

Worker Paid Leave Usage Simulation (Worker PLUS) Model

Issue Brief: Benchmarking Results of the Benefit Financing Module's Payroll Tax Revenue Estimates

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OVERVIEW

The Benefit Financing module is part of the Worker Paid Leave Usage Simulation (Worker PLUS) model developed by IMPAQ International and the Institute for Women's Policy Research, contracted by the Chief Evaluation Office at the U.S. Department of Labor. This module helps users estimate the payroll tax revenue generated for a given paid leave program policy design and payroll tax regime.

This issue brief presents the results of the benchmarking exercise on the Benefit Financing module. Using payroll tax parameter inputs from California, Rhode Island, and New Jersey, we compared the module's estimated expected tax revenue with each state's 2018 actual payroll tax revenue for their paid leave programs.

In essence, the Benefit Financing module operates by multiplying the user-supplied payroll tax rate by the earnings of workers who are covered by the paid leave program under simulation. We estimate earnings using the 2014–2018 American Community Survey (ACS) Public Use Microdata Sample (PUMS). The user specifies which workers are covered by the program by selecting eligibility rules (e.g., only private employees are covered) as part of their program policy design. The user also specifies a payroll tax regime by entering a payroll tax rate and maximum taxable earnings level.

We found that the Benefit Financing module underestimates the tax revenue for all three states. This could suggest a conservative bias in that program revenue would likely be higher, on average, than estimated by the module. Underestimation may be driven by several aspects of ACS data on earnings, including possible negative annual values for business earnings and top-coding for confidentiality. In addition, we are unable to simulate the portion of workers in voluntary categories that might opt into program coverage, so we may have underestimated the number of covered workers in these cases.

The Benefit Financing module results may not provide exact estimates of the actual payroll revenue potential. However, in the absence of administrative data, the tool can be used to easily generate preliminary estimates of payroll tax revenue under different tax rate scenarios. These estimates can be obtained with little computational burden and subsequently aid discussions on refinement of the input parameters or the need for administrative data. For policy scenarios that are simple and that rely on statewide payroll tax contributions, the Benefit Financing module may produce reliable estimates of payroll tax revenue.

The Methodology section below describes the setup and the three state paid leave policies used for this benchmarking exercise. The Results section summarizes our findings, and the Conclusion summarizes the limitations of ACS data for payroll tax estimation. The Appendix has a guide to help the reader replicate the benchmarking results from this issue brief.

METHODOLOGY

To facilitate understanding of the potential impacts of different policy alternatives on workers' leave-taking behaviors and program costs, the U.S. Department of Labor's Chief Evaluation Office contracted with IMPAQ International, and its partner Institute for Women's Policy Research (IWPR), to develop the Worker Paid Leave Usage Simulation (Worker PLUS) model, an open-sourced microsimulation tool based on public microdata and predictive modeling. The model and other relevant materials are publicly available at [\[hyperlink\]](#).

This issue brief provides a benchmarking study of the Worker PLUS model's Benefit Financing module. We compare payroll tax revenue estimates from Worker PLUS to actual program administrative data for three state paid leave programs (California, New Jersey, and Rhode Island). The study shows that the Benefit Financing module produces conservative revenue estimates in these cases, by underestimating the payroll tax revenue by about 10% to 15%. The underestimation may be driven by a set of limitations of the American Community Survey data files, including earnings' top-coding, earnings' misreporting, inclusion of business losses in earnings, and a lack of information on employee opt-in choices for paid leave programs. Despite these limitations, the payroll tax revenue estimates from the Benefit Financing module can provide a starting point for feasibility studies on state paid leave programs. Further improvement of these estimates can be achieved with additional data sources, such as administrative data from state workforce agencies.

