The Minimum Wage in Hawai‘i: Labor Market Impacts

January 2020
Department of Business, Economic Development & Tourism
Research and Economic Analysis Division

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Executive Summary

The federal minimum wage, set in 2009, is $7.25. Adjusting for inflation, the federal minimum wage is among its historic lows. Hawai‘i recently raised its minimum wage, in 2018, to $10.10. Adjusting for inflation, Hawai‘i’s minimum wage is among its historic highs. Despite this, Hawai‘i’s minimum wage is relatively low when adjusting for cost of living. Taking into account the high cost of living in Hawai‘i, the State’s minimum wage falls below the federal minimum wage (around $5 in 2019 when adjusted for cost of living, compared to the federal minimum wage of $7.25).

With recent calls to increase the minimum wage throughout the nation, this report analyzes the labor market effects of previous increases to the minimum wage in Hawai‘i and estimates the number of workers affected by future increases to the minimum wage.

A look back

The minimum wage in Hawai‘i has increased in four waves since 1990, with the most recent wave occurring in 2015-2018. A preliminary analysis comparing increases in the minimum wage to employment growth in low-wage occupations reveals no obvious negative effect on employment among occupations most likely to be affected by minimum wage increases.

Using additional, more robust analyses confirms that there were no large negative employment effects when the minimum wage was increased in Hawai‘i.

- A “synthetic” Hawai‘i and Honolulu were created from states and counties that have not changed their minimum wage since the last federal minimum wage increase in 2009. These synthetic controls are created to closely mirror the actual data prior to a policy intervention, with any post-intervention differences evidence that the policy had an effect on the outcome variable. Comparing employment and wages in the food services and drinking industries in the synthetic Hawai‘i and Honolulu with the actual state and county, the synthetic Hawai‘i and Honolulu had employment and wages that fell below the actual state and county data. This suggests that the minimum wage not only increased wages, but also employment in the low-wage food services industry.
- Workers’ labor market outcomes (income, wages, and employment status) were regressed on worker characteristics (age, gender, education) and various minimum wage variables to see if the minimum wage affected labor market outcomes. The results from the regressions suggest that the minimum wage had little effect on employment outcomes, while generally increasing income and wages.

A look forward

Just as questions arise about how many workers were affected by previous increases in the minimum wage, there are questions about how many workers are likely to be affected by future increases to the minimum wage. In particular, this report estimates how many workers would be affected by a $12, $15, $17, and $20 minimum wage. The report also assesses the demographics of affected workers.

The Bureau of Labor Statistics provides information on employment and earnings by major and detailed occupations that allows for an estimate of the wage distribution in various occupations. Using this estimated wage distribution, it is estimated that around 15% of workers would be affected by a $12 minimum wage, 28% would be affected by a $15 minimum wage, 36% would be affected by a $17 minimum wage, and 48% would be affected by a $20 minimum wage. Occupations would be differentially affected; occupations that are more likely to be affected include food preparation and serving related occupations (30% affected by a $12 minimum wage), personal care and service occupations (36% affected by a $12 minimum wage), and sales and related occupations (31% affected by a $12 minimum wage). These are likely overestimates of the effect of a gradual increase in the minimum wage, as wages tend to grow over time, thereby decreasing the number of workers that fall below these cutoffs in the future.

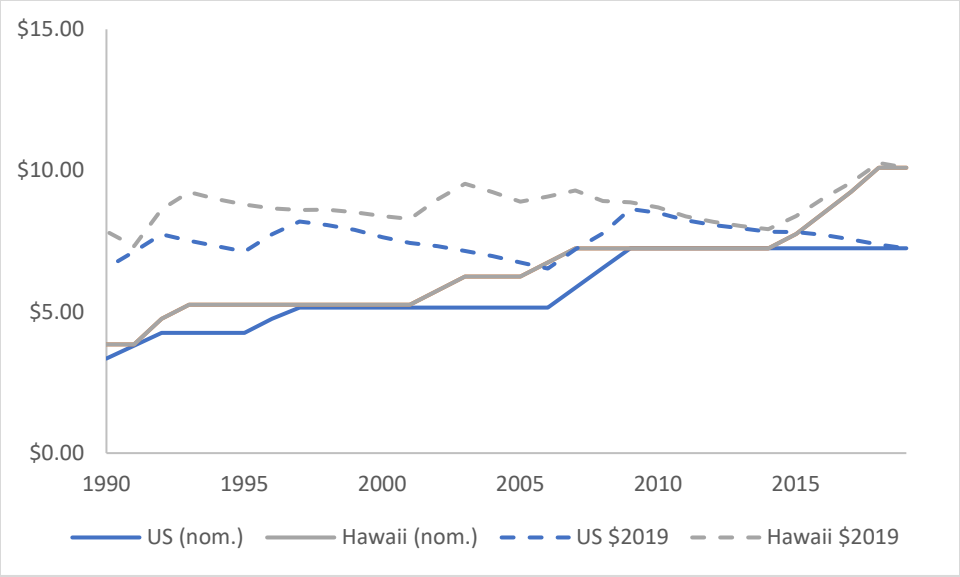
Using responses from surveys administered by the Census Bureau, estimates can be made of the which workers are most likely to be affected. Hourly wages can be imputed from survey responses, and the percentage of workers with imputed wages that fall below the various wage cutoffs can be estimated by demographics (gender, age, household/family income, education, etc. of the respondent). Females, younger workers, workers from poorer families, and workers with less education are all more likely to be affected by increases to the minimum wage.

I. Introduction

The current federal minimum wage is $7.25, set in 2009. Hawai‘i’s state minimum wage has consistently been higher than the federal minimum wage, and currently sits at $10.10. After Seattle passed a law in 2014 increasing its minimum wage to $15 by 2017 for big businesses and 2019 for small businesses, similar bills have appeared in Congress, state legislatures, and county and city councils.

One argument for increasing the minimum wage is that the federal minimum wage has not kept up with inflation. Using the Consumer Price Index – All Urban Consumers (CPI-U) to adjust for inflation, since 1978, the minimum wage has only been lower from 2002-2007 (just before the minimum wage was increased to $7.25) and 1988-1989 (just prior to an increase in the minimum wage from $3.35 to $4.25). Hawai‘i’s recent legislation increasing the minimum wage has allowed it to be at its highest level even in real dollars, except for some years in the late 1970s where it was slightly higher in real terms. Figure 1 presents the national and Hawai‘i minimum wage since 1990 in nominal and real (2019) dollars.

Figure 1. National and Hawai‘i Minimum Wage, Nominal and Real (2019) Dollars



Source: U.S. Department of Labor; Bureau of Labor Statistics; DBEDT calculations

Even though Hawai‘i’s recent minimum wage increase has made it rank among the top third of the states (see Appendix A for a list of states’ minimum wages), and historically high within the state, the high cost of living in Hawai‘i means a $10.10 minimum wage might not go as far. Table 1 shows how much Hawai‘i’s minimum wage equals when adjusted for cost of living compared to various high-cost-of-living cities and the national average. Hawai‘i’s minimum wage, adjusted for Honolulu’s cost of living, is worth around $5 in the nation, below the federal minimum wage. While Manhattan[1] and San Francisco have higher costs of living, they also have

[1] According to CNN’s cost of living index, Brooklyn and Queens have lower costs of living than Honolulu.

higher minimum wages; a minimum wage comparable to $10.10 in Honolulu for Manhattan ($12.78) and San Francisco ($10.21) would be lower than the minimum wage in those cities.

Table 1. Hawai‘i's Minimum Wage, Relative to Other Places, Adjusted for Cost of Living, 2019

	Hawai‘i minimum wage, adjusted for cost of living	Locality minimum wage
Nation	$4.98	$7.25
New York City (Manhattan)[a]	$12.78	$15.00
San Francisco	$10.21	$15.00
Washington, D.C.	$8.20	$14.00
Seattle	$8.04	$15.00
Boston	$7.55	$12.00
Los Angeles	$7.53	$14.25

Source: CNN cost of living index (https://money.cnn.com/calculator/pf/cost-of-living/index.html); Council for Community and Economic Research Cost of Living Index (http://coli.org/); Bureau of Labor Statistics; DBEDT calculations.

[a] According to CNN's cost of living index, Brooklyn and Queens have lower costs of living than Honolulu.

The rest of this report is divided into four sections. Section 2 briefly discusses minimum wage models and provides a brief literature review, section 3 presents recent legislation and proposals to increase minimum wages, and section 4 analyzes the minimum wage in the context of Hawai‘i. Section 5 concludes.

II. The Effects of a Minimum Wage: Theory and Application

The standard labor market models of labor supply and demand in perfect competition demonstrates that setting a minimum wage above the equilibrium wage leads to a shortage of jobs available to workers. When the cost of production increases, firms will decrease the demand of inputs that have become more expensive; if the cost of workers increases, such as through a minimum wage, the demand for workers decreases. This decrease in labor demand could appear as fewer employed workers, workers working fewer hours, or some combination of the two.

However, more complex models of the labor market suggest that a binding minimum wage, i.e. a minimum wage above the lowest wages in the economy, does not necessarily lead to lower employment rates. For example, a labor market that is not in perfect competition (like when there are a small number of firms hiring workers) could lead to higher wages and more employment after a minimum wage increase. Likewise, workers could demand more goods and services with their new, higher wages, and the increased demand for goods and services could lead to firms hiring more workers to meet the increased demand for their products. Even a small extension of the standard labor market model could lead to ambiguous wage and employment effects: the standard labor market model is built on the assumption that workers are identical, an unlikely assumption for the real world. In this case, even though a minimum wage could affect certain groups of workers as in the standard labor market model, a more careful analysis would need to

be done to assess the overall economy; a decrease in demand for one group of workers could be more than offset by an increase in the demand for another group of workers.

Because of these numerous models, some with ambiguous conclusions, there is plentiful empirical research as to whether minimum wage laws lead to outcomes that follow the standard labor market model – higher wages, lower employment – or if minimum wage laws can lead to positive employment outcomes.

Empirical research is in general agreement that higher minimum wages work as intended with regards to wages: wages for low wage workers increase following minimum wage increases. However, employment outcomes are less clear, with inconsistent results for a variety of reasons. For example, one of the first papers to find results contradicting the standard labor market model compared New Jersey and Pennsylvania fast food restaurants[2], concluding that employment in fast food restaurants in New Jersey, which increased its minimum wage in 1992, increased its employment relative to Pennsylvania, which did not have a minimum wage change. Using an alternative data source, a subsequent paper examining New Jersey and Pennsylvania fast food restaurants over the same time period found an employment decrease[3].

