

Unemployment Insurance Financing As A Uniform Payroll Tax

By SEBASTIAN GRAVES, JONATHON HAZELL, WALKER F. LEWIS AND CHRISTINA PATTERSON*

In the United States, unemployment insurance (UI) is financed by a system of payroll taxes levied on employers. Figure 1 plots total tax revenues from firm-level payroll taxes, separating UI payroll tax receipts from those due to Medicare and Social Security. The time trends of these two taxes are starkly different. First, contributions to entitlement programs have risen dramatically over the sample period, while contributions to the UI system have remained largely stable. Second, the cyclical nature of these tax revenues is markedly different. While Medicare and Social Security tax receipts are pro-cyclical, UI tax receipts are strongly counter-cyclical. For example, UI tax revenues increased by 19.6% from 2008-2010, despite a 1.7% decline in payrolls, whereas Medicare and Social Security tax cuts led to a fall in revenues of 6% over the same period.

One natural explanation for these patterns is the “experience rating” inherent in UI taxes (Guo and Johnston, 2020). UI taxes differ across firms according to the amount of UI payments that a firm has caused (and potentially the amount of UI taxes that the firm has paid in the past). When firms lay off workers at the onset of a recession, they cause additional UI claims and their tax rates rise. Thus, the current UI financing system operates in a similar way to a firing tax. A number of papers have used variation in this tax schedule across states to estimate the impact of experience rating on employment dynamics (e.g. Card and Levine (1994) or Anderson and Meyer (2000)).

Our paper highlights that in addition to

the experience rating component, a significant portion of UI taxes are levied on firms regardless of their history of layoffs, i.e. they operate as a uniform payroll tax. The uniform component of the UI tax is not only substantial overall, but we find that it also contributes meaningfully to the countercyclicality of UI taxes. This pattern, combined with evidence demonstrating that higher uniform payroll taxes raise unemployment (e.g. Cahuc, Carcillo and Le Barbanchon, 2019), suggests that the current structure of state financing is destabilizing — raising unemployment precisely when it is already high. While the firing tax component of the UI system is inherently countercyclical, the countercyclicality of the payroll component is a policy choice and one that could be avoided through reforms to overall funding system.

This paper proceeds as follows. First, we develop a simple model of UI financing, which we use to clarify the extent to which the current system of UI financing operates both as a uniform payroll tax and as a firing tax.

Second, we set out to measure the size of the uniform payroll tax relative to the average size of the payroll tax. No existing public data-sets clearly disaggregate the two components of UI taxes, and we develop a novel strategy to measure both components utilizing disaggregated industry and county data from the Quarterly Census of Employment and Wages (QCEW).

Third, we document facts about the uniform payroll tax component of UI financing. We show that this component is large, accounting for around half of overall UI taxes. The uniform tax is also highly counter-cyclical—indeed, just as cyclical as the firing tax component of UI. Finally, we show that the uniform tax tends to be more counter-cyclical in states with poorly funded UI systems.

* Graves: Federal Reserve Board (email: sebastian.h.graves@frb.gov); Hazell: London School of Economics (email: J.Hazell@lse.ac.uk); Lewis: University of Chicago (email: wflewis@uchicago.edu); Patterson: University of Chicago Booth School of Business (email: christina.patterson@chicagobooth.edu). We thank Andrew Johnston for helpful comments.

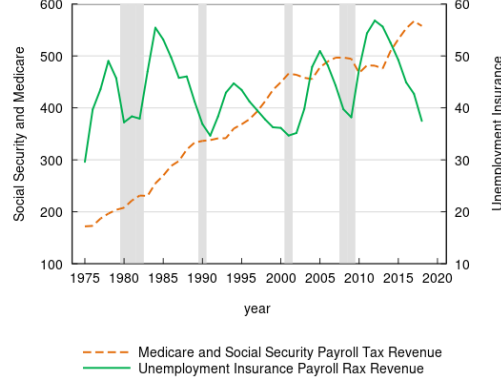


FIGURE 1. THE COMPOSITION OF PAYROLL TAXES

Note: Unemployment Insurance Payroll revenues are calculated from the QCEW data. Total wages are reported in the Federal Reserve Economic Data dataset on total wages. Social Security and Medicare tax revenues are reported in The White House Office of Management and Budget’s Historical Table 2.4 and are defined as “Old-Age and Survivors’ Insurance,” “Disability Insurance,” and “Hospital Insurance.” All values are reported in billions of 2018 dollars, deflated using the Minneapolis Fed’s data on chained CPI-U. Gray bars indicate NBER recession dates.