We used the 2014–2018 ACS PUMS data files to estimate the 2018 taxable payroll revenue in three states that had active paid leave programs in 2018. We compared the Benefit Financing module payroll tax revenue results with the actual tax revenue observed in each state in 2018. This benchmarking exercise aims to provide future module users with information on potential variation in estimates generated by the Benefit Financing module. This variation derives from limitations of ACS data (discussed further in the Conclusion), including both the imprecision of ACS earnings data and the inability of the data to capture all the nuances of program coverage. Thus, caution is required in accepting or sharing these estimates. The module provides only a starting point for estimates and is not to be construed as the final prediction for feasibility studies.

Exhibit 1 presents a brief summary of the relevant paid leave program eligibility criteria and tax regimes for each state. All three states built their programs upon their existing Temporary Disability Insurance systems.ⁱ California and Rhode Island have similar eligibility rules and payroll tax rates for both the original disability leave benefits and the newer family leave benefits. For these two states, we ran the model once to represent each state’s full program. However, New Jersey is unique because it has different eligibility criteria and payroll tax rates for the family leave benefit versus the disability leave benefit (e.g., state and local workers are eligible for family leave but not for disability leave). To represent these different policy scenarios in New Jersey, we performed separate model runs for the family leave benefit and the disability benefit. In addition, since the employer’s contribution to the payroll tax for New Jersey’s disability leave could range from 0.1% to 0.75% of taxable wages, varying by employer characteristics, we ran both a minimum and maximum payroll tax rate scenario.

Exhibit 1: Paid Family and Medical Leave Programs in California, New Jersey, and Rhode Island (2018)

	California	Rhode Island	New Jersey
Employees Covered by the Program	Employees covered by the state unemployment insurance law, except for most public employees, are automatically covered by the program. Domestic workers are also covered. Those who are self-employed can opt into the program. Many public employers can opt in as well, but may need to do so through a negotiated agreement with an authorized bargaining unit.	Employees covered by the state unemployment insurance law, except for public employees, are automatically covered by the program. Some domestic workers are covered. Public employers can opt into coverage. They may also be covered through unions via a collective bargaining process.	Employees covered by the state unemployment insurance law (with some exceptions for public-sector employees) are covered by the program. Some domestic workers are covered. Family Leave: Public-sector workers are covered for paid family leave. Disability Leave: Most public-sector workers are not covered for their own health, though their employers can opt in.
Minimum Wage Requirements	\$300 in the base period	Minimum of \$11,520 in base period OR 1. \$3,840 in base period AND 2. \$1,920 in one of the base period quarters AND 3. Base period wages are at least 1.5 times the highest quarter of earnings.	\$8,400 in the base year OR Must have worked 20 calendar weeks in the base year, where each week had at least \$168 in earnings
Taxable Earnings Maximum (2018)	\$114,967	\$69,300	\$33,700
Payroll Tax Rates (2018)	1.0%	1.1%	Family Leave: 0.09% Disability Leave: Worker contribution: 0.19% Employer contribution: ⁱⁱ <ul style="list-style-type: none"> ▪ New employer: 0.5% ▪ Experience-rated employers: 0.1% to 0.75%ⁱⁱⁱ

Note: Paid leave program eligibility rules, taxable earning maximums, and payroll tax rates are obtained from state program public reports and program websites as of October 2020. Covered employment information was retrieved from <https://www.abetterbalance.org/resources/paid-family-leave-laws-chart> and [https://www.nj.gov/labor/forms_pdfs/tidi/WPR-119%20\(1-18\).pdf](https://www.nj.gov/labor/forms_pdfs/tidi/WPR-119%20(1-18).pdf). Minimum wage requirements were retrieved from https://edd.ca.gov/Disability/Calculating_PFL_Benefit_Payment_Amounts.htm, <http://ripaidleave.net/wp-content/uploads/2016/09/Fast-Facts-for-Workers-about-RI-TCL.pdf>, [https://www.nj.gov/labor/forms_pdfs/tidi/WPR-117\(1-17\).pdf](https://www.nj.gov/labor/forms_pdfs/tidi/WPR-117(1-17).pdf), and [https://www.nj.gov/labor/forms_pdfs/tidi/WPR-119%20\(1-17\).pdf](https://www.nj.gov/labor/forms_pdfs/tidi/WPR-119%20(1-17).pdf).