Aside from how various geographies and policies can lead to contrasting results, there are a couple of reasons why there are opposite conclusions in the literature: first, finding appropriate comparison groups remains a concern; second, there are concerns over how to incorporate economic trends in the analysis. For the former, it appears that selecting localities that are physically close to the locality of interest tends to result in near-zero or even positive employment outcomes, whereas using a more diverse selection of localities results in a decrease in employment as predicted by the standard perfectly competitive labor market model. For the latter, there is research showing that results are sensitive to linear trends in the model, meaning results can change from near-zero to negative with the inclusion or exclusion of the trend in the regression model. Even with these differences, most research tends to find results that are very small in magnitude or near-zero[4].

Research on the minimum wage goes beyond looking at employment and earnings outcomes. For example, there is research on other firm/employer decisions, such as whether prices increase to

[2] Card, David and Alan Krueger, Minimum Wages and Employment: A Case Study of the Fast Food Industry in New Jersey and Pennsylvania (September 1994). American Economic Review, 84:4.
[3] Neumark, David and William Wascher, Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Comment (2000). American Economic Review, 90:5.
[4] In "What Does the Minimum Wage Do?" (Belmand, Dale and Paul Wolfson, 2014. Upjohn Institute.), the authors review over 200 articles on the minimum wage, mostly dated from 2000 forward, concluding that results on the sensitivity of labor demand to the minimum wage are "are either statistically nonsignificant or are too small in magnitude to be economically meaningful" (p.15).

offset higher wages[5], or how higher minimum wages affect business location[6]. Research on workers likely to be most affected by higher minimum wages look at downstream effects of higher earnings, such as health outcomes[7]. There is also research on economy-wide effects, such as how minimum wages affect income inequality[8].

III. Recent Changes to the Minimum Wage

Perhaps the most well-known increase to the minimum wage that has happened recently is the increased minimum wage in Seattle. Several states have increased their minimum wage within the past few years, perhaps in response to the increase in the federal minimum wage in 2010 to $7.25, with most of these minimum wages being set to around $10 (see Appendix A for a list of states' minimum wages). Seattle was the first locality to set a minimum wage of $15, which it set for large businesses (more than 500 employees) in 2017, after $2 increases in 2015 and in 2016. Numerous localities have followed suit by passing laws to gradually increase the minimum wage to $15, including several California cities and counties such as Los Angeles, San Jose, and Santa Monica[9]; St. Paul and Minneapolis, Minnesota; Flagstaff, Arizona; and Washington, D.C. Localities that currently have a $15 minimum besides Seattle include Berkeley, Cupertino, Mountain View, and San Francisco.

Hawai‘i is one of several states that have recently increased its minimum wage. Following legislation passed in 2014 (Act 82, Session Laws of Hawai‘i 2014), the minimum wage in Hawai‘i was increased in four steps: from the federal minimum wage of $7.25 to $7.75 in 2015, to $8.50 in 2016, to $9.25 in 2017, and to the current state minimum wage of $10.10 in 2018.

There have been several recent proposals to increase the federal minimum wage. The Minimum Wage Fairness Act (S. 1737, 113th U.S. Congress) proposed increasing the minimum wage to $10.10 over a two-year period. Most recently, the Raise the Wage Act (S. 150, 116th U.S. Congress) proposed increasing the minimum wage to $15 over a five-year-period (a version of this bill for the 115th U.S. Congress proposed the same $15 minimum wage, but with the increase occurring over a seven-year-period).

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[5] For example, see (1) Aaronson, Daniel, Price Pass-Through and the Minimum Wage (March 13, 2006). Review of Economics and Statistics, 83:1; (2) Allegretto, Sylvia and Michael Reich, Are Local Minimum Wages Absorbed by Price Increases? Estimates from Internet-Based Restaurant Menus (January 2018). ILR Review, 71:1; and (3) MacDonald, Daniel and Eric Nilsson, The Effects of Increasing the Minimum Wage on Prices: Analyzing the Incidence of Policy Design and Context (June 30, 2016). Upjohn Institute Working Papers, 16-260.

[6] For example, see (1) Méjean, Isabelle and Lise Patureau, Firms' Location Decisions and Minimum Wages (January 2010). Regional Science and Urban Economics, 40:1; and (2) Rohlin, Shawn, State Minimum Wages and Business Location: Evidence from a Refined Border Approach (January 2011). Journal of Urban Economics, 69:1.

[7] For example, see Meltzer, David and Zhuo Chen, The Impact of Minimum Wage Rates on Body Weight in the United States (2011). In "Economic Aspects of Obesity", ed. Michael Grossman and Naci Mocan; and Komro, Kelli, Melvin Livingston, Sara Markowitz, and Alexander Wagenaar, The Effect of an Increased Minimum Wage on Infant Mortality and Birth Weight (2016). American Journal of Public Health, 106:8.

[8] For example, see Autor, David, Alan Manning, and Christopher Smith, The Contribution of the Minimum Wage to U.S. Wage Inequality over Three Decades: A Reassessment (2016). American Economic Journal: Applied Economics 8:1.

[9] California has scheduled an increase of its state minimum wage to $15 by 2022-2023, though some of these localities will reach $15 before the state reaches it.

IV. The Effects of Increasing the Minimum Wage in Hawai‘i

This section consists of two subsections with two types of analyses. The first subsection looks at the historic effect of increasing the minimum wage in Hawai‘i, focused on the recent increase to $10.10. The second subsection looks at how many people would be affected by additional increases to the minimum wage.

A. A Look Back: Increasing the Minimum Wage to $10.10

How have previous increases to Hawai‘i’s minimum wage affected labor market outcomes in the state? Published literature might provide some insight into how minimum wage increases generally affect labor market outcomes, but different localities might react differently and have different results.

Since 1990, Hawai‘i has increased its minimum wage in four waves:

1. From $3.85 to $4.75 in 1992 and $5.25 in 1993 (Act 264, Session Laws of Hawai‘i 1991);
2. From $5.25 to $5.75 in 2002 and $6.25 in 2003 (Act 279, Session Laws of Hawai‘i 2001);
3. From $6.25 to $6.75 in 2006 and $7.25 in 2007 (Act 240, Session Laws of Hawai‘i 2005); and
4. From $7.25 to $7.75 in 2015, $8.50 in 2016, $9.25 in 2017, and $10.10 in 2018 (Act 82, Session Laws of Hawai‘i 2014)

The first analysis in this subsection consists of brief graphical analyses of different occupations within Hawai‘i. Subsequent analysis in this subsection is more rigorous, developing more robust comparisons to occupations most likely affected by an increase to the minimum wage.

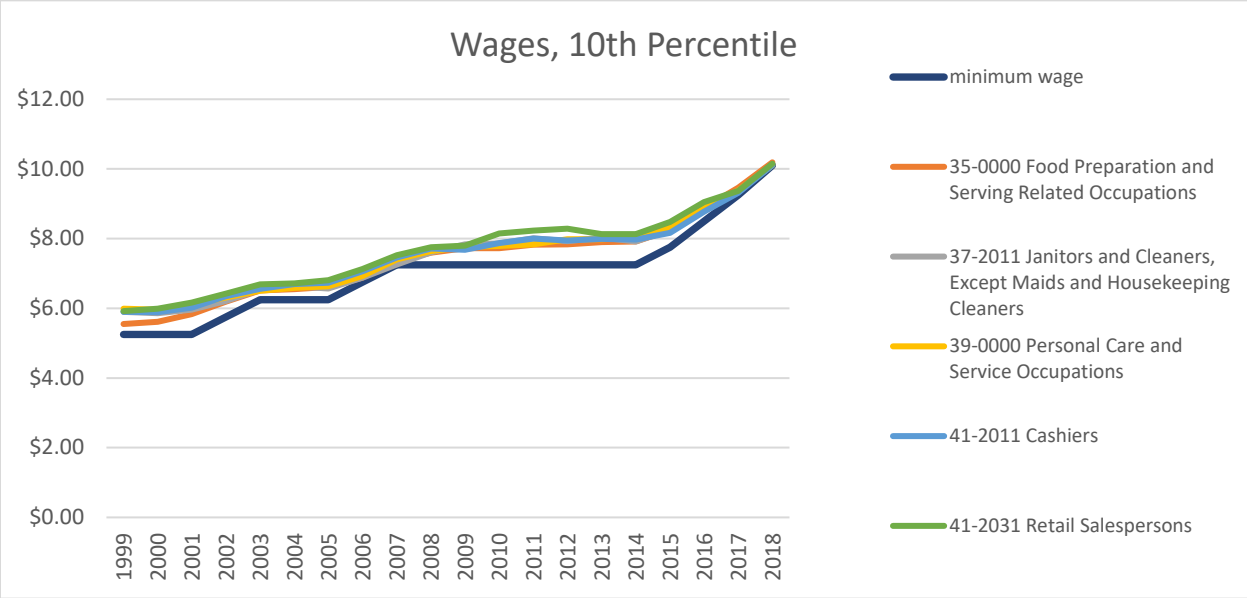
Comparing Occupational Data within Hawai‘i

Figure 2 to Figure 4 shows how some low-wage occupations’ employment outcomes have been affected by the minimum wage increases using data from the Bureau of Labor Statistics’ Occupational Employment Statistics (OES) program. OES data contains total employment; median and mean wages; and wages in the 10th, 25th, 75th, and 90th percentile, for both major and detailed occupation titles. Due to changes in occupational groupings and labeling, consistent data is only available from 1999; this still covers three waves of increases. The low-wage occupation groups used for this analysis consist of two major occupation groups (food preparation and serving related occupations and personal care and service occupations) where most of the detailed occupation groupings have similar wage distributions, and three detailed occupation groups (janitors and cleaners, except maids and housekeeping cleaners; cashiers; and retail salespersons) that have a higher number of workers.