I. A Model of UI Financing

We introduce a stylized model of UI taxes in order to distinguish between the uniform payroll tax and firing tax components of UI financing.

The model has two periods. In the second period, a firm’s payroll tax rate, τ , depends on their “benefit-ratio”, which is the level of unemployment benefits attributed to the firm, B' , divided by their payroll in the first period, wn :¹

$$(1) \quad \tau \left(\frac{B'}{wn'} \right) = \begin{cases} \tau_0 & \text{if } \frac{B'}{wn} = 0 \\ \tau_0 + \tau_1 \frac{B'}{wn} & \text{if } 0 < \frac{B'}{wn} \leq \bar{B} \\ \tau_0 + \tau_1 \bar{B} & \text{if } \frac{B'}{wn} \geq \bar{B} \end{cases}$$

This function captures three key features of UI tax schedules – all firms pay a minimum rate τ_0 , UI taxes are weakly increasing in the benefits attributed to the firm, and firms face a maximum possible rate. In practice, this tax rate is only applied on wages up to a threshold, known as the taxable wage base, which varies across states

¹This specification captures the funding structure in states that use benefit ratios for experience ratings, but the same economic forces apply in states where UI taxes are a function of the reserve ratio, where taxes are a function not only of the benefits attributed to the firm but also the UI taxes paid by the firm in the past.

and time. The amount of unemployment benefits attributed to the firm evolves as follows:

$$(2) \quad B' = u' \phi w$$

where u' denotes the number of unemployed workers attributed to the firm, ϕ is the UI replacement rate, and w is the average wage that the unemployed workers were previously earning at the firm. The number of unemployed workers is given by:

$$(3) \quad u' = (1 - f)(n - n')I(n' < n)$$

where f is the job-finding rate, n' is the firm’s chosen employment in period 2, and n is the firm’s level of employment in period 1. We assume no voluntary separations, meaning that the number of employees fired by the firm is $(n' - n)I(n' < n)$.

Combining equations 1, 2 and 3, the firm’s payroll tax rate can be written as a function of their employment choice:

$$(4) \quad \tau(n') = \begin{cases} \tau_0 & \text{if } n' \geq n \\ \tau_0 + \tau_1(1 - f)\phi \frac{(n - n')}{n} & \text{if } \underline{n} \leq n' < n \\ \tau_0 + \tau_1(1 - f)\phi \frac{(n - \underline{n})}{n} & \text{if } n' \leq \underline{n} \end{cases}$$

where $\underline{n} = n \left(1 - \frac{\bar{B}}{(1 - f)\phi} \right)$ is the employment level at which the firm hits the maxi-

imum UI payroll tax. Given this, we define τ_0 as the uniform payroll tax component, and $\tau(n') - \tau_0$ as the firing tax component. These definitions imply that the firing tax component of a firm's UI taxes will change over time without any changes in the tax schedule. For firms that are below the maximum payroll tax, the firing tax component is increasing in the slope of the tax schedule, τ_1 , the number of workers that the firm fires, and the UI replacement rate ϕ . The size of the firing tax component is decreasing in the job finding rate: an increase in the job finding rate decreases the cost of firing workers as it lowers the amount of unemployment benefits that they will claim. The Online Appendix expands this simple model and shows that that an experience-rated UI tax system is equivalent to an environment in which firms face a uniform payroll tax and a counter-cyclical firing tax.

In contrast to the firing tax component, the uniform payroll tax will only change if there is a shift in the UI tax schedule due to a change in τ_0 . As we discuss in more detail in the next section, τ_0 can change for various reasons. Both the state and the federal government may change the basic tax schedule so that τ_0 varies. In addition, states may levy further uniform taxes that apply to all firms in addition to the basic tax schedule, such as so-called "solvency taxes" (designed to support a state's UI trust fund balance).