Exhibit 2 shows how we converted the information in **Exhibit 1** into the Benefit Financing module’s input parameters. Importantly, the definitions of covered workers and program eligibility available in the ACS closely approximate but may not perfectly match the policy parameters (e.g., ACS data include self-report data for a worker’s industry, which in some cases may not align with a program’s classification of a given occupation), and the module does not capture the complexities of each program (e.g., opt-ins to coverage).

Exhibit 2: Benefit Financing Module Input Parameters for Benchmarking

	CA	RI	NJ Family Leave	NJ Disability Leave
Benefit Financing Module Policy Parameters				
Private workers	Yes	Yes	Yes	Yes
Self-employed workers	No	No	No	No
Federal government workers	No	No	No	No
State government workers	No	No	Yes	No
Local government workers	No	No	Yes	No
Minimum annual earnings	\$300	\$3,840	\$8,400	\$8,400
Minimum number of weeks worked over a year	1	1	1	1
Minimum number of hours worked in a year	1	1	1	1
Minimum employer size	1	1	1	1
Benefit Financing Module Payroll Tax Parameters				
Maximum Taxable Earnings (2018)	\$114,967	\$69,300	\$33,700	
Payroll Tax Rate (2018)	1.0%	1.1%	0.09%	Min.: 0.29% (employer contribution = 0.1% with lowest experience rating) Max.: 0.94% (employer contribution = 0.75% with highest experience rating)

Note: The employer payroll tax rate for the disability insurance program in New Jersey poses complications for testing the Benefit Financing module because it is not a single rate. The tax rate for disability insurance in New Jersey is experience rated. A new employer in 2019 would pay 0.5% of taxable wages, but across all covered employers the tax rate would vary from 0.1% to 0.75% of taxable wages depending on past experience. Because our model inputs require a single payroll tax rate, we estimated the range of possibilities with the lowest and highest experience ratings with two separate model runs. There was no minimum number of weeks worked, number of hours, or employer size for any of these paid leave programs, which translates to an input value of 1 for each of these parameters.

RESULTS

Exhibit 3 summarizes the benchmarking results. The first two rows present our model’s estimated payroll tax revenue and the actual payroll tax revenue collected by each state in 2018. The third row presents the Benefit Financing module results as a percentage of the actual revenue. For California, Rhode Island, and New Jersey, the Benefit Financing module payroll tax revenue estimates are lower than administrative reports on program revenue. Using only workers primarily employed in the private sector, the ACS captures from 86.9% (California) to 89.7% (Rhode Island) of the program’s published payroll tax revenue in 2018. ACS data also underestimate the family leave revenue for New Jersey (capturing 84.5%), which includes state, local, and private-sector workers.

As noted in **Exhibit 1**, New Jersey employers contribute to disability insurance at varying rates. Their payroll tax rates are experience rated—between 0.1% and 0.75% of taxable payroll (while new employers pay 0.5% of taxable payroll). We do not have access to the distribution of these employer payroll tax rates to produce a credible point estimate, and thus we present a range instead. Applying these minimum and maximum rates for employers, the module estimates disability insurance payroll tax revenue ranging from \$238.1 million to \$771.8 million. While large, this range includes the revenue value reported by the agency: \$419.1 million in 2018.^{iv} For users testing policy scenarios in jurisdictions similar to New Jersey, the Benefit Financing module can be used to obtain revenue estimates using different rates to set up a range that will include the potential revenue. The user can use the midpoint or weighted average of the range estimates to obtain an estimate of the revenue.