Figure 2 shows the 10th percentile of wages for the five occupation groups, to confirm how a non-trivial percentage of workers in these occupations work close to the minimum wage. The gap between 10th percentile wages for these occupations and the minimum wage tends to widen during periods of no minimum wage increases, as wages slowly grow. The gap tightens during waves of minimum wage increases, and wage growth looks a little faster when the minimum

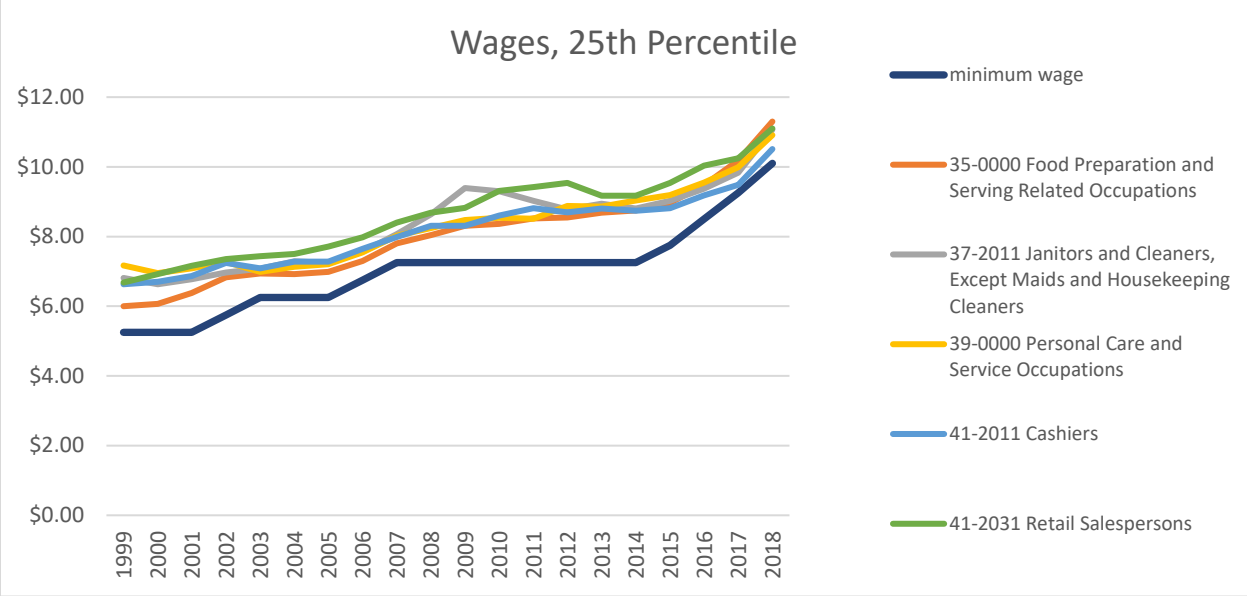
wage starts pushing up against the 10th percentile wages. Figure 3 shows the 25th percentile of wages for the occupation groups. It appears that wage growth is similar for the 10th percentile and 25th percentile, with minimum wage increases slightly adding to the growth rate even for the 25th percentile despite 25th percentile wages for these occupations being $1 to $2 higher than the minimum wage.

Figure 2. Wages, 10th Percentile, Low-Wage Occupations



Source: Bureau of Labor Statistics Occupational Employment Statistics

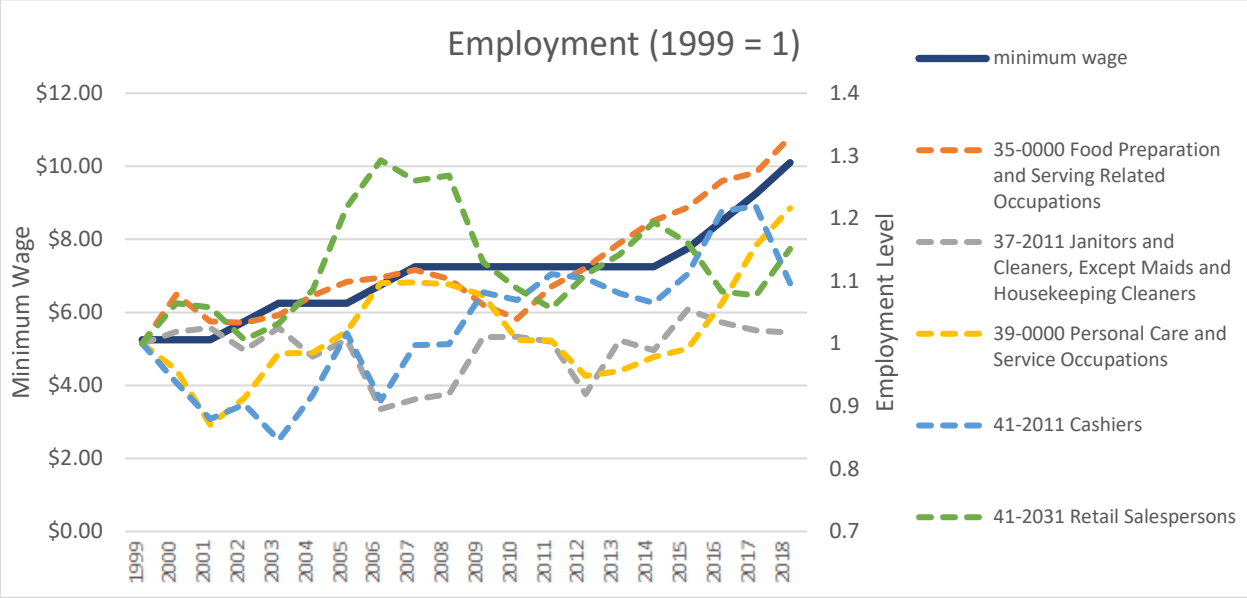
Figure 3. Wages, 25th Percentile, Low-Wage Occupations



Source: Bureau of Labor Statistics Occupational Employment Statistics

Figure 4 shows the employment in these occupations scaled to employment in 1999. There is some growth during some of the minimum wage increases, suggesting that employment does not necessarily fall when the minimum wage is increased. Unfortunately, OES only measures the number of employees in an occupation and does not account for changes in work hours. Even though there is some employment growth for some of the occupations when the minimum wage increases, workers could be working fewer hours, offsetting some of the gains from a higher wage rate. With that being said, these workers would still be benefitting; earning the same income while working fewer hours is generally considered an improvement in wellbeing.

Figure 4. Employment, Low-Wage Occupations



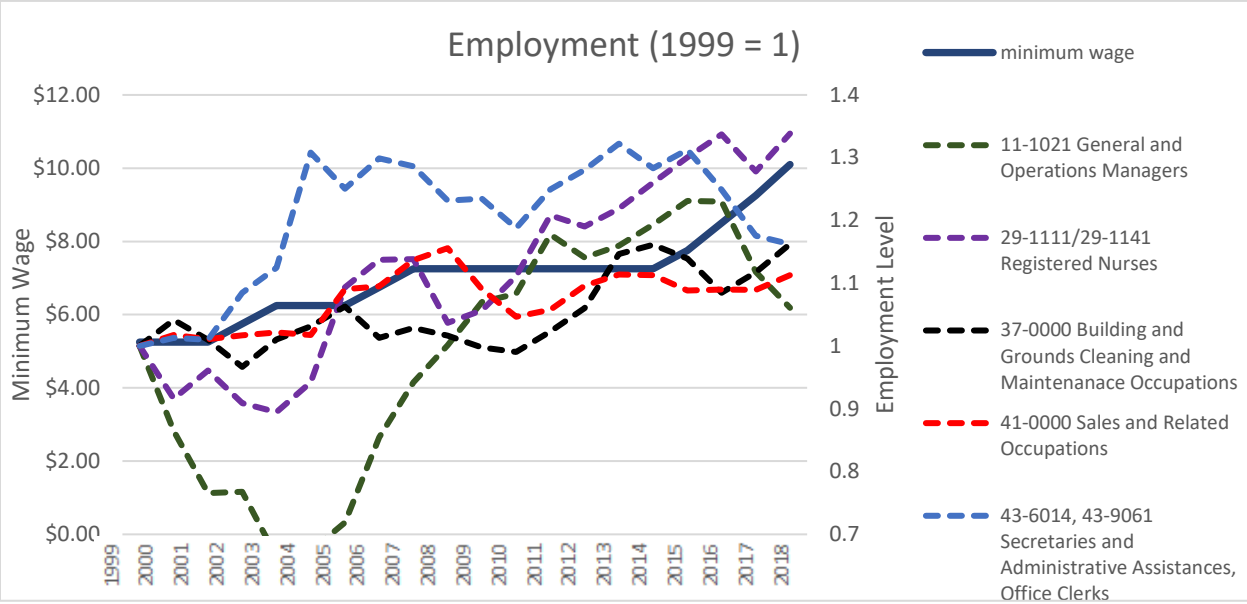
Source: Bureau of Labor Statistics Occupational Employment Statistics
Note: Left axis is the wage (minimum wage); right axis is employment in the occupational grouping relative to 1999 (dashed lines).

While Figure 4 is suggestive that the minimum wage has minimal effect on employment, some of these fluctuations might not be directly related to changes in the minimum wage. Even though there is some growth in employment in the face of increases in the minimum wage, this could be due to a growing economy or higher demand for certain goods or services, such as those related to the tourism industry. If other occupations that are less likely to be affected by the minimum wage are growing at a faster rate than the occupations in the above figures, it would support the theory that minimum wages have a negative effect on employment. Thus, in order to better evaluate the effect of previous minimum wage increases in Hawai‘i, a control group theoretically unaffected by the minimum wage increase must be used as a comparison.

A cursory analysis using a few occupation groups points to employment outcomes for the above occupations that are not particularly unique. Figure 5 contains employment outcomes for six occupation groupings: two major occupation groups (building and grounds cleaning and maintenance occupations, and sales and related occupations) for three of the detailed low-wage occupations above (janitors and cleaners, except maids and housekeeping cleaners; and cashiers

and retail sales persons, respectively) that contain some higher paid occupations, to see if related occupations are affected; and four detailed occupations (general and operations managers; registered nurses; office clerks, general; and secretaries, administrative assistances, except legal, medical, and executive; due to some occupation definition issues, office clerks and secretaries and administrative assistances are combined) that have a large number of workers and varying degrees of work relationships and interactions with the low-wage occupations from above (minimal for registered nurses, versus probably working for the same employer and having more regular interactions for some general and operations managers). Outside of the large decrease among general and operations managers after 2000, employment outcomes are not particularly dissimilar from those found in Figure 4.[10]

Figure 5. Employment, Comparison Occupations



Source: Bureau of Labor Statistics Occupational Employment Statistics
Note: Left axis is the wage (minimum wage); right axis is employment in the occupational grouping relative to 1999 (dashed lines).

The following analyses utilize more robust comparison, or control, groups.

- One strategy is similar to the New Jersey/Pennsylvania study, using an unaffected state to make comparisons. However, instead of using a neighboring unaffected state as a comparison, a "synthetic" Hawai'i is constructed using a data-intensive approach that combines unaffected localities to create a control that closely follows Hawai'i's pre-policy change employment outcomes. Any differences in outcomes between the synthetic and real Hawai'i after policy enactment is the effect of the policy change.
- The second strategy is to model how individual workers' labor market outcomes are affected by the policy change and individual-level characteristics. The minimum wage

[10] The employment decrease to general and operations managers could be due to some reorganization of occupations that the Census Bureau does for most decennial censuses. However, looking at data for these occupations before and after 2000/2010, it's not clear how the reorganization would have drastically affected employment figures.

