew about 4 percent per year during the expansion and only 2 percent during the recession.

What caused the recession?

While economists have identified several potential causes of the 2015–18 recession in Alaska, including the strengthening of the dollar and declining government spending, the drop in oil prices is consistently identified as the main cause. Alaska’s oil price fell 81 percent from April 2011 to February 2016. This shock reverberated throughout the economy, affecting private industry and government.
Alaska’s reliance on government

The Alaskan economy is reliant on government spending, much of which depends on the oil sector. All levels of government make up a combined 18 percent of GDP in Alaska, compared with 13 percent for the United States. Federal civilian spending and military spending make up 7 percent of Alaska’s GDP compared with 3 percent for the United States. State and local government spending make up 11 percent of Alaska’s GDP compared with 9 percent for the United States.13

In 2014, the year before the recession, Alaska had the highest proportion of government jobs to total nonfarm jobs (24 percent) of any state.14 In comparison, government jobs for the United States as a whole make up only 16 percent of employment. In fact, Alaska has a higher percentage of government employees than the United States at every level of government (federal, state, and local).15

Almost all land in Alaska is owned by either the federal government (61 percent), the state government (27 percent), or Alaska Native groups (12 percent).16 Less than 1 percent is in private non-native hands.17 The state of Alaska is the second-largest landowner in the United States, after the federal government.18 All this public land requires government workers and contractors to manage, in addition to the costs of supplies and infrastructure.

Economist Scott Goldsmith estimated that in 2006 about one-third of Alaskan jobs depended either directly or indirectly on federal spending.19 There are four major reasons for this. First, a lot of military spending goes to the five major military bases in Alaska and the service members stationed there. Second, the federal government owns 61 percent of the land in Alaska, the fourth highest percentage of any state in the country and the largest by total area. Alaska contains 86 percent of U.S. land administered by the Fish and Wildlife Service and 66 percent of U.S. land administered by the National Parks Service.20 The federal government spends money on federal positions, contractors, and supplies required to manage these lands. Third, a lot of federal dollars go to health and other programs for Alaska Natives, who are 28 percent of the population–higher than the proportion of American Indians in any other state.21 Finally, Alaska is the least densely populated state with some of the harshest terrain, so building basic infrastructure for all residents is expensive. The federal government helps pay for this construction.22

In 2014, the year before the recession, per capita state government spending was the highest in the country at $15,463 per resident, compared to $5,339 nationally.23 It was the highest in both education and corrections, and the second highest in both public assistance and transportation.24 This is partially explained by the fact that state spending includes funds from the federal government, and the Alaska state government gets more than twice the national average in federal grants per resident.25 Also, Alaska’s small population is spread across the largest state meaning that getting services to residents costs more in transportation costs, personnel, and infrastructure.

One example of this is healthcare. In 2015, the first year of the recession, Alaska had the highest per capita healthcare spending of any state (including both public and private spending). This was 37 percent higher than the national average.26 Among other factors, getting patients to a hospital from a remote area frequently requires an expensive air ambulance.

Alaska’s reliance on petroleum

Alaska’s reliance on the state government means revenue to fund it is very important. Most of this revenue comes from petroleum, which is a major driver of the economy. Mining, quarrying, and oil and gas extraction was 32 percent of Alaskan GDP in 2011, compared to 2 percent nationally.27 Alaska has consistently been one of the top two U.S. states by this measure.28

Alaska relies on petroleum income to fund its state government. It is the only state without a personal income tax or a state sales tax.29 Most of the Alaskan state government’s petroleum-related tax revenues come from severance taxes (taxes on the extraction of natural resources). Alaska led the nation in severance tax revenue as a percentage of total state tax revenues from 1980 through 2014, with the percentage maxing out at 82 percent in 2012. It has remained one of the top two states by this measure since then.30 As shown in chart 5, inflation-adjusted state tax collections grew by $4.0 billion (656 percent) between 1999 and 2008. Tax revenues then fell by $4.2 billion (91 percent) from 2008 to 2016, ending up at the lowest level since at least 1990.31 This dramatic decline in tax revenue was partly offset by dipping into reserve funds, but it ultimately contributed to a decline in the state government’s ability to fund government services.32