Distinguishing between the two components of UI taxes is important because of the different ways in which they affect firms' hiring and firing incentives. Theoretically, higher payroll taxes should lower employment, because the post-tax marginal product of labor falls. This prediction has been confirmed empirically using both micro and macro approaches.² The effect of firing taxes on the level of employment is more complicated. In our simple two-period model, firing taxes discourage lay-

offs, which increases n' . However, given the prospect of future layoff costs, firing taxes also discourage the hiring of new workers. Thus, while it appears clear that firing taxes will lower reallocation, their effect on overall employment is ambiguous.³

II. Measuring Each Component of UI Payroll Taxes

In order to measure the two components of UI taxes, we require an accurate measure of the average tax rate paid on taxable wages (τ) and the minimum UI tax rate (τ_0) in each year in each state.

Off-the-shelf data are not well-suited to measuring the minimum UI tax rate paid in each state. The Department of Labor's ETA 204 Report provides data on the distribution of UI taxes, but this data is only available beginning in 1998 and contains numerous transcription errors. The *Significant Provisions of State Unemployment Insurance Laws* publication from the Department of Labor provides data on minimum and maximum tax rates within the UI system for each state. However, this data misses important UI taxes that increase during recessions—such as "solvency taxes," additional UI taxes applied when a state's UI trust fund balance is low.

We develop a new method to measure the minimum UI tax rate that firms pay, using data from the Quarterly Census of Employment and Wages (QCEW). The QCEW reports a comprehensive measure of UI taxes paid to state authorities, by all firms within a county by industry cell, as well as the total value of taxable wages in each cell. Therefore we can calculate the average UI tax rate on taxable wages for each cell. The minimum average tax across all county by industry cells will be the minimum tax rate faced by firms (τ_0), as long as in some cells *all* firms face the minimum UI tax. Since between 30 and 60% of all employers pay the minimum rate in most states,

²Amongst others, Saez, Schoefer and Seim (2019) and Cahuc, Carcillo and Le Barbanchon (2019) show at the firm level that cuts in payroll taxes raise firm level employment. Papers such as Romer and Romer (2010) and Zidar (2019) find that in aggregate, payroll tax increases tend to lower employment.

³Ljungqvist (2002) provides a comparison of the effect of firing taxes on the level of employment in a variety of general equilibrium models. He demonstrates that firing taxes may either increase or decrease employment depending on the specifics of the model.

we expect that within many county by industry cells, all firms pay the minimum rate. Therefore, rather than simply identifying the minimum tax rate across county-by-industry cells, which may be subject to noise, we identify the minimum rate paid within the state (τ_0^s) as the tax rate near the bottom where there is a spike in the fraction of county-by-industry cells paying that rate. In Online Appendix Section A.A1 we explain the measurement in more detail and in Section A.A2 we provide a case study of the method using Alabama. The case study shows that our method captures significant increases in minimum UI tax rates during recessions, which other datasets do not measure.

In addition to the state UI contributions recorded in the QCEW, all firms in a state pay additional UI taxes to the federal government. These taxes are generally levied at 0.6 percent of the federal taxable wage base, but this tax rate rises if states have a low trust fund balance with the federal government. Since the federal taxable base is low (currently \$7,000), we approximate the contributions of each state to the federal government as the prevailing state-wide federal tax rate times the taxable base times the total employment of the state. Since this tax is levied on all firms, we add these contributions to the minimum rate and calculate

$$\tau_0 = \frac{\tau_0^s \times W_s + \tau_s^{federal} \times B \times E_s}{W_s}$$

where W_s is total state taxable payroll (i.e. total taxable wages paid to all workers), τ^s is the state-level minimum rate, identified using the QCEW as described above, $\tau_s^{federal}$ is the federal tax rate in each state, B is the federal taxable base, and E_s is state-level employment. Lastly, given our estimate of the uniform payroll tax component, we recover the average firing tax component as $\bar{\tau}^{s,t} - \tau_0^{s,t}$, where $\bar{\tau}^s$ is the average payroll tax in the state paid to both state and federal governments.