(adjusted for inflation) is incorporated in the model in three ways: first, it considers whether all workers are affected by the minimum wage; second, it focuses on occupations that are most likely to be affected, to see if the minimum wage effects are concentrated among particular occupations; lastly, it considers whether the minimum wage has spillover effects on workers in positions with working relationships with the most-likely-to-be-affected occupations.

A "Synthetic" Hawai‘i

Instead of trying to find a robust control to compare Hawai‘i's labor market outcomes with, the "synthetic control" strategy involves a data-intensive approach, creating a "synthetic" Hawai‘i from other localities to compare with actual outcomes. Weights are assigned to each locality's data to contribute to the synthetic Hawai‘i, and the weights must add up to 100%. Localities that are not very similar are assigned smaller weights (a weight of zero, in many cases) and localities that are more similar are assigned higher weights. This synthetic Hawai‘i is constructed to closely follow the actual Hawai‘i's labor market outcomes prior to the minimum wage increase.

Following research that uses the synthetic control method to analyze minimum wage increases in Chicago; Seattle; Washington, D.C.; and the Bay Area[11], this analysis focuses on outcomes for the food services and drinking places industry (NAICS code 722) using data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) program. The QCEW provides quarterly employment and wage data reported by covered employers, available at the county, MSA, state, and national levels by industry. The QCEW covers over 95 percent of U.S. jobs.

The main drawback with using a synthetic control is that the time span available to construct a synthetic Hawai‘i is limited. The federal minimum wage increased in July 2009, meaning only data from 2009 Q4 (for 21 states[12] that do not have state minimum wages higher than the federal minimum wage) and after can be used to construct the synthetic Hawai‘i. Thus, an analysis of minimum wage increases can only be done on the most recent 2015-2018 minimum wage increase.

A smaller issue is that Hawai‘i's high cost of living and concentration in the visitor and service industry means that finding combinations of localities to closely follow the actual Hawai‘i is not possible in some cases; Hawai‘i's wages in the food services are higher than the average food service wages in the 21 states, so no combination of the states to create a synthetic Hawai‘i will come close to the actual Hawai‘i's wages. To address this issue, a synthetic Honolulu county is created instead, using counties in the 21 states as its donor pool. This works because large, populous counties with high wages can contribute to creating a synthetic Honolulu, whereas the high wages in these counties would be offset by smaller, lower-wage counties in the state, thereby lowering the state's average wages to an amount that is too low to compare to the State

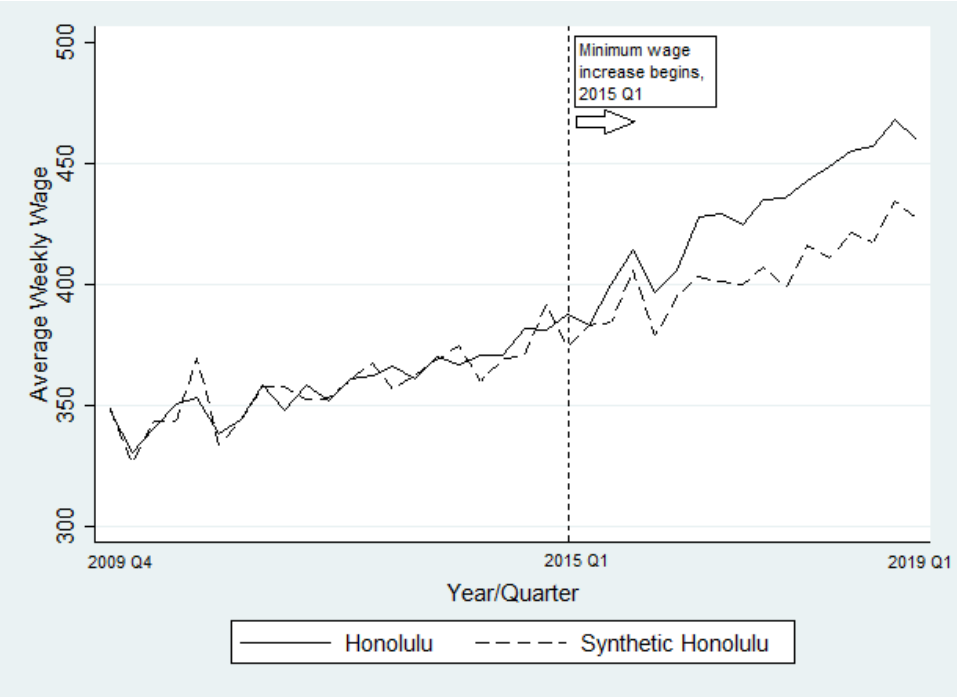
[11] Allegretto, Sylvia, Anna Godoey, Carl Nadler, and Michael Reich, The New Wave of Local Minimum Wage Policies: Evidence from Six Cities (September 6, 2018). Center on Wage and Employment Dynamics Policy Report.
[12] Alabama, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Mississippi, New Hampshire, North Carolina, North Dakota, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, Wisconsin, and Wyoming.

of Hawai‘i’s wages. Many of the states are larger than Hawai‘i, so it is feasible to use synthetic controls to look at the number of workers in Hawai‘i.

The counties that make up the donor pool for the synthetic Honolulu are counties from the aforementioned 21 states that have, on average, more than 500 private establishments over the sample period, leaving 87 counties to use for creating the synthetic Honolulu. To measure earnings data, the QCEW’s average weekly wage is used. Unfortunately, hourly wages cannot be determined, as the QCEW does not include measures of hours worked. With that being said, an increase in the average weekly wage would suggest that even if employers are cutting some hours for workers due to needing to pay a higher wage, workers are still earning more than before the minimum wage increase. To measure employment data, QCEW’s total quarterly wages are divided by the average weekly wage to find the total number of employment weeks in the quarter, a measure of the total number of weeks workers were employed during the quarter (one worker working two weeks or two workers each working one week would both equal two total employment weeks). This is used instead of the number of employees as a compromise between the extensive margin (whether workers remain employed or are laid off) and intensive margin (whether workers are assigned fewer hours).

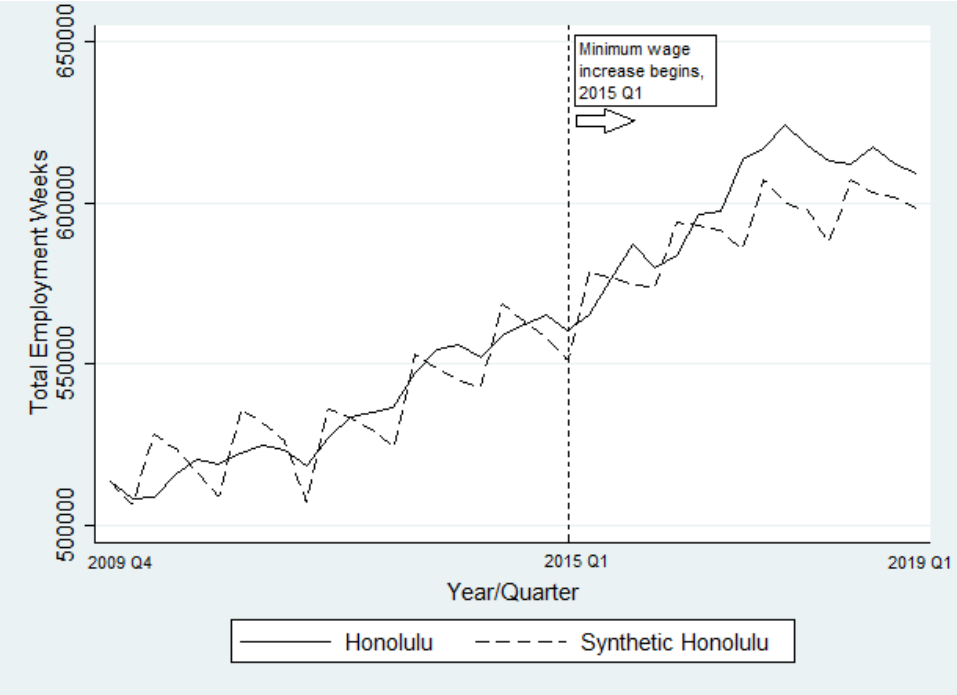
Figure 6 and Figure 7 compare the actual and synthetic Honolulu’s average weekly wage and total employment weeks, respectively. Six counties were used to generate the synthetic Honolulu’s average weekly wage and four counties were used to generate the synthetic Honolulu’s total employment weeks for each quarter; see Appendix B for the counties that make up each synthetic control. There is a small increase in the average weekly wage, while the employment results are a little less clear. It seems like employment increased relative to the synthetic Honolulu around 2017, but employment flattened out in 2018 and seasonality makes the fit for the synthetic Honolulu difficult. It appears that employment trends are similar were it not for seasonal downturns that are not as steep in Honolulu. At the very least, the synthetic control analysis shows no strong evidence that increasing the minimum wage decreases employment.

Figure 6. Honolulu Synthetic Control Average Weekly Wage Analysis, NAICS 722 Food Services and and Drinking Places, Private Establishments, 2009Q4-2019Q1



Source: Bureau of Labor Statistics Quarterly Census of Employment and Wages; DBEDT calculations

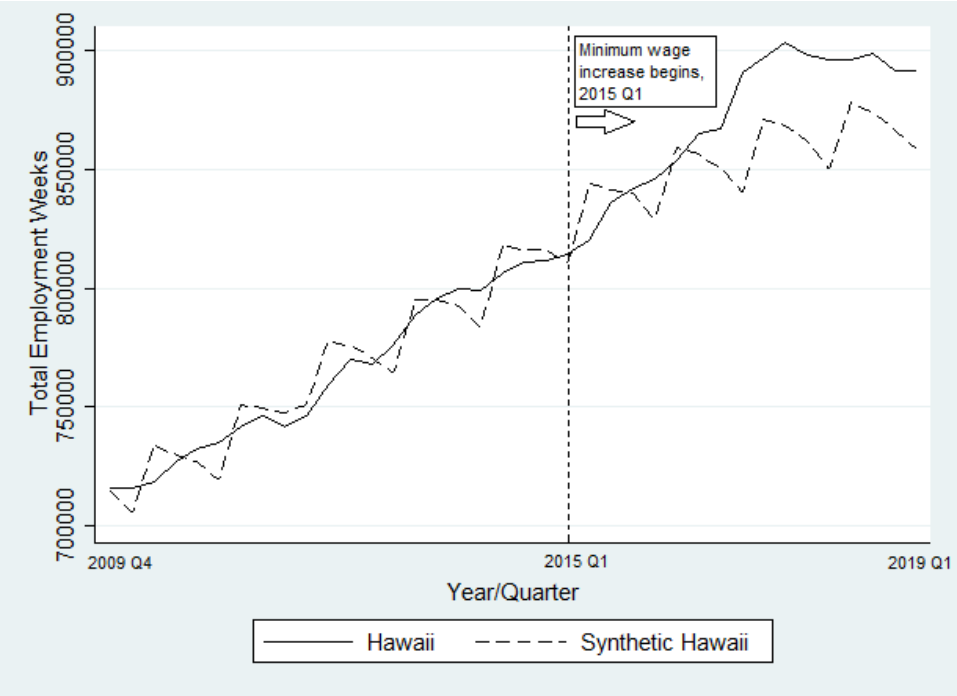
Figure 7. Honolulu Synthetic Control Total Employment Weeks Analysis, NAICS 722 Food Services and and Drinking Places, Private Establishments, 2009Q4-2019Q1



Source: Bureau of Labor Statistics Quarterly Census of Employment and Wages; DBEDT calculations

Figure 8 shows total employment weeks for the State of Hawai‘i and its synthetic control. Figure 8 is more suggestive that employment actually increased after increasing the minimum wage.