Exhibit 3: Comparison of Payroll Tax Revenue Estimates versus Program Actual Revenue

	CA	RI	NJ Family Leave	NJ Disability Leave
Benefit Financing Module			Total: \$86.6	
Estimated Program Revenue from Taxes (\$ Millions)	\$6,384.8	\$168.9	(Private workers: \$73.9; state/local workers: \$12.7)	\$238.1–\$771.8
Program Actuals (\$ Millions, 2018)	\$7,344.9	\$188.3	\$102.5	\$419.1
Benefit Financing Module Estimate as % of Actuals	86.9%	89.7%	84.5%	56.8%–184.1%

Note: Paid leave program payroll tax revenues were obtained from state program public reports. The state of California’s *May 2019 Disability Insurance (DI) Fund Forecast* is retrieved from https://www.edd.ca.gov/About_EDD/pdf/eddiforecastmay19.pdf. The Rhode Island Department of Labor and Training’s *Statistical and Fiscal Digest 2018* is retrieved from <https://dlt.ri.gov/documents/pdf/lmi/sfdigest.pdf>. The *New Jersey Annual Report for 2018: Family Leave Insurance and Temporary Disability Insurance Programs* was retrieved from https://myleavebenefits.nj.gov/labor/myleavebenefits/assets/pdfs/ANNUAL_FLI-TDI_REPORT_FOR_2018.pdf. Simulation results are based on eligible workers whose workplace rather than place of residence is in the respective state, consistent with the same eligibility rule of all of these programs. For New Jersey tax revenue estimates, we applied the minimum (0.29%) and the maximum payroll rates (0.94%) to represent the lowest and highest experience ratings for all New Jersey employers in the ACS and estimated separate payroll tax revenue under the two regimes if they were to be applied statewide. If we use a midpoint of the employer experience range, which is 0.615%, the Benefit Financing module estimate is about 120.5% (\$504.9 million) of the program actuals. An employer’s experience rating depends on multiple factors, including benefits charged, employer contributions paid, the average annual payroll, and the balance of the Unemployment Trust Fund. More details are available at <https://www.nj.gov/labor/ea/employer-services/rate-info>.

CONCLUSION

We used the Worker PLUS model’s Benefit Financing module to produce payroll tax revenue estimates and compared them with the actual tax revenue numbers observed in California, Rhode Island, and New Jersey. The objective of this benchmarking exercise was to validate the Benefit Financing module results, provide information to model users and policy makers on potential variation in estimates generated by the module, and note that caution is required in accepting or sharing these estimates.

We find that the Benefit Financing module underestimates the paid leave program payroll revenue in the three test states by about 10% to 15%, based on publicly available payroll tax revenue data. However, this is not sufficient evidence to assume that it will always underestimate the revenue for other states or leave policy designs. It is unclear how the limitations of ACS data interact with leave policy design to influence the final results. Users must take caution in interpreting and accepting these estimates. Below, we list some of the limitations of the ACS data that may influence the module’s estimates of payroll tax revenue from a paid leave program.

- The ACS imputes data to mitigate non-responses and top-codes earnings to ensure confidentiality of high-earning respondents. The U.S. Census Bureau imputed about 19.1% of responses for wage and salary earnings and 10.5% for self-employment earnings.^v
- Some reported total earnings have negative values (both for farm and non-farm workers), implying the existence of losses.
- The ACS does not account for employees who might opt into the paid leave program as self-employed workers or as part of a collective bargaining agreement. For example, we cannot identify which state or local government workers might be paying for coverage under collective bargaining agreements in Rhode Island or California or which, if any, primarily self-employed workers are opting into the state programs. Because the ACS cannot measure opt-ins, these groups were considered ineligible for paid leave in our testing.
- The ACS lacks information on employer size, which can be an important feature of paid leave programs. For example, the state of Washington adopted a paid leave policy that allows some employers (those with fewer than 50 employees) to choose to not pay the tax.^{vi} The Worker PLUS model imputes employer size using the Current Population Survey (CPS); however, these imputed data are subject to precision issues due to a limited CPS sample size, a lack of CPS state identifiers, and imputation errors.
- The ACS classifies workers as private, government, or self-employed based on their main job, but their ACS earnings can reflect multiple jobs. For example, many self-employed workers have earnings from jobs in which they earn wages and salaries, as well as self-employment income. Program rules may treat these job types differently for determining eligibility and benefits in ways that cannot be captured in an analysis of the ACS earnings data.
- The ACS collects data retrospectively as a self-reported snapshot of the previous 12 months, and thus the data are subject to error. Both under- and over-reporting are common.