III. Facts about Uniform Payroll Taxes

We highlight three facts about uniform payroll taxes within the UI system using our new data series on minimum and average tax rates. First, we show that the average uniform payroll tax imposed by the UI system is sizeable and accounts for over a third of the overall tax. In the left panel of Figure 2, we plot the average payroll tax and the minimum payroll tax, averaged across states, from 1975 onward. In the right panel, we plot the ratio of these two time series. The uniform payroll tax accounted for around half of total UI tax revenues in 1980, declining to around 40 percent from 1990 onwards.⁴

Second, the uniform payroll tax component is almost as countercyclical as the more discussed firing tax component. Both the total payroll tax and minimum payroll tax rates rise in the years after each recession, generally peaking 1-2 years after the recession ends. Indeed, the fraction of tax revenue that is uniform across firms is relatively constant over the business cycle, despite the cyclicity of layoffs and thus the average experience rating of firms.

Finally, we consider what characteristics of a state's UI system are associated with a more cyclical uniform payroll tax. Unlike firing taxes, uniform payroll taxes are not mechanically linked to unemployment benefits, and need not rise when unemployment increase. We find that states with a low share of taxable wages or generous unemployment benefits—i.e. the states with poorly funded UI systems—are more likely to increase minimum UI rates during recessions.

Table 1 regresses the minimum UI tax rate in each state and year on state fixed effects, and various state determinants of minimum rates. In the first column we regress minimum rates on state unemployment. Unsurprisingly, the coefficient is positive—when state unemployment rises, so too do minimum taxes. In the second

⁴This trend in the 1980s is likely explained by the passing of the Tax Equity and Fiscal Responsibility Act of 1982, which effectively mandated the experience-rating of UI taxes.

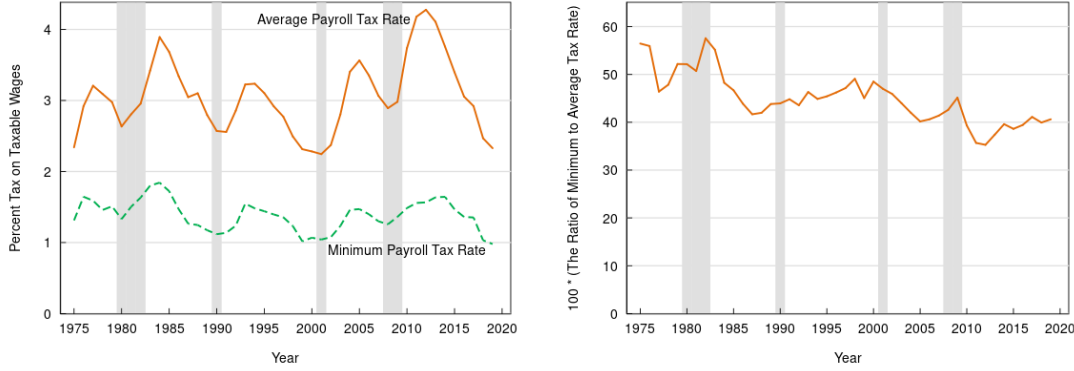


FIGURE 2. MINIMUM AND AVERAGE PAYROLL TAXES OVER TIME

Note: Both the orange and green lines average across states, weighting each state by the fraction of employment in that year. Gray lines indicate national recessions. The average payroll tax is calculated within the QCEW as the sum of state contributions divided by taxable wages in the state plus contributions to the federal government. The minimum payroll tax includes both state and federal uniform payroll taxes, calculated as described in the text.

TABLE 1—DETERMINANTS OF MINIMUM TAX RATE CYCLICALITY

	Outcome: Minimum Tax Rate (τ_0)				
	(1)	(2)	(3)	(4)	(5)
Unemployment Rate	0.136 (0.015)		0.213 (0.041)		0.112 (0.016)
Percent of Wages Taxable		-0.135 (0.051)	0.063 (0.081)		
Unemp. Rate \times Percent Taxable			-0.032 (0.012)		
Average Weekly Benefits				-0.371 (0.164)	-1.174 (0.733)
Unemp. Rate \times Benefits					0.217 (0.167)
Observations	1617	1617	1617	1617	1617
Adjusted R^2	0.677	0.621	0.692	0.613	0.678