Figure 8. Hawai‘i State Synthetic Control Total Employment Weeks Analysis, NAICS 722 Food Services and and Drinking Places, Private Establishments, 2009Q4-2019Q1



Source: Bureau of Labor Statistics Quarterly Census of Employment and Wages; DBEDT calculations

Modeling Worker Outcomes Using Individual-Level Characteristics

This analysis uses data from the Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC) and the American Community Survey (ACS) to estimate how the minimum wage and various individual-level characteristics affect labor market outcomes. As mentioned previously, the model incorporates the minimum wage in three ways: it analyzes whether the minimum wage affects all workers, just workers in low-wage occupations, and workers in industries with a high percentage of low-wage-occupation workers. To keep the model as simple as possible, the variables considered to affect labor market outcomes are limited to age, gender, and education, including the person is attending school or not; occupation is also controlled for, to ensure outcomes are based on changes in the minimum wage and not characteristics inherent to an occupation.

The CPS-ASEC and the ACS are both used to add as much depth to the analysis as possible. The ACS has a much larger sample size than the CPS-ASEC (3.5 million households surveyed in the nation, versus 60,000), allowing for more precision in any model’s estimates. However, the ACS was only inaugurated in 2005, with testing data since 1996 for a limited number of states, and thus has less coverage with regards to policy changes; data is available for Hawai‘i since 2000. In contrast, the CPS began in 1940, covering the four waves of minimum wage increases since 1990 mentioned previously.

Regressions were run for five outcome variables: family total income, worker's total income, worker's income from salary and wages, worker's hourly wage[13], and whether the respondent was employed or not. Income/wage variables were converted into real terms, and the natural log of real income/wage were used for the regressions. The sample for wage and income regressions was limited to employed workers aged 16 to 65; the sample for the employment regressions was limited to all people aged 16 to 65. Tables of results can be found in Appendix C.

Using the ACS sample from 2000-2017, the results show that the minimum wage has strong effects on income and wages for workers in low-wage occupations and other workers except for their co-workers who are not in low-wage occupations. For all workers as a baseline, the coefficients suggest that a $1 increase in the minimum wage increases hourly wage by 5.8%, individual wage income by 5.9%, total individual income by 6.3%, and total family income by 4.5%. Low-wage workers experience additional, modest increases to hourly wage, individual wage income, total individual income, and total family income. Employment does not appear to be affected; the coefficient is positive, but the standard errors are almost as large as the coefficient. The coefficients for workers in industries with a high percentage of low-wage-occupation workers are negative and consistently statistically significant for income and wages, but small relative to the coefficient for all workers and low-wage-occupation workers, but this is relative to the "all workers" baseline, meaning income and wages increase, just not as much compared to other workers. The employment coefficient is positive and statistically significant for these workers, but economically small (0.1% for every $1 increase in minimum wage).

In contrast, using the CPS sample from 1990-2018, the coefficient on the minimum wage variable for workers in low-wage occupations is positive for the income/wage regressions and negative for the employment variable. The coefficients suggest that an increase of the minimum wage by $1 increases hourly wage by 1.5%, individual income from wages by 0.2%, total individual income by 2.8%, total family income by 4.6%, and decreases the probability of employment by 0.3%. However, the standard errors are large, such that only the coefficient for the minimum wage variable in the total family income regression is statistically different from zero. The minimum wage has a negative effect on income and wages for workers in general, though the standard errors are twice the size of the coefficient, which is itself generally much smaller than the coefficient for the low-wage occupation variable (e.g., hourly wages decline by 0.3%). The coefficients for workers in industries with a high percentage of low-wage-occupation workers are the only coefficients that are consistently statistically significant for income and wages, though the coefficient is economically small (about -0.6% for all regressions).

To see if the difference between the ACS and CPS results is due to the difference in sample period, as might be the case if pre-2000 minimum wage increases were non-binding, for example, the CPS sample was changed to 2000-2018 and the regressions were run again. Results were qualitatively similar to the 1990-2018-sample regressions for low-wage occupations; the minimum wage did not appear to have a major effect on income, wage, or employment. Overall,

[13] Hourly wage is imputed from (1) income from salary and wages, (2) weeks worked (last year), and (3) hours usually worked per week. For data on weeks worked that is recorded in intervals, the weeks worked variable is set to the midpoint of each interval.

the minimum wage moves to having a positive effect on income, though the coefficient for minimum wage in the total individual income regression and hourly wage regression stay statistically insignificant.

Thus, the evidence suggests that increasing the minimum wage generally has a neutral-to-positive effect on income and wages, but low-wage occupation workers do not appear to particularly benefit from minimum wage increases. Employment effects appear to be minimal.

B. A Look Forward: Increasing the Minimum Wage to $12 or higher

How many workers would be directly affected an increase to the minimum wage, to $12 or higher? While modeling labor market decisions is difficult, due to the difficulty of modeling worker, firm, and consumer decisions, counting the number of workers who earn below a proposed minimum wage, and thus "directly" affected by a minimum wage increase, is more straightforward. This sets a baseline as to how many workers are affected; these workers will either receive a higher wage or be laid off.

One strategy is to use data from the Bureau of Labor Statistics' Occupational Employment Statistics (OES) program to estimate wage distributions and count how many workers currently earn below some dollar amount. OES not only has median and mean wages, but wages in the 10^{th}, 25^{th}, 75^{th}, and 90^{th} percentile as well, for detailed occupation titles, allowing for a reasonable approximation of wage distributions.

Another strategy is to use household surveys, such as the American Community Survey or the Current Population Survey, and the respondents' wages to estimate who would be affected by an increase to the minimum wage. This strategy involves counting the number of respondents who have wages below a particular amount and using survey weights to calculate how many total people are affected. One advantage to using household surveys over the OES data is that surveys contain demographic information, allowing for a breakdown of workers affected by variables like age, education, and marital status. However, wage information might be imprecise, as the surveys typically ask respondents to recall how much they worked and earned over a certain time period, as opposed to asking what the respondents' hourly wage is. Even small errors to these responses can affect imputations of the workers' wage.

The following estimates could overestimate the number of workers affected by larger increases to the minimum wage. Minimum wage proposals, particularly those with higher dollar amounts, tend to be phased in over a number of years; for example, Seattle's increase to $15 took two years for larger businesses and four years for small businesses. If there is any wage growth between now and the implementation of a higher minimum wage, it's likely that fewer people will fall below any of the minimum wage cutoffs examined in this section.

Occupational Employment Statistics Estimate

Table 2 presents the results from using the May 2018 OES to estimate the number (and percentage) of workers that would be affected by increasing the $10.10 minimum wage to $12, $15, $17, and $20. The table provides estimates when the calculation is done by major occupation group. While wage distributions for detailed occupation group are more precise than for major occupation group, some data for detailed occupation groups are withheld due to the

small sample size, which could lead to an underestimate of the number of workers affected. OES provides a breakdown of employment and wages by metropolitan area (Honolulu, i.e. O‘ahu; Kahului-Wailuku-Lahaina, i.e. Maui; and Hawai‘i/Kaua‘i nonmetropolitan area), providing additional insight into which workers would be affected.

Table 2. Number and Percentage of Workers Affected by Minimum Wage Increase, 2018

	$10.10	$12	$15	$17	$20
State	24,443 (3.8%)	93,225 (14.5%)	181,164 (28.2%)	232,268 (36.2%)	306,803 (47.8%)
Honolulu	18,646 (4.0%)	69,393 (14.9%)	128,684 (27.6%)	163,764 (35.1%)	214,737 (46.1%)
Maui	1,753 (2.3%)	9,058 (12.0%)	20,212 (26.8%)	27,146 (36.0%)	37,011 (49.1%)
Hawai‘i/Kaua‘i	3,121 (3.1%)	15,265 (15.2%)	31,444 (31.4%)	41,433 (41.4%)	54,556 (54.5%)

Source: Bureau of Labor Statistics Occupational Employment Statistics, May 2018 State Occupational Employment and Wage Estimates for Hawai‘i; DBEDT calculations
Note: Percentage of workers directly affected by minimum wage increase in parentheses.

According to the estimates using the OES, in 2018, about 4% of workers earn the current minimum wage of $10.10, 15% of workers earned less than $12 per hour, 28% earned less than $15 per hour, 36% earned less than $17 per hour, and 48% earned less than $20 per hour. Hawai‘i and Kaua‘i had the highest percentage of workers who earned less than these rates. Maui had the lowest percentage of workers earning less than $12 and $15 per hour, and Honolulu had the lowest percentage of workers earning less than $20 per hour.

Of the major occupation groups, personal care and service occupations had the highest percentage of workers that would be directly affected by an increase of the minimum wage (about 36% for an increase to $12, up to an 80% for an increase to $20), followed by sales and related occupations (30.8% up to 73.5%) and food preparation and serving related occupations (30.5% up to 68.3%). Some occupational groups like healthcare support occupations and buildings and grounds cleaning and maintenance occupations have a lower percentage of workers who earn less than $12 (15.0% and 17.6%, respectively), but a higher percentage of workers who earn less than $20 (72.8% and 71.8%, respectively).

Among detailed occupation groups, almost 80% of ushers, lobby attendants, and ticket takers earn less than $12, though the number of workers is relatively small (880). Of the detailed occupation groups with a larger number of workers, combined food preparation and serving workers (68.0% of 14,250 workers); counter attendants, cafeteria, food concession, and coffee shop (64.2% of 4,470 workers); and cashiers (55.3% of 14,590 workers) had the highest percentage of workers earning less than $12. A table of the percentage of workers affected by select major and detailed occupational groups can be found in Appendix D.