In summary, the purpose of the Benefit Financing module is to provide a starting point for estimates or feasibility studies. Many users of the Worker PLUS model may be able to access state-level data (e.g., from the state department of labor) for calculating payroll tax revenue. However, if state data are not available, experienced data analysts may find that the ACS provides access to microdata on earnings that can be flexibly used to estimate taxable wages and tax revenue. While we make ACS data points available, it is the user’s

responsibility to determine whether these are ultimately an appropriate basis for estimating tax revenue to support a paid leave program within a specific area.

APPENDIX: GUIDE TO REPLICATING RESULTS IN THIS ISSUE BRIEF USING THE WORKER PLUS PYTHON MODEL

Model users should follow the steps below to replicate the results in this brief. The results can be replicated using the random seed value specified below on a Windows 10 Pro operating system with OS Build version 17134.1792. The results may vary slightly for different Windows operating systems and OS Build versions.

1. Ensure that all model materials have been downloaded according to the Worker PLUS Model User Manual.^{vii}
2. Follow the user manual to complete these steps:
 - a. Launch the model graphical user interface (GUI).
 - b. Turn on the Advanced Parameters button.
 - c. Use the 2018 Family and Medical Leave Act (FMLA) employee data and the 2014–2018 ACS PUMS data as input files.
 - d. Set the location of the output directory.
 - e. Set the Year to 2018.
 - f. Set Random Seed to 12345 and Engine Type to Python.
3. To replicate the Benefit Financing module “State of Work” results for California and Rhode Island in **Exhibit 3**, row 1:
 - a. In the main panel of the GUI, set State to Simulate to the desired state (either CA or RI).
 - b. In the main panel of the GUI, confirm that the “State of Work” box is checked.
 - c. Under the Simulation tab of the GUI, set Existing State Program to the same state as in Step 3a. This will auto-fill all the parameters under the *Program* tab with the pre-configured parameters for these state programs, including the Benefit Financing parameters, which are relevant to the Benefit Financing module.
4. In the main panel of the GUI, set Simulation Method to Logistic Regression GLM.
5. Click the Run button to execute the simulation.
6. After the simulation is completed, navigate to the output directory (as specified in Output Directory in the GUI) and choose the latest output folder. The latest output folder can be identified by the folder name containing the date stamp and time stamp when the model was executed. For example, the folder named “*output_20200924_115049_main simulation*” contains simulation output files from the simulation executed on September 24, 2020 at 11:50:49 local machine time.
7. Rename the output folder produced by Step 5 with a label that indicates the state selected in Step 3a and the specifications of the model run, with the abbreviation *sow* indicating state of work. For example, if in Step 3 the state chosen is CA (California), then the output folder should be renamed *ca_sow*.

Output Folder Renaming Labels for RI & CA

State Chosen	Label
CA	ca_sow
RI	ri_sow

8. Place the renamed output folder in the directory specified in Step 2d.
9. Repeat Steps 3 through 8 for both states. This should result in a total of two output folders named *ca_sow* and *ri_sow*, respectively.
10. To replicate the Benefit Financing module “State of Work” results for New Jersey’s *Family Leave* program in **Exhibit 3**, row 1, repeat Steps 3 through 8 for New Jersey with the following small changes to the setup parameters in Step 3. This should result in a total of one output folder named *nj_sow_fl*:
 - a. In the main panel of the GUI, set State to Simulate to NJ.
 - b. In the main panel of the GUI, confirm that the “State of Work” box is checked.
 - c. Under the Simulation tab of the GUI, set Existing State Program to NJ. This will auto-fill all the parameters under the *Program* tab with the pre-configured parameter for this state program.
 - d. In the main panel of the GUI, make the following change to the pre-configured parameters: Ensure all the following Eligible Employee Types are checked: “Private Employees,” “State Employees,” and “Local Employees.”