Note: All regressions include state fixed effects. The Unemployment Rate is defined as the state unemployment rate, lagged 1 year, in percent. The percent of wages taxable is defined as the percent of total wages in the state which are taxable, normalized relative to the standard deviation, and then averaged over the 5 to 10 years prior to time t . Similarly, average weekly benefits is defined as the average weekly benefits an unemployed worker would have received, averaged over the 5 to 10 years prior to time t . Both interacted terms are the lagged state unemployment interacted with their respective independent variable. Robust standard errors are presented in parentheses.

column, we regress minimum tax rates on the percent of wages that are taxable, standardizing the regressor for ease of interpretation. The coefficient is negative, suggesting that states taxing a greater share of UI wages can also pay lower minimum tax

rates. In the third column we interact minimum rates and taxable wages. The coefficient in the third row is negative, meaning states with high taxable wage shares are less likely to increase UI taxes during recessions. The magnitude is sizeable: the

estimates imply a two standard deviation increase in the taxable wage base halves the cyclical of minimum tax rates. Columns 4 and 5 show that minimum tax rates are also more cyclical in states with more generous unemployment benefits. These results suggest that when the taxable base is high the natural variation in UI tax revenues due to the firing tax component is able to preserve a state's UI trust fund balance in recessions. On the other hand, if the taxable base is low, state's must impose additional uniform payroll taxes in order to preserve trust fund solvency.

IV. Conclusion

This paper highlights the fact that a significant fraction of UI financing comes from a uniform payroll tax, which is levied on firms regardless of their history of layoffs. We introduce a new approach to measure the uniform payroll tax component and show that it is significantly counter-cyclical — the increase in UI tax revenues that occurs after recessions is not only due to the experience-rating of such taxes.

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APPENDIX

A1. Measurement Details

Measures of the minimum UI tax rate from off-the-shelf datasets are not well suited to measuring the true minimum UI tax rate. We use an alternative dataset combined with a new method, to estimate a comprehensive measure of the minimum UI tax rate.

We calculate the minimum UI tax rate in each state using the Quarterly Census of Employment and Wages (QCEW) data from the Bureau of Labor Statistics (BLS). The QCEW data contains data for county by industry cells. There is information on total taxable wages in the cell. Also, crucially for our purposes, there is a comprehensive measure of state UI taxes, namely, total contributions to state UI trust funds.

The goal is to measure the minimum UI tax rate paid by firms within each state. In the QCEW, we can calculate the average UI tax paid by county-by-industry cells, averaging across firms within the cell. We calculate the minimum, within each state and year and across cells, of the average UI tax rate. We then use minimum average UI tax across cells in the state to approximate the minimum UI tax across firms in the state.

There is a simple test for whether our approximation is correct—we should observe a “spike” at bottom of the distribution of cells’ average UI tax rates. The average UI tax rate of a cell is based on the number of workers fired by firms within the cell. If the cell collectively fires few workers, then the cell will pay an average UI tax at minimum UI tax rate for firms in the state. In practice, many cells have low firing rates. Therefore many cells should have average UI tax rates equal to the minimum UI tax rate for firms in the state—leading to a spike at the bottom of the distribution of average UI tax rates. There is clear evidence of such spikes in the data, as we document in subsection A.A2.

In practice, we calculate the minimum tax rate for a state in a given year as follows. For each county by industry cell, we calculate the average payroll tax paid ($\bar{\tau}$), as quarterly UI contributions divided by quarterly UI-taxable wages $\times 100$, and rounded to the nearest tenth. We let $\tau' = \min(\bar{\tau})$ be the lowest rate any industry-cell pays. We then search for the value of $\bar{\tau}$ with a spike in the distribution, near the minimum value τ' . We define τ_0 , our estimate of the minimum UI tax rate, as the value of $\bar{\tau}$ at the spike. We locate the spike at the mode of all values of $\bar{\tau}$ such that $\bar{\tau} < \tau' + .5$.^{5,6}

The QCEW data uses SIC industry codes for 1975-2000, and NAICS industry codes for 2001-2018. As we are interested in determining the lowest tax rate which industries pay (rather than which industries pay that rate), this discrepancy poses no problems for our estimation of τ_0 . All level of industry aggregation (SIC/NAICS codes ranging from 2 to 6 digits) were used in calculating the minimum rate. This does not affect our estimation of τ_0 , as a more aggregated industry cannot have a lower tax rate than its constituent industries. We include only private sector industries.