Survey Estimates: American Community Survey

Several organizations have estimated the direct effect of minimum wage increases using household surveys. These estimates take annual income from wages and divide by the

respondent's weeks worked and usual hours worked per week to impute hourly wage. The Economic Policy Institute (EPI) uses the Current Population Survey (CPS) to estimate the effect of gradually increasing the federal minimum wage to $15 over the next few years, while the Center on Wage and Employment Dynamics (CWED) uses the American Community Survey (ACS) to find the direct effect of various minimum wage proposals in California in New York, which are then incorporated with their model to forecast a total effect of the minimum wage increase. EPI has estimates by state, but the estimate is for a gradual increase to $15. Accordingly, this section provides estimates calculated by DBEDT on the effect of immediately increasing the $10.10 minimum wage to $12, $15, $17, and $20 following the strategy used by EPI and CWED, but differs from the EPI and CWED analysis by ignoring the spillover modeling done by EPI and CWED[14] and only focusing on an immediate increase, thereby omitting any wage growth modeling as done by EPI and CWED. Imputed wages that fall significantly below the current minimum wage are likely due to reporting errors, thus imputed wages below $5 are not considered affected by increases in the minimum wage.

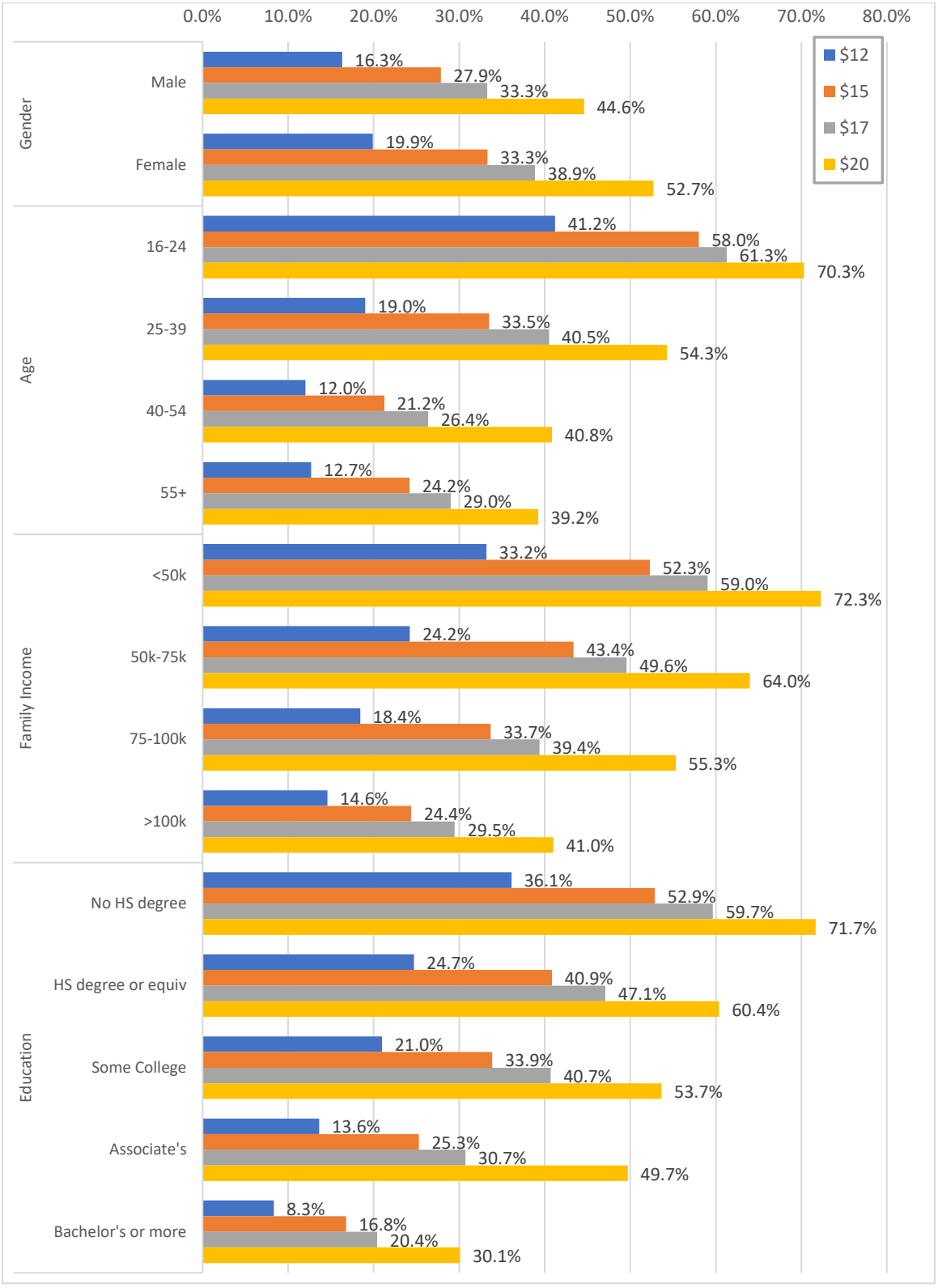
Figure 9 shows the percentage of workers directly affected by increasing the minimum wage to various levels by a variety of demographics based on the 2017 ACS. Females are more likely than males to be affected by an increase in the minimum wage, by between 3.5-8.0 percentage points. Focusing studies on the effect of the minimum wage on teens is particularly relevant: almost half of young adults aged 16-24 years old would be affected by increasing the minimum wage to $12 and over 70% of these young adults would be affected by increasing the minimum wage to $20. In contrast, 12% to 19% of older adults would be affected by a $12 minimum wage, depending on the age bracket. Workers 40-54 years old and workers 55 or older would be similarly affected. Families earning $25,000 or less had the highest percentage of workers affected by a $12 minimum wage, but this bracket has by far the fewest number of workers (less than half the number of workers of any other demographic breakdown), so the bracket is combined with the $25,000-to-$49,999 family income bracket in Figure 9.

Over 35% of workers without a high school degree would be affected by a $12 minimum wage. A little less than a quarter of those with a high school degree and those who have some college would be affected by a $12 minimum wage. The demographic least affected by minimum wage increases are those with a bachelor's degree or higher; less than 10% would be affected by a $12 minimum wage. Less than a third would be affected by a $20 minimum wage, smaller than the percentage of workers affected by a $17 for most other demographics.

Appendix E provides the demographic breakdown of affected workers. While younger people, workers from poorer families, and workers with no high school degree are far more likely to be affected, their small population size means they do not make up a plurality of affected workers. The large number of workers with a family income between $75,000-100,000 means that even though these workers are less likely to be affected, the majority of affected workers come from this family income bracket.

[14] Both EPI and CWED consider workers who have wages up to 15% higher than the minimum wage to be indirectly affected by the increases, as these workers might need slight wage increases to maintain wages higher than the workers who fall below the proposed minimum wage.

Figure 9. Percentage of Workers Directly Affected by Minimum Wage Increase, by Demographics, 2017



Source: American Community Survey; DBEDT calculations

V. Conclusion

Due to inflation and being unchanged since 2010, the federal minimum wage is currently among its historic lows. Meanwhile, even though Hawai‘i has recently increased its minimum wage, the high cost of living means the state’s $10.10 minimum wage is not worth as much as the $7.25 federal minimum wage. Some other high-cost localities have taken into account their high costs of living and increased their minimum wage to as high as $15.

The effect of increasing the minimum wage is somewhat ambiguous. The classical labor market model in perfect competition suggests a binding minimum wage will lower employment, but other labor market models have been developed showing that employment does not necessarily decrease in response to increasing the minimum wage. Empirical evidence also provides contrasting results. In general, analyses of minimum wage increases find that small increases to the minimum wage lead to small increases in unemployment, but there is a growing body of evidence that suggests increasing the minimum wage might have no effect on unemployment, and in some cases, actually increase employment.

Looking at the effect of increasing the minimum wage specifically in Hawai‘i yields somewhat inconclusive results as well. A brief comparison of wages and employment in a variety of occupations using the Bureau of Labor Statistics’ Occupational Employment Statistics finds no clear evidence that minimum wage increases in Hawai‘i having a negative effect on employment. A more careful analysis that compares a “synthetic” Hawai‘i that has not increased its minimum wage to the actual Hawai‘i also points to no negative effect on employment after the minimum wage increased in 2015. Finally, several regressions that model workers’ labor market outcomes like wages and employment using worker characteristics and changes to the minimum wage do not provide consistent evidence that increasing the minimum wage in Hawai‘i led to an increased likelihood of unemployment. Regressions using the American Community Survey suggest that income and wages increased modestly for all workers, while results from the Current Population Survey point to the possibility of relative declines in income among workers who work in industries with many low-wage occupations but who are not working in low-wage occupations themselves.

Estimates of how many workers would be directly affected by future increases to the minimum wage find that increasing the minimum wage to: $12 would affect 15% of workers; $15 would affect 28% of workers; $17 would affect 36% of workers; and $20 would affect 48% of workers. These workers would be directly affected by a higher minimum wage because their current wage falls below the new minimum wage; these workers would either receive a raise or be laid off. Increasing the minimum wage would have a larger effect among low-wage occupations, females, younger workers, workers with lower family income, and workers with less education.

Appendix A. State Minimum Wages

Table A-1. State Minimum Wages: 2019

Federal (FLSA)	7.25
Alabama	...
Alaska	10.19
Arizona	12.00
Arkansas	10.00[a]
California	12.00
Colorado	12.00
Connecticut	11.00
Delaware	9.25
Florida	8.56
Georgia	5.15[b]
Hawai'i	10.10
Idaho	7.25
Illinois	9.25[a]
Indiana	7.25[c]
Iowa	7.25
Kansas	7.25
Kentucky	7.25
Louisiana	...
Maine	12.00
Maryland	11.00
Massachusetts	12.75
Michigan	9.65[c]
Minnesota	8.15-10.00[d]
Mississippi	...
Missouri	9.45
Montana	8.65[d]
Nebraska	9.00[a]
Nevada	7.25-8.25
New Hampshire	7.25
New Jersey	11.00
New Mexico	9.00
New York	11.80
North Carolina	7.25
North Dakota	7.25
Ohio	8.70
Oklahoma	2.00-7.25[d]
Oregon	11.25
Pennsylvania	7.25
Rhode Island	10.50
South Carolina	...
South Dakota	9.30
Tennessee	...
Texas	7.25
Utah	7.25
Vermont	10.96[c]
Virginia	7.25[a]
Washington	13.50
West Virginia	8.75
Wisconsin	7.25
Wyoming	5.15
District of Columbia	14.00

… No state minimum wage

[a] Rates applicable to employers of four or more.