![Chart 5: Alaska tax collections (millions of real dollars), 1990–2019](chart.png)

In addition to severance taxes, state government revenue from petroleum also includes rent paid by oil companies drilling on state-owned land as well as royalties on the sale of oil and gas extracted from this land.32 In the decade leading up to the recession (2005 through 2014), petroleum revenue made up 91 percent of the government’s general fund—money it uses for most of its expenses.34

Petroleum revenue is also important for the Alaska Permanent Fund (APF), a trust fund in which a portion of state government revenues from oil are invested for the future. With assets valued at $81.9 billion at the end of fiscal year 2021, it is one of the largest sovereign wealth funds in the world.35 Alaska’s constitution requires that at least 25
percent of all oil and gas royalty revenues be put into the APF. The principal of the fund is prohibited from being spent, but the earnings can be spent by the state government. A companion fund called the Constitutional Budget Reserve Fund is also available to the legislature for appropriation.

Each resident gets a yearly Permanent Fund Dividend (PFD) check. The total value of the checks is usually half the earnings of the APF averaged over the past 5 years. These checks ranged from $878 to $2,072 in the 2010s. From 2016 through 2018, the government reduced the amounts of the PFD and used the savings to fund government operations.

Economist Scott Goldsmith estimated that about half of all jobs in Alaska were directly or indirectly dependent on the petroleum industry in 2007. Oil revenue accounted for 31 percent of state spending, spinoff jobs from oil wealth accounted for 16 percent, and oil industry jobs were 3 percent. Spillover jobs from oil wealth include those produced by increased demand resulting from people spending their PFD checks. These percentages were quite stable from year to year as of 2012. More recent numbers are not available, but these percentages likely dropped substantially as oil revenues fell after 2014. Mining, quarrying, and oil and gas extraction fell as a percentage of nominal GDP from 32 percent in 2012 to 13 percent in 2016.

Oil price drop led to the recession

After rising from $33 per barrel in January 2009 to $111 in April 2011, the Alaska North Slope (ANS) first purchase oil price fell to $21 in February 2016, a drop of 81 percent. The ANS oil price reflects what oil from the state’s North Slope region (where most of the oil and gas in the state is extracted) is selling for in the oil market. The ANS area includes the Prudhoe Bay Oil Field, one of the largest oil fields in the world, as well as the National Petroleum Reserve. The Prudhoe Bay Oil Field is on land owned by the state government and leased by private companies. In addition to rent, the state gets royalties on the sale of petroleum produced there.

Previous research supports the claim that falling oil prices were the primary cause of Alaska’s 2015–18 recession. First, the oil price drop has been linked to job losses on a national level. The price drop beginning in November 2014 is estimated to have caused a loss of 259,000 jobs nationally through October 2016. Second, these oil price drops have been linked to local recessions in other oil-producing states. The Federal Reserve Bank of Kansas City found that the decline in oil prices starting in 2014 led to recessions in oil-producing states within its district. Both Oklahoma and Wyoming entered recessions in 2015, and Kansas and New Mexico did likewise in 2016.

Finally, research shows that falling oil prices specifically caused Alaska’s recession. Economists Gregg Erickson and Milt Barker argue that most state-level recessions in the United States are caused by a large decline in the price of the state’s main export, which in Alaska’s case is petroleum. Moreover, Alaska is more dependent on its main export than most states are. In most cases, other export industries can take advantage of lower costs for labor, buildings, and real estate caused by the recession, hastening a recovery. However, Alaska’s other export sectors, like seafood and mineral mining, were too weak to step in as major industries. Industries besides petroleum have had difficulty developing because of Alaska’s low population density, harsh climate, and distance from import and export partners. Other industries also had to compete with the petroleum industry for labor, infrastructure, and materials, making the costs of starting a business more expensive, especially during the oil boom.