A2. Advantages of the Method: Demonstration with a Case Study

We use a case study to explain our method, verify its accuracy, and confirm its advantages versus off the shelf measures of UI tax rates. The case study is the increase in minimum UI taxes from 2009 to 2010 in Alabama.

We start by confirming spikes at the minimum of the distribution of cells’ UI tax rates, meaning our method correctly measures firms’ minimum UI tax rates in Alabama. Figure

⁵We do not set our estimate of the minimum UI tax rate faced by firms, τ_0 , equal to the minimum value across cells, τ' . Due to measurement error and time aggregation, there are typically a few small cells with average UI tax rates beneath the spike.

⁶For states operating under the reserve ratio system, a substantially smaller number of firms are at the minimum rate. Spikes in $\bar{\tau}$ are less common. For these states our estimate of τ_0 is the .5th percentile of all firm’s tax rates.

A1 plots histograms of the values of $\bar{\tau}$ by industry-county cells, in the neighborhood of $\tau' = \min(\bar{\tau})$, for Alabama in 2009 and 2010.

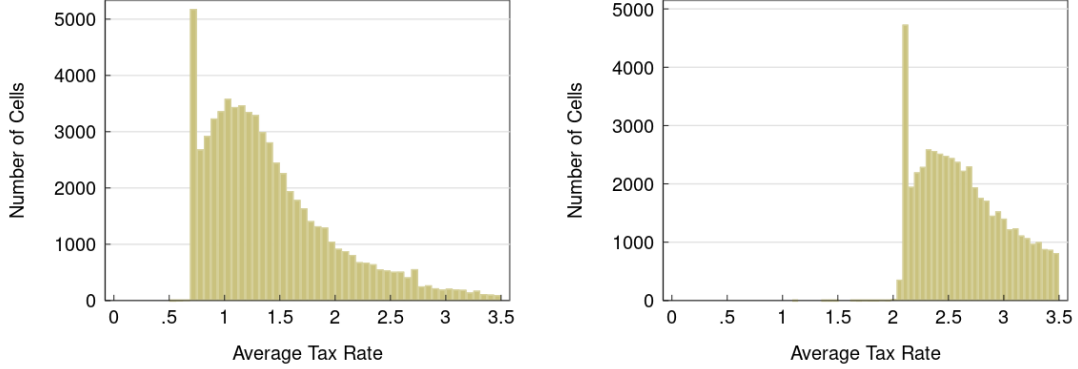


FIGURE A1. AVERAGE COUNTY BY INDUSTRY TAX RATES NEAR τ_0 IN ALABAMA, 2009 AND 2010

Note: The x-axis is the average UI tax in a county-by-industry cell and is truncated at $x = 3.5$. The y axis is the number of cells corresponding to each value of the UI tax. The UI tax is the ratio of quarterly UI contributions paid by firms in the cell, to the sum of quarterly UI-taxable wages in the cell, measured in percent. The sample is all industry by county cells, measured separately for each quarter of 2009 (left panel) or 2010 (right panel) in Alabama. Industry-by-county cells include industries at the NAICS 2 through 6 digit level.

These histograms show a clear spike near the minimum of the distribution, consistent with our assumption that the minimum UI tax rate across cells measures the minimum UI tax rate across firms in the state.

Our method implies that the minimum UI tax rate rose from $\approx .7\%$ to $\approx 2.2\%$ from 2009 to 2010. We show that off-the-shelf datasets do not capture this tax increase. In particular, Figure A2 plots the minimum UI tax rate measured from the *Significant Provisions* alongside our measure. Our measure clearly documents an increase, which the measure from the *Significant Provisions* omits.