[b] Rates applicable to employers of six or more.

[c] Rates applicable to employers of two or more.

[d] Rates depend on gross annual receipts/sales.

Source: U.S. Department of Labor, Wage and Hour Division.
https://www.dol.gov/whd/state/stateMinWageHis.htm

Appendix B. Synthetic Control Weights

Assigned weights in the following tables might not sum to 1 due to rounding.

Table B-1. Synthetic Control Weights - Honolulu Average Weekly Wage

County, State	Assigned weight
Rockingham County, New Hampshire	0.011
Philadelphia County, Pennsylvania	0.062
Dallas County, Texas	0.222
Montgomery County, Texas	0.286
Travis County, Texas	0.249
Loudoun County, Virginia	0.170

Table B-2. Synthetic Control Weights - Honolulu Total Employment Weeks per Quarter

County, State	Assigned weight
Allegheny County, Pennsylvania	0.203
Shelby County, Tennessee	0.605
Dallas County, Texas	0.053
Salt Lake County, Utah	0.140

Table B-3. Synthetic Control Weights - Hawai‘i State Total Employment Weeks per Quarter

State	Assigned weight
Kansas	0.062
Mississippi	0.505
North Dakota	0.434

Appendix C. Worker Outcome Regression Results

The equation for estimating the regressions is:

$$y_{i,t} = \alpha + \beta_1 X_{i,t} + \beta_2 MWAll_t + \beta_3 MWLowWage_t + \beta_4 MWSpill_t + \varepsilon_{i.t}$$

where α is the constant term; $\varepsilon_{i,t}$ is the error term; $X_{i,t}$ is a vector of individual characteristics including age, age squared, gender, education, and whether the individual is attending school or not; and MWAll, MWLowWage, and MWSpill are the minimum wage in real terms. MWAll is equal to the minimum wage in real terms for all workers, MWLowWage is equal to the minimum wage in real terms for low wage occupations and zero otherwise, and MWSpill is equal to the minimum wage in real terms for non-low-wage workers in industries with a high proportion of low wage occupations and zero otherwise.

Low wage occupations are based on the IPUMS OCC2010 variable: food preparation and serving occupations *except* for chefs and cooks and first line supervisors of food preparation and serving workers (4030-4150); janitors and building cleaners (4220); personal care and service occupations *except* for first line supervisors of gaming workers and first-line supervisors of personal service workers (4340-4650); and cashiers, counter and rental clerks, parts salespersons, and retail salespersons (4720-4760).

Spillover industries are based on the IPUMS IND1990 variable: retail trade (580-691), personal services (761-791), and entertainment and recreation services (800-810).

The dependent variable, $y_{i,t}$, is a labor market outcome: log real total family income, log real individual total income, log real individual income from wages, log real hourly wage, or whether the person is employed or not.

Table C-1. American Community Survey Results, 2000-2017

	Log total family income, 2018$	Log individual total income, 2018$	Log individual income from wages, 2018$	Log hourly wage, 2018$	Employed
Minimum wage (real), all workers	**0.045*** **	**0.063*** **	**0.059*** **	**0.058*** **	**0.0012**
	(0.009)	**(0.007)**	**(0.007)**	**(0.005)**	**(0.002)**
Minimum wage (real) low wage occupations	**0.052** **	**0.057*** **	**0.052** **	**0.022**	**0.009**
	(0.025)	**(0.021)**	**(0.021)**	**(0.015)**	**(0.008)**
Minimum wage (real) spillover	**-0.012*** **	**-0.011*** **	**-0.013*** **	**-0.008*** **	**0.0012** **
	(0.002)	**(0.001)**	**(0.001)**	**(0.001)**	**(0.00059)**
Age	-0.041***	0.104***	0.116***	0.057***	0.016***
	(0.003)	(0.002)	(0.002)	(0.0014)	(0.001)
Age^2	0.00052***	-0.001***	-0.001***	-0.00055***	-0.0002***
	(2.99e-05)	(2.24e-05)	(2.35e-05)	(1.68e-05)	(7.52e-06)
Female	-0.056***	-0.241***	-0.231***	-0.137***	-0.042***
	(0.0098)	(0.008)	(0.008)	(0.006)	(0.003)
HS degree or equivalent	0.143***	0.226***	0.225***	0.0786***	0.018***
	(0.02)	(0.017)	(0.017)	(0.012)	(0.005)
Some college	0.098***	0.294***	0.290***	0.128***	0.026***
	(0.020)	(0.018)	(0.018)	(0.012)	(0.005)
Associate's degree	0.088***	0.357***	0.346***	0.158***	0.046***
	(0.022)	(0.019)	(0.019)	(0.013)	(0.006)
Bachelor's degree	0.176***	0.460***	0.439***	0.254***	0.051***
	(0.021)	(0.018)	(0.018)	(0.013)	(0.005)
Master's/Professional/Doctoral	0.315***	0.629***	0.588***	0.381***	0.058***
	(0.023)	(0.020)	(0.021)	(0.015)	(0.006)
Attending school	-0.094***	-0.437***	-0.453***	-0.079***	-0.059***
	(0.018)	(0.013)	(0.014)	(0.009)	(0.004)
Constant	12.22***	8.234***	8.034***	1.725***	0.580***
	(0.102)	(0.0831)	(0.0841)	(0.0676)	(0.0283)
Observations	103,140	103,197	97,078	97,078	145,809
R-squared	0.100	0.409	0.422	0.317	0.447

*** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%. Robust standard errors in parentheses; income and wages deflated using Hawai‘i CPI-U. Coefficients on occupations omitted from table.

Table C-2. Current Population Survey Results, 1990-2018

	Log total family income, 2018$	Log individual total income, 2018$	Log individual income from wages, 2018$	Log hourly wage, 2018$	Employed
Minimum wage (real), all workers	**0.019***	**-0.017**	**-0.003**	**-0.003**	**0.002**
	(0.011)	**(0.011)**	**(0.011)**	**(0.008)**	**(0.002)**
Minimum wage (real) low wage occupations	**0.046***	**0.028**	**0.0019**	**0.015**	**-0.003**
	(0.027)	**(0.030)**	**(0.028)**	**(0.021)**	**(0.006)**
Minimum wage (real) spillover	**-0.0051****	**-0.006****	**-0.0055****	**-0.0061*****	**0.0003**
	(0.0024)	**(0.0025)**	**(0.0021)**	**(0.0017)**	**(0.00063)**
Age	0.0088**	0.079***	0.0840***	0.043***	0.0039***
	(0.00343)	(0.00394)	(0.00340)	(0.00249)	(0.000877)
Age^2	-0.0000059	-0.0008***	-0.0009***	-0.0004***	-7.64e-05***
	(3.95e-05)	(4.50e-05)	(3.99e-05)	(2.93e-05)	(9.96e-06)
Female	-0.107***	-0.278***	-0.280***	-0.164***	-0.077***
	(0.014)	(0.015)	(0.013)	(0.010)	(0.003)
HS degree or equivalent	0.033	0.099***	0.093***	0.092***	0.028***
	(0.024)	(0.025)	(0.022)	(0.016)	(0.005)
Some college	0.151***	0.193***	0.149***	0.159***	0.053***
	(0.025)	(0.025)	(0.023)	(0.018)	(0.006)
Associate's degree	0.149***	0.214***	0.193***	0.196***	0.058***
	(0.027)	(0.029)	(0.025)	(0.019)	(0.007)
Bachelor's degree	0.303***	0.379***	0.353***	0.340***	0.054***
	(0.026)	(0.027)	(0.025)	(0.019)	(0.006)
Master's/Professional/Doctoral	0.470***	0.665***	0.690***	0.575***	0.090***
	(0.045)	(0.049)	(0.050)	(0.042)	(0.012)
High school full-time attendance	0.563***	-1.535***	-1.409***	0.0242	-0.147***
	(0.066)	(0.102)	(0.083)	(0.063)	(0.009)
High school part-time attendance	-0.099	-1.251***	-1.162***	0.274	-0.141***
	(0.192)	(0.412)	(0.416)	(0.263)	(0.05)
College/university full-time	0.100**	-0.532***	-0.692***	-0.137***	-0.135***
	(0.047)	(0.045)	(0.042)	(0.029)	(0.008)
College/university part-time	0.078	-0.325***	-0.348***	-0.170***	-0.081***
	(0.069)	(0.065)	(0.067)	(0.048)	(0.013)
Not attending school	-0.030*	-0.102***	-0.076***	-0.046***	-0.068***
	(0.018)	(0.018)	(0.017)	(0.013)	(0.004)
Constant	11.15***	9.507***	9.340***	2.511***	0.963***
	(0.135)	(0.146)	(0.132)	(0.122)	(0.0297)
Observations	33,268	32,789	30,540	30,540	46,325
R-squared	0.132	0.328	0.398	0.298	0.695

*** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%. Robust standard errors in parentheses; income and wages deflated using Hawai‘i CPI-U. Coefficients on occupations omitted from table.