University of Alaska economist Mouhcine Guettabi argued that Alaska’s employment levels have been strongly affected by oil price levels for a while, and that the 2015–18 downturn was driven by declining oil prices. Guettabi’s econometric analysis of monthly employment and oil price data from 1991 to 2018 in oil-dependent states found that, on average, a 10.0-percent change in oil prices results in a 1.7-percent change in employment in the long run. He also found that the higher a state’s dependency on petroleum, the slower it is to recover from job loss.

Declining federal government spending contributed to the recession

Although falling oil prices were the main cause of the recession, declining federal spending in Alaska has been cited as an independent, secondary reason for the recession. Alaska lost 15 percent of its federal government jobs during the national economic expansion between 2009 and 2015. Alaska’s federal civilian plus military GDP (real) fell by 8 percent during the same period. Federal government contributions to state government revenue increased by about $300 million, 25 percent, from 2006 to 2010 because of the Great Recession stimulus package, but the amount then decreased by about $500 million between 2010 and 2015 after those programs expired. This decline in federal government contributions contributed to Alaska’s job loss.

Why did job losses not increase the unemployment rate?

Less money coming to the state from oil exports and the federal government led to drops in both GDP and employment. Despite the jobs that were lost during the recession, however, Alaska’s unemployment rate remained relatively constant. This consistency is largely because Alaska has a large cohort of baby boomers who are now retiring and dropping out of the labor force. This group is largely composed of people who moved to the state to work on petroleum-related projects after oil was discovered on Alaska’s North Slope in 1968.

Unemployment

Alaska’s loss of jobs during its recession did not lead to a large increase in unemployment. The unemployment rate represents the number of people who are jobless, looking for a job, and available for work as a percentage of the labor force (all people who are employed or unemployed). Alaska’s unemployment rate was higher than the U.S. rate every year from 1977 through 2008. Then the Great Recession hit, and the U.S. rate increased from 4.6 percent in 2007 to 9.6 percent in 2010, overtaking the Alaskan rate, which only increased from 6.3 percent to 8.2 percent during that period. (See chart 6.)
During the recovery from the Great Recession, the U.S. rate declined dramatically by 2015 (to 5.3 percent), but Alaska’s was little changed at 6.3 percent, exceeding the U.S. rate again. Then Alaska’s recession hit, and the U.S. rate continued to decline while Alaska’s rate stayed constant. As a result, Alaska had the highest unemployment rate of any state in the nation from 2017 through 2019. Why didn’t Alaska’s rate increase even though Alaska was rapidly losing jobs?

Labor force participation rate

Part of the reason the unemployment rate in Alaska has not seen a large increase in response to major job losses is the large decline in the proportion of people who are working or looking for jobs, as measured by the labor force participation rate. Instead of being counted as unemployed, many people just left the labor force. As shown in chart 7, Alaska’s labor force participation rate has historically been much higher than that of the United States. Both the U.S. and Alaskan rates have been declining since around the year 2000, but Alaska’s rate declined faster. It fell from 73 percent in 2000 to 65 percent in 2019, a decline of 8 percentage points. The U.S. rate only declined by 4 percentage points (from 67 percent to 63 percent).

Employment-population ratio

Another measure that helps explain why Alaska’s unemployment rate remained stable in the face of rapid job loss is the employment-population ratio, which is the number of people working divided by the civilian noninstitutional population. Alaska’s ratio has traditionally been higher than that of the United States, but they both have been declining for a while. However, starting in 2012 the U.S. ratio began to increase while Alaska’s continued to fall. Between 2012 and 2018, Alaska’s ratio fell 2 percentage points, and the United States’ rose by 2 percentage points. In other words, in contrast to the United States as a whole, a shrinking proportion of Alaskans were working.

Age and participation rates

Why was Alaska’s employment-population ratio historically higher than that of the United States, and why has it been declining more quickly?