Independent sources verify that Alabama did indeed increase UI taxes in 2010. However the increase came from “social cost taxes” and “solvency taxes” (see Vroman et al. (2017) for details). These forms of UI taxes are not measured in the *Significant Provisions* but are captured in our comprehensive measure of UI taxes from the QCEW. More generally, our measure of minimum tax rates is more volatile than the measure from the *Significant Provisions* and tends to increase by much more during recessions—due to increases in social cost and solvency taxes. Reassuringly, during periods without social cost or solvency taxes such as 1985-2000, our estimate is the same as the *Significant Provisions*.

A3. Model Extension

In this Appendix we clarify the extent to which UI taxes are equivalent to a uniform payroll tax combined with a firing tax in the model outlined in Section I. Assuming that the firm’s revenue in the second period is a function of their employment, $f(n')$, profits in the second period are:

$$(A1) \quad \pi = f(n') - w \left(1 + \tau \left(\frac{B'}{wn} \right) \right) n'$$

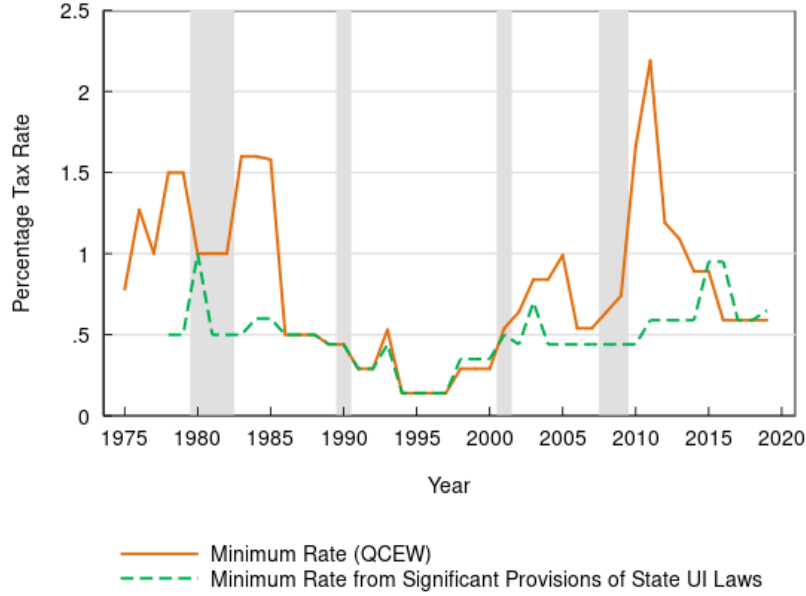


FIGURE A2. MINIMUM UI TAX RATES FROM OUR DATA VS. OTHER DATASETS

Note: The solid line plots estimates of Alabama's minimum UI tax rate, from our method based on the QCEW. The dashed line plots estimates of Alabama's minimum UI tax rate, from the *Significant Provisions*. The data are reported for each year between 1975 and 2019.

For firms below the maximum UI tax rate, this is equal to:

$$(A2) \quad \pi = f(n') - w \left(1 + \tau_0 + \tau_1(1-f)\phi \frac{(n-n')}{n} \mathbf{1}(n' < n) \right) n'$$

$$(A3) \quad = f(n') - (1 + \tau_0) w n' - \tau_1(1-f)\phi w \frac{n'}{n} (n - n') \mathbf{1}(n' < n)$$

Now, consider an alternate environment in which firms pay a payroll tax $\tilde{\tau}$ and a firing tax F per employee that they layoff. In this environment, profits in the second period are:

$$(A4) \quad \tilde{\pi} = f(n') - w(1 + \tilde{\tau})n' - F(n - n') \mathbf{1}(n' < n)$$

Thus, these two environments are exactly equivalent if $\tilde{\tau} = \tau_0$ and $F = \tau_1(1-f)\phi w \frac{n'}{n}$, and if there is no maximum UI tax rate. The "firing tax" is counter-cyclical, as it depends negatively on the job-finding rate: a laid-off worker will not collect unemployment insurance if they find a job, and thus the firm's UI tax rate will not increase.

In practice, if there is a maximum UI tax rate, the experience-rated tax system is equivalent to an environment in which there is a payroll tax and a firing tax which only needs to be paid on any layoffs up to a fraction $\frac{n-n}{n}$ of the firm's workforce. Any layoffs in excess of this do not face a firing tax, as such a firm would already face the maximum UI tax rate.