Output Folder Renaming Labels for New Jersey’s Family Leave Program

State Chosen	Label
NJ	nj_sow_fl

11. To replicate the minimum, maximum, and midpoint Benefit Financing module results for New Jersey’s *Disability Leave* program in **Exhibit 3**, row 1, repeat Steps 3 through 8 for New Jersey with the following small changes to the setup parameters in Step 3 (see a–d below). Repeat for each of the three payroll tax scenarios. This should result in a total of three output folders named *nj_sow_di_min*, *nj_sow_di_max*, *nj_sow_di_mid*. Alternatively, as a shortcut, once you run one of the scenarios, you can manipulate the payroll tax parameters in the Benefit Financing results tab to produce the other two scenarios.
 - a. In the main panel of the GUI, set the State to Simulate to NJ.
 - b. In the main panel of the GUI, confirm that the “State of Work” box is checked.
 - c. Under the Simulation tab of the GUI, set Existing State Program to NJ. This will auto-fill all the parameters under the *Program* tab with the pre-configured parameters for this state program.
 - d. In the main panel of the GUI, make the following change to the pre-configured parameters:
 - i. Set the Payroll Tax Rate and the Maximum Taxable Earnings parameters to match the bottom panel of **Exhibit 2** for New Jersey’s Disability Leave program, selecting either the minimum, maximum, or midpoint payroll tax rate scenarios.
 - ii. Ensure that only the “Private Employees” type of Eligible Employee Types is checked. (Make sure that “State Employees” and “Local Employees” are not checked).

Output Folder Renaming Labels for New Jersey’s Disability Leave Program

State Chosen	Label
NJ	nj_sow_di_min
NJ	nj_sow_di_max
NJ	nj_sow_di_mid

ⁱ The Associated Press. (2017, June 30). Family-leave measure passed by Washington Legislature. *Seattle Times*. Retrieved from <https://www.seattletimes.com/seattle-news/politics/washington-legislature-passes-paid-family-leave-measure>

ⁱⁱ The employer payroll tax rate for the disability insurance program poses complications for testing our Benefit Financing module because it is not a single rate. The employer share of the payroll tax rate for disability insurance in New Jersey is experience rated. A new employer in 2019 would be pay 0.5% of taxable wages, but across all covered employers the tax rate would vary from 0.1% to 0.75% of taxable wages depending on past experience. Because our model inputs require a single payroll tax rate, we estimated the range of possibilities with the lowest and highest experience ratings with two separate model runs.

ⁱⁱⁱ Chapter 1: Employer Taxes and Wage Reporting; Section 5 - Experience Rating: <https://nj.gov/labor/handbook/chap1/chap1sec5ExperienceRating.html>.

^{iv} We also ran the Benefit Financing module with a midpoint of the employer experience rating (0.425%) in New Jersey for the disability insurance calculations, and added to the worker’s contribution (0.19%), which totals to 0.615%. Under this assumption the module estimate of payroll tax revenue is about 118% (\$495.02 million) of the actuals.

^v Information on ACS imputation and top-coding is available at <https://www.census.gov/acs/www/methodology/sample-size-and-data-quality/item-allocation-rates>.

^{vi} The state of Washington sets the paid leave program payroll tax rate at 0.4%, which is split between employers and employees. However, the program allows small businesses with fewer than 50 employees to opt out of paying the employer portion of the paid leave program payroll taxes.

^{vii} The Worker PLUS Model User Manual is provided along with model code and data files during model downloading. See IMPAQ (2021). Worker Paid Leave Usage Simulation Model User Manual.