One reason that the employment-population ratios of the United States and Alaska are moving in different directions is the difference in the age distribution between the country and the state. As of 2020, people 65 and older were 13 percent of the total population of Alaska, a lower percentage than that of any state besides Utah. By comparison, the national rate is 17 percent. However, both Alaska and the United States are experiencing rapid increases in the percentage of the population that is 65 and older. (See chart 8.) The difference is that, although Alaska’s percentage is currently lower than the United States’, it is increasing much more quickly. In fact, Alaska has the fastest growing 65 and older population in the country. The number of people 65 and older in Alaska grew from about 55 thousand to about 92 thousand, a 67 percent increase, between April 2010 and July 2019. In comparison, this population only grew by 34 percent nationally.
As shown in table 1, the labor force participation rate is much lower for people 65 and older compared with the population as a whole. This low level is largely because of retirement (for reference, the Social Security Administration defines normal retirement age as 66 to 67 years old). A low proportion of the population being 65 and older is indicative of a high labor force participation rate, and a growing 65 and older population pushes the labor force participation rate down. The difference in level and trend of the labor force participation rate between Alaska and the United States, therefore, is partially driven by the difference in level and trend of the proportion of the population that is 65 and older.

Table 1: Labor force participation rate by age group, Alaska and United States, 2019

<table>
<thead>
<tr>
<th>Age group</th>
<th>Alaska</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total, above 16</td>
<td>63.1</td>
<td>63.1</td>
</tr>
<tr>
<td>16 to 19 years</td>
<td>37.5</td>
<td>35.1</td>
</tr>
<tr>
<td>20 to 24 years</td>
<td>76.0</td>
<td>72.2</td>
</tr>
<tr>
<td>25 to 34 years</td>
<td>79.2</td>
<td>82.9</td>
</tr>
<tr>
<td>35 to 44 years</td>
<td>78.3</td>
<td>83.1</td>
</tr>
<tr>
<td>45 to 54 years</td>
<td>81.3</td>
<td>81.4</td>
</tr>
<tr>
<td>55 to 64 years</td>
<td>80.2</td>
<td>85.4</td>
</tr>
<tr>
<td>65 years and over</td>
<td>22.3</td>
<td>20.2</td>
</tr>
</tbody>
</table>


Migration

Why is Alaska’s population rapidly aging? This aging mostly comes down to Alaska’s history of migration. Young people tend to come to Alaska for jobs on military bases or in the fishing or mining industries. The largest example of this migration occurred in the 1970s and 1980s, when tens of thousands of people moved to the state to build the Trans-Alaska oil pipeline and work in the oil fields. Many of these workers, mostly members of the baby-boom generation, stayed in Alaska. This cohort is now at or nearing retirement age.

Chart 9 shows net migration (in-migration minus out-migration) for Alaska from 1960 to 2019. Most of this migration was to or from other U.S. states. The waves of migration in the 1970s and 1980s show up as distinct spikes. After that, although some people left Alaska when the pipeline projects ended, many stayed. This cohort of migrants are now reaching retirement age, a major factor in the state’s aging population and the decline in the labor force participation rate. The declining participation rate, in turn, helps to explain why employment has fallen so much without causing the unemployment rate to increase substantially.
In 2017, the Alaska Department of Labor and Workforce Development (DOLWD) listed reasons that might explain why unemployment had not increased substantially in the face of job losses. In addition to a declining participation rate caused by retirement, people leaving Alaska outnumbered those coming to the state. As shown in chart 9, Alaska’s net migration has been negative every year since 2013. Both in-migration and out-migration have declined since then, but in-migration has declined more (not shown in chart). Since the national economy expanded during Alaska’s local recession (see chart 6), many workers who left the state may have found jobs elsewhere. Perhaps more importantly, fewer people were moving to the state because of its relatively weak job market. Any workers or job seekers who left the state would have left the Alaskan labor force, decreasing employment without increasing unemployment in the state.

Conclusion
Alaska’s recession, which lasted from March 2015 to April 2018, was caused primarily by declining oil prices and secondarily by declining federal government spending in the state. Total nonfarm employment fell greatly, especially in mining and logging, professional and business services, manufacturing, and state government. The job loss spread beyond the oil sector partly because the state government is so dependent on oil revenues. This dependency meant that the government had to substantially reduce spending when oil revenues fell. The job losses during the recession did not lead to a statistically significant increase in the annual unemployment rate. This lack of change is mainly because Alaska’s population is aging rapidly and so many people are leaving the labor force by retiring.