Table C-3. Current Population Survey Results, 2000-2018

	Log total family income, 2018$	Log individual total income, 2018$	Log individual income from wages, 2018$	Log hourly wage, 2018$	Employed
Minimum wage (real), all workers	**0.058*** **	**0.015**	**0.027** **	**0.012**	**0.007*** **
	(0.012)	**(0.014)**	**(0.013)**	**(0.010)**	**(0.003)**
Minimum wage (real) low wage occupations	**0.0175**	**0.0300**	**0.0004**	**0.010**	**-0.0017**
	(0.031)	**(0.037)**	**(0.032)**	**(0.024)**	**(0.007)**
Minimum wage (real) spillover	**-0.00240**	**-0.00097**	**-0.0029**	**-0.0048*** **	**0.0009**
	(0.0025)	**(0.0027)**	**(0.0022)**	**(0.0018)**	**(0.00064)**
Age	0.00051	0.081***	0.085***	0.045***	0.0034***
	(0.00369)	(0.00445)	(0.00371)	(0.00275)	(0.000858)
Age^2	8.69e-05**	-0.0008***	-0.0009***	-0.0004***	-7.20e-05***
	(4.23e-05)	(5.06e-05)	(4.33e-05)	(3.26e-05)	(9.75e-06)
Female	-0.111***	-0.269***	-0.242***	-0.143***	-0.0639***
	(0.016)	(0.017)	(0.014)	(0.012)	(0.003)
HS degree or equivalent	0.188***	0.265***	0.229***	0.163***	0.040***
	(0.032)	(0.036)	(0.030)	(0.023)	(0.006)
Some college	0.292***	0.336***	0.266***	0.231***	0.069***
	(0.034)	(0.038)	(0.032)	(0.024)	(0.007)
Associate's degree	0.304***	0.360***	0.291***	0.240***	0.072***
	(0.036)	(0.0398)	(0.034)	(0.025)	(0.007)
Bachelor's degree	0.460***	0.530***	0.479***	0.413***	0.074***
	(0.035)	(0.039)	(0.033)	(0.025)	(0.007)
Master's/Professional/Doctoral	0.663***	0.877***	0.855***	0.674***	0.099***
	(0.055)	(0.057)	(0.056)	(0.047)	(0.013)
High school full-time attendance	0.725***	-1.334***	-1.264***	0.0269	-0.124***
	(0.08)	(0.132)	(0.098)	(0.07)	(0.0097)
High school part-time attendance	-0.069	-1.259	-0.565	0.593	-0.134**
	(0.217)	(0.925)	(0.543)	(0.442)	(0.057)
College/university full-time	0.077	-0.465***	-0.652***	-0.122***	-0.132***
	(0.052)	(0.050)	(0.045)	(0.034)	(0.008)
College/university part-time	0.0153	-0.349***	-0.384***	-0.179***	-0.078***
	(0.075)	(0.069)	(0.070)	(0.052)	(0.012)
Not attending school	-0.010	-0.072***	-0.057***	-0.033**	-0.067***
	(0.019)	(0.020)	(0.018)	(0.014)	(0.004)
Constant	10.84***	8.985***	8.907***	2.279***	0.908***
	(0.156)	(0.174)	(0.153)	(0.139)	(0.0312)
Observations	26,473	26,069	24,277	24,277	37,084
R-squared	0.133	0.318	0.400	0.305	0.727

*** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%. Robust standard errors in parentheses; income and wages deflated using Hawai‘i CPI-U. Coefficients on occupations omitted from table.

Appendix D. Percentage of Workers in Hawai‘i Earning Less than $12, $15, $17, and $20, by Occupation

Occupations included in the following table are those that have more than 1,000 workers and either have a higher percentage of workers earning $12 than the state average, a higher percentage of workers earning $15 than the state average, or a higher percentage of workers earning $17 and $20 than the state average.

Table D-1. Percentage of Workers Directly Affected by Minimum Wage, by Occupation

Occupation, group type	No. of Workers	$12	$15	$17	$20
All Occupations, total	**641,790**	**14.5%**	**28.2%**	**36.2%**	**47.8%**
Healthcare Support Occupations, major	19,630	15.0%	37.9%	53.1%	72.8%
Food Preparation & Serving Related Occupations, major	85,770	30.5%	51.7%	58.4%	68.3%
Building & Grounds Cleaning & Maintenance Occupations, major	37,720	17.6%	36.6%	49.6%	71.8%
Personal Care & Service Occupations, major	23,390	35.9%	58.4%	68.8%	79.6%
Sales & Related Occupations, major	63,240	30.8%	53.5%	61.5%	73.5%
Office & Administrative Support Occupations, major	89,730	13.0%	29.4%	41.6%	57.7%
Farming, Fishing, & Forestry Occupations, major	1,000	17.5%	35.2%	47.0%	62.2%
Production Occupations, major	15,100	20.6%	37.3%	47.4%	58.5%
Transportation & Material Moving Occupations, major	42,020	19.7%	35.9%	45.3%	56.7%
Social & Human Service Assistants, detailed	2,260	5.5%	29.5%	48.6%	73.2%
Self-Enrichment Education Teachers, detailed	1,730	11.1%	30.6%	44.7%	60.2%
Merchandise Displayers & Window Trimmers, detailed	1,020	16.5%	46.5%	64.2%	79.8%
Home Health Aides, detailed	4,920	38.8%	77.2%	89.9%	100.0%
Nursing Assistants, detailed	4,800	0.0%	31.1%	52.2%	77.3%
Medical Assistants, detailed	3,600	2.1%	22.7%	40.7%	64.7%
Security Guards, detailed	9,460	20.1%	44.1%	60.4%	80.3%
First-Line Supervisors of Food Preparation & Serving Workers, detailed	5,850	11.9%	28.1%	38.0%	52.3%
Cooks, Fast Food, detailed	1,560	25.0%	76.5%	94.3%	100.0%
Cooks, Institution & Cafeteria, detailed	1,360	4.2%	28.5%	42.7%	61.6%
Cooks, Restaurant, detailed	10,660	26.4%	51.0%	61.7%	76.1%
Cooks, Short Order, detailed	1,120	28.4%	51.9%	74.5%	100.0%
Food Preparation Workers, detailed	7,700	42.2%	67.4%	79.9%	96.7%
Combined Food Preparation & Serving Workers, Including Fast Food, detailed	14,250	68.0%	90.9%	100.0%	100.0%
Counter Attendants, Cafeteria, Food Concession, & Coffee Shop, detailed	4,470	64.2%	90.1%	100.0%	100.0%
Food Servers, Nonrestaurant, detailed	1,320	19.1%	38.0%	50.3%	63.1%
Dining Room & Cafeteria Attendants & Bartender Helpers, detailed	5,210	27.2%	42.6%	52.5%	65.6%
Dishwashers, detailed	4,480	46.3%	72.3%	79.9%	88.8%
Hosts & Hostesses, Restaurant, Lounge, & Coffee Shop, detailed	3,400	31.1%	53.4%	64.8%	79.4%

Occupation, group type	No. of Workers	$12	$15	$17	$20
Janitors & Cleaners, Except Maids & Housekeeping Cleaners, detailed	12,860	30.9%	49.8%	65.8%	84.6%
Landscaping & Groundskeeping Workers, detailed	8,230	20.6%	44.1%	58.6%	77.5%
Amusement & Recreation Attendants, detailed	1,590	51.0%	71.9%	79.5%	88.1%
Hairdressers, Hairstylists, & Cosmetologists, detailed	1,190	31.1%	53.1%	61.2%	73.4%
Baggage Porters & Bellhops, detailed	1,480	36.1%	57.0%	66.3%	76.8%
Concierges, detailed	1,160	12.2%	28.4%	37.3%	50.8%
Tour & Travel Guides, detailed	2,010	32.7%	58.4%	71.6%	81.4%
Childcare Workers, detailed	1,790	54.9%	81.9%	96.9%	100.0%
Personal Care Aides, detailed	4,650	34.6%	77.2%	92.6%	100.0%
Fitness Trainers & Aerobics Instructors, detailed	1,050	18.4%	29.3%	35.0%	43.6%
Recreation Workers, detailed	2,800	37.3%	59.1%	68.0%	79.8%
Personal Care & Service Workers, All Other, detailed	1,010	76.0%	81.5%	85.2%	90.6%
Cashiers, detailed	14,590	55.3%	82.1%	92.3%	100.0%
Counter & Rental Clerks, detailed	1,920	30.6%	55.7%	66.4%	78.2%
Retail Salespersons, detailed	24,560	36.7%	70.0%	80.5%	91.5%
Tellers, detailed	2,080	16.1%	49.3%	69.2%	89.1%
Customer Service Representatives, detailed	8,070	14.3%	33.7%	47.7%	64.2%
Receptionists & Information Clerks, detailed	4,040	21.0%	50.7%	63.8%	79.8%
Cargo & Freight Agents, detailed	1,110	26.4%	50.1%	56.5%	66.0%
Shipping, Receiving, & Traffic Clerks, detailed	1,890	15.3%	35.6%	48.2%	64.7%
Stock Clerks & Order Fillers, detailed	8,710	32.9%	62.0%	76.1%	87.6%
Office Clerks, General, detailed	10,440	17.3%	41.6%	59.2%	79.6%
Office & Administrative Support Workers, All Other, detailed	1,880	38.2%	56.3%	65.4%	77.4%
Bakers, detailed	1,460	22.6%	46.2%	56.8%	70.4%
Laundry & Dry-Cleaning Workers, detailed	1,760	28.5%	52.2%	65.3%	81.0%
Bus Drivers, School or Special Client, detailed	1,140	11.3%	32.0%	42.4%	56.8%
Driver/Sales Workers, detailed	1,530	29.3%	49.6%	56.6%	66.7%
Light Truck or Delivery Services Drivers, detailed	4,830	17.2%	39.0%	51.9%	66.3%
Taxi Drivers & Chauffeurs, detailed	1,370	35.9%	64.4%	77.0%	88.9%
Parking Lot Attendants, detailed	1,860	55.2%	78.1%	84.7%	94.6%
Transportation Attendants, Except Flight Attendants, detailed	1,160	28.0%	59.7%	76.5%	100.0%
Cleaners of Vehicles & Equipment, detailed	1,930	48.7%	76.3%	84.0%	95.6%
Laborers & Freight, Stock, & Material Movers, Hand, detailed	7,280	19.3%	44.2%	56.9%	73.0%
Packers & Packagers, Hand, detailed	2,810	54.7%	80.2%	89.5%	100.0%

Source: Bureau of Labor Statistics Occupational Employment Statistics, May 2018 State Occupational Employment and Wage Estimates for Hawai‘i; DBEDT calculations

Appendix E. Demographic Breakdown of Workers in Hawai‘i Earning Less than $12, $15, $17, and $20

Table E-1. Demographic Breakdown of Workers Directly Affected by Minimum Wage Increase, 2017

	$12	$15	$17	$20
By gender				
Males	44.8%	45.3%	45.9%	45.6%
Females	55.2%	54.7%	54.1%	54.4%
By age				
16 to 24 years old	27.3%	22.8%	20.4%	17.3%
25 to 39 years old	36.4%	38.0%	39.0%	38.7%
40 to 54 years old	19.9%	20.8%	21.8%	25.1%
55 years old and over	16.4%	18.5%	18.8%	18.8%
By family income				
Less than $50,000	19.6%	18.3%	17.5%	15.9%
$50,000 to $74,999	14.2%	15.0%	14.6%	13.9%
$75,000 to $99,999	13.4%	14.5%	14.4%	15.0%
$100,000 or more	52.8%	52.2%	53.5%	55.2%
By education				
No high school degree	12.7%	11.0%	10.5%	9.4%
H.S. degree or equiv.	38.6%	37.8%	36.9%	35.1%
Some college	25.7%	24.6%	25.0%	24.5%
Associate’s degree	8.2%	9.0%	9.3%	11.1%
Bachelor’s degree or higher	14.8%	17.7%	18.3%	19.9%

Source: American Community Survey; DBEDT calculations