Appendix: Dating the recession in Alaska
Ultimately, I decided to set the start and end dates of the 2010s Alaskan recession by using the Bry-Boshchan method of finding peaks and troughs with smoothed seasonally adjusted total nonfarm employment. Before settling on this method, however, I considered a few other ways. Since the NBER determines U.S. recession dates, I considered looking for an Alaskan source. In 2016, an economist with the Alaska DOLWD announced the state was in a recession, and that it “likely began at the end of 2015.” Eventually the DOLWD confirmed that the recession ran from 2015 to 2018. However, they did not give specific months, so I explored other approaches.

I also considered using the Bry-Boshchan method with Alaska’s GDP data. However, an attempt to use this method did not yield reasonable results. Furthermore, the Alaska DOLWD uses employment rather than GDP for determining the dates of Alaskan recessions because, “[Alaskan GDP] tends to rise and fall with oil prices, and short-term declines in oil prices don’t necessarily cause a ‘significant decline in economic activity that spreads across the economy.’ Many oil companies operating in Alaska are international and publicly traded, and when oil prices rise or fall, much of the initial benefit or loss goes to company operations and shareholders outside the state.”

A third approach I considered was from a paper published by the Kansas City Federal Reserve. It involved running the Bry-Boshchan method on state-by-state coincident indexes of economic activity developed by the Philadelphia Federal Reserve. The components of these indexes are GDP, nonfarm payroll employment, average hours worked in manufacturing by production workers, the unemployment rate, and wage and salary disbursements deflated by the consumer price index. The paper only looks at states in the Kansas City region of the federal reserve, but it was possible to replicate the method for Alaska. The results suggested that the recession lasted from September 2015 to September 2016.

Unfortunately, those dates do not make sense for several reasons. First, the Alaska DOLWD, other Alaskan economists, and the Alaskan media all agreed as late as 2018 that the state was still in a recession. Second, none of the five components of the coincident index can really explain why it shows a trough in September 2016. The paper only looks at states in the Kansas City region of the federal reserve, but it was possible to replicate the method for Alaska. The results suggested that the recession lasted from September 2015 to September 2016.

In the end, the recession dates were chosen using the Bry-Boshchan method with total nonfarm employment. The NBER does not use employment alone to determine the dates of a national recession, especially the end date, but employment peaks and troughs tend to be close to recession starting and ending dates. The Great Recession lasted 19 months, but U.S. total nonfarm employment continued to decline another 8 months after the end of the recession. This period of postrecession job loss is less than half of the length of the recession. Using September 2015 to September 2016 for the Alaska recession would mean that the recession lasted 13 months and employment continued to decline for 19 more months, longer than the recession itself. It seems that employment, although not a perfect indicator of the recessionary period, is better than the alternatives. Finally, using the March 2015 to April 2018 period is consistent with the Alaska DOLWD.

SUGGESTED CITATION:


3 The most recent data are estimates based on a monthly survey of a sample of employers. The sample includes about 145,000 U.S. businesses and government agencies, which cover approximately 697,000 individual worksites. Historical data are based on data from the Quarterly Census of Employment and Wages (QCEW) program, which is an administrative data source that covers 97 percent of all employment within the scope of the Current Employment Statistics (CES) program. For more information on the program’s concepts and methodology, see “Technical notes for the Current Employment Statistics survey” (U.S. Bureau of Labor Statistics). [https://www.bls.gov/ces/employment/est bullet/censet.htm. For Alaska’s employment data, see “State and metro area employment, hours, and earnings” (U.S. Bureau of Labor Statistics). [https://www.bls.gov/ces/area. All data are seasonally adjusted unless otherwise stated.  

4 This job-loss timeframe is based on quarterly averages of seasonally adjusted CES total nonfarm employment.  

5 Industries (such as information, financial activities, other services, and local government) that moved by less than 1,000 jobs in both periods are not displayed.  


8 Government employment is the sum of employment in federal, state, and local government. Goods-producing industries employment is the sum of employment in mining and logging, construction, and manufacturing. Private service-providing industries employment is the sum of employment in trade, transportation, and utilities; information; financial activities; professional and business services; education and health services; leisure and hospitality; and other services.  

9 GDP is summed across quarters and then total GDP is divided by mining GDP.  

10 Real gross domestic product for Alaska is available starting in 2005. See “GDP by state” (U.S. Bureau of Economic Analysis).  

11 Real nonmining GDP cannot be calculated from the values industries composing real GDP do not necessarily add to total real GDP.  


13 Using 2014 nominal GDP. See “GDP by state” (U.S. Bureau of Economic Analysis).  

14 Though the proportion of government jobs to total nonfarm jobs in the District of Columbia is higher than Alaska’s proportion.  


17 Less than 1 percent of Alaskan land is in private non-native possession, however, private non-native land per capita is higher in Alaska than nationally. Alaska has about 5 million acres of private non-native land divided by about 737 thousand people, or about 7 acres per capita. The United States has about 1.3 billion privately owned acres divided by about 330 million people, or about 4 acres per capita. See Dick Mylius, “Alaska’s state, federal and [Alaska Native Claims Settlement Act] lands—who owns what and why?”, May 16, 2021, in AUF Podcasts, podcast, MP3 audio and accompanying PDF, [http://auuf-podcasts.org/AUUF_Podcasts/podcasterview?name=2021-05-17_20210516_0900.mp3.  

18 See Mylius “Who owns what and why.”  


22 Goldsmith “What drives the Alaska economy?”  


24 Andrew Kitchenman, “Alaska has the highest level of state spending, but that’s not the whole story.” KTOO, July 25, 2016, [https://www.ktoo.org/2016/07/25/alaska-has-the-highest-level-of-state-spending-but-thats-not-the-whole-story/.  


27 See “GDP by state” (U.S. Bureau of Economic Analysis); and “Gross domestic product” (U.S. Bureau of Economic Analysis).  


31 “Annual survey of state government tax collections” (U.S. Census Bureau).


Petroleum revenues and the general fund value are summed across years rather than averaged.


See Scott Goldsmith, “The Alaska economy: how does it work?” (Institute of Social and Economic Research, University of Alaska Anchorage, February 1, 2012), https://pubs.iseralaska.org/meda/2919336d-a19a-4775-ad85-904e8a555662012_02-AkEconomyHowDoesItWork.pdf. See especially slide 32 “Petroleum has transformed the Alaskan economy.” Also see Scott Goldsmith, Structural analysis of the Alaska economy: what are the drivers? (Institute of Social and Economic Research, University of Alaska Anchorage, March 10), https://scholarworks.alaska.edu/bitstream/handle/11122/4287/REVISEDstructure_ak_economy_v2.pdf?sequence=1&isAllowed=y. For an alternative estimate, see American Petroleum Institute, “Economic impacts of the oil and natural gas industry on the U.S. economy in 2011,” July 2013, https://www.api.org/~/media/Files/Policies/Job/Economic_Impacts_OOG_2011.pdf. The American Petroleum Institute (API) estimates that in 2011, 6 percent of U.S. jobs were directly or indirectly attributable to oil and natural gas, compared to 12 percent for Alaska. However, that national number includes the impact of capital investment while the state level number does not, so they are not directly comparable. Also, the API does not include government jobs funded by oil revenue, of which Alaska has a much higher percentage relative to total employment than the United States does.

Erickson and Barker, The Great Alaska Recession.

Data available at “Alaska North Slope First Purchase Price” (U.S. Energy Information Administration), https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=F005071_3&f=M. The U.S. Energy Information Administration defines first purchase as “an equity (not custody) transaction involving an arms-length transfer of ownership of crude oil associated with the physical removal of the crude oil from a property (lease) for the first time. A first purchase normally occurs at the time and place of ownership transfer where the crude oil volume sold is measured and recorded on a run ticket or other similar physical evidence of purchase. The reported cost is the actual amount paid by the purchaser, allowing for any adjustments (deductions or premiums) passed on to the producer or royalty owner.” For this and other definitions, see “Petroleum and other liquids: definitions, sources and explanatory notes” (U.S. Energy Information Administration), https://www.eia.gov/dnav/pet/ThiSDef/pt_pril_nf_1bf6ef2.asp.


Erickson and Barker, The Great Alaska Recession; and Goldsmith, “What drives the Alaska economy?”

Goldsmith, “What drives the Alaska economy?”

Emilene Ostlind, “Living in a Natural Resource Economy,” Western Confluence, May 2022, https://westernconfluence.org/living-in-a-natural-resource-economy/. The natural resource curse hypothesis states that having abundant natural resources (such as petroleum) can make an economy poorer. In Alaska, other industries likely had more trouble developing because the petroleum industry drove up the cost of labor, capital goods, and real estate. The resource curse can also be a result of people dropping out of school to work in oil fields, resulting in lower educational attainment. Finally, natural resource wealth can have a negative effect on the political system, which can result in lower economic growth. See Alexander James, “The long-run vanity of Prudhoe Bay,” Resources Policy 50, December 2016, https://www.sciencedirect.com/science/article/pii/S030420716302057.

Guettabi, “How do oil prices influence Alaska?”

See “Annual Survey of State Government Finances” (U.S. Census Bureau), https://www.census.gov/programs-surveys/state/data/tables.html. Intergovernmental revenue represents funds given to the state government by the federal government. For analysis, see Erickson and Barker, The Great Alaska Recession.


The small increase in Alaska’s unemployment rate during this period was not statistically significant at the 90-percent confidence level. Alaska’s unemployment rate has a wide confidence interval because it has a relatively small population compared to most states. For error measures, see “Information on model-based error measures for regions, divisions, and states” (Local Area Unemployment Statistics, U.S. Bureau of Labor Statistics, last modified March 14, 2022), https://www.bls.gov/laus/lasterry.htm.

The labor force participation rate is the total number of unemployed persons plus the number of employed persons, all divided by the civilian non-institutional population (the population age 16 or older neither in the care of a specialized institution nor active-duty military).

Confidence intervals are not available for the labor force participation rate over nonconsecutive years. Confidence intervals are not available for state-level annual averages of labor force participation rates nor changes between years.


For data by state, see “State population by characteristics: 2010-2019” (U.S. Census Bureau, June 2020), https://www.census.gov/data/datasets/time-series/demo/popest/2010s-state-detail.html; use tables under the heading “Annual estimates of the resident population for selected age groups by sex: April 1, 2010 to July 1, 2019.” For the 2020 ranking, see Lillian Kilduff, “Which U.S. states have the oldest populations?” (U.S. Population Reference Bureau, December 2021), https://www.prb.org/resources/which-us-states-are-the-oldest/.


ethnicity, marital status, and detailed age.” The difference between the United States as a whole and 65 and older age groups is statistically significant at the 90-percent confidence level.


58 One possible reason that Alaska’s participation rate has been relatively high historically, in addition to its young population, is the state’s high male-to-female ratio. Alaska has the highest male-to-female ratio in the country with 52.0 percent of the Alaskan population being male compared with 49.2 percent for the United States in 2019. See ‘2019: ACS 1-year estimates subject tables,” American Community Survey, Bureau, 2020, https://data.census.gov/cedsci/table?q=American%20Community%20Survey%20%20ACS%20%201-Year%20%20State%20%20Total&g=0100000US&tid=ACST1Y2019S0101. In both Alaska and the United States, male labor force participation rates are higher than female labor force participation rates, although these two rates are closer together in Alaska than in the United States. In 2019, male participation rates were 66.7 percent for Alaska and 69.2 percent for the United States and female rates were 59.5 percent for Alaska and 57.4 percent for the United States. For U.S. data, see “Labor force statistics from the Current Population Survey” (U.S. Bureau of Labor Statistics). For state-level data, see “Expanded state employment status demographic data” (U.S. Bureau of Labor Statistics).


66 Brown, “Identifying state-level recessions.”


68 For a graph of personal income, see “Total personal income in Alaska” (FRED, Federal Reserve Bank of St. Louis), https://fred.stlouisfed.org/series/AKOTOT.

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