Unemployment Insurance Financing As A Uniform Payroll Tax

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

One natural explanation for these patterns is the "experience rating" inherent in UI taxes (Guo and Johnston, 2020). UI tax rates differ across firms according to the amount of UI payments that a firm has caused (and potentially the UI taxes that the firm has payed 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. Numerous papers have used variation in tax schedules 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 firing tax 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 is not only substantial overall, but we find that it also contributes meaningfully to the countercyclicality of UI tax rates. 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 UI financing is destabilizing — raising unemployment precisely when it is already high. While the firing tax component is inherently countercyclical, the countercylicality of the payroll component is a policy choice and one that could be avoided through reforms to the UI tax 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 contains both uniform payroll tax and firing tax components.

Second, we set out to measure the size of these two components. No public data-sets clearly disaggregate the two components of UI taxes, so we develop a novel strategy to measure both components using county by industry level data from the Quarterly Census of Employment and Wages (QCEW).

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

I. A Model of UI Financing

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

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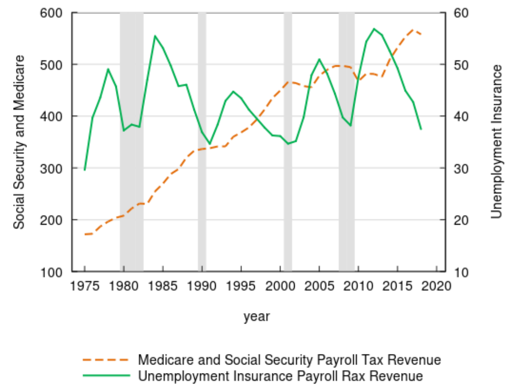

Figure 1. The Composition of Payroll Taxes

Note: Unemployment Insurance revenues are calculated from the QCEW. Social Security and Medicare tax revenues are reported in The White House OMB'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. Gray bars indicate NBER recession dates.

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

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

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

$$B' = u'\phi w \tag{2}$$

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 earning at the firm. The number of unemployed workers is given by:

$$u' = (1 - f)(n - n')I\,(n' < n) \tag{3}$$

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, implying that the number of workers fired by the firm is $(n - n')I\,(n' < n)$.

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

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

where $\underline{n} = n\left(1 - \frac{\bar{B}}{(1-f)\phi}\right)$ is the employment level at which the firm hits the maximum UI tax rate. 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 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 fir-

[1]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.

ing 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 shows 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 only changes if the tax schedule shifts due to a change in τ_0. As we discuss in more detail in the next section, τ_0 could change due to variation in a state's basic tax schedule, changes in a state's federal UI tax rate, or the imposition of 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 layoffs, 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]

[2]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 Zidar (2019) find that in aggregate, payroll tax increases tend to lower employment.

[3]Ljungqvist (2002) provides a comparison of the effect of firing taxes on the level of employment in various general equilibrium models, demonstrating that they may increase or decrease employment depending on the specifics of the model.

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_t^s) and the minimum UI tax rate ($\tau_{0,t}^s$) in each year in each state.

Off-the-shelf data are not well-suited to measuring minimum UI tax rates. The Department of Labor's ETA 204 Report provides data on the distribution of UI tax rates, but this data is only available beginning in 1998 and contains transcription errors. The *Significant Provisions of State Unemployment Insurance Laws* publication from the Department of Labor provides data on minimum and maximum rates in the basic tax schedule for each state. However, this data misses important UI taxes that increase during recessions—such as "solvency 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 QCEW. The QCEW reports a comprehensive measure of UI taxes paid to state authorities as well as the total value of taxable wages within county by industry cells. Therefore we can calculate the average UI tax rate for each cell. The minimum tax rate across all cells within a state will be the state's minimum rate as long as in some cells *all* firms face the minimum UI tax rate. In practice there is often a large spike in the number of county-industry cells at the minimum tax rate which we can use to identify the minimum rate, denoted $\tilde{\tau}_{0,t}^s$, as between 30 and 60% of all employers pay the minimum rate in most states. In Online Appendix Section A.A1 we explain the measurement in more detail and in Section A.A2 we provide a case study focusing on Alabama, which 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 taxes recorded in the QCEW, all firms pay additional federal UI taxes. These taxes are the same for all firms in a state, generally levied at 0.6 percent of the federal taxable wage base, but higher rates apply if states have a low federal trust fund balance. Since the federal taxable wage base is low (currently $7,000), we approximate the federal contributions of each state 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 QCEW minimum rate and calculate:

$$\tau^s_{0,t} = \tilde{\tau}^s_{0,t} + \frac{\tau^{s,f}_t \times w_{b,t} \times E_{s,t}}{W_{s,t}} \quad (5)$$

where $W_{s,t}$ is total state taxable payroll (i.e. total taxable wages paid to all workers), $\tilde{\tau}^s_{0,t}$ is the state-level minimum rate, identified using the QCEW as described above, $\tau^{s,f}_t$ is the federal tax rate in each state, $w_{b,t}$ is the federal taxable base, and $E_{s,t}$ is state-level employment. Lastly, given our estimate of the uniform payroll tax component, we recover the average firing tax component as $\tau^s_t - \tau^s_{0,t}$, where we measure τ^s_t as the average UI tax rate including both state and federal contributions.

III. Facts about Uniform Payroll Taxes

We highlight three facts about the uniform payroll tax component using our new series on minimum and average tax rates. First, we show that the uniform payroll tax component is sizeable, accounting for a little under half of overall UI taxes. In the left panel of Figure 2, we plot the average UI payroll tax rate and the minimum UI tax rate, averaged across states, from 1975 onward. In the right panel, we plot the ratio of these two time series. The uniform payroll tax component 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 roughly as countercyclical as the firing tax component. Both the average and minimum tax rates rise in the years after each recession, generally peaking 1-2 years after the recession ends. Indeed, the fraction of revenue from the uniform component is relatively constant over the business cycle, despite the cyclicality 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 the firing tax component, the uniform payroll tax component is 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— increase minimum UI tax rates by more 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. Consistent with Figure 2, the coefficient is positive—when unemployment rises, so do minimum taxes. In the second 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 minimum tax rates are lower when a greater share of wages is taxable. In the third column we interact unemployment and taxable wages. The coefficient in the third row is negative, meaning that minimum rates are less cyclical in states where a higher fraction of wages is taxable. The magnitude is sizeable: the estimates imply a two standard deviation increase in the taxable wage share halves the cyclicality 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 tax revenues due to the firing tax component is able to preserve a state's UI trust fund balance in recessions. If the taxable base is low, state's must impose additional uniform payroll taxes to preserve trust fund solvency.

[4] This 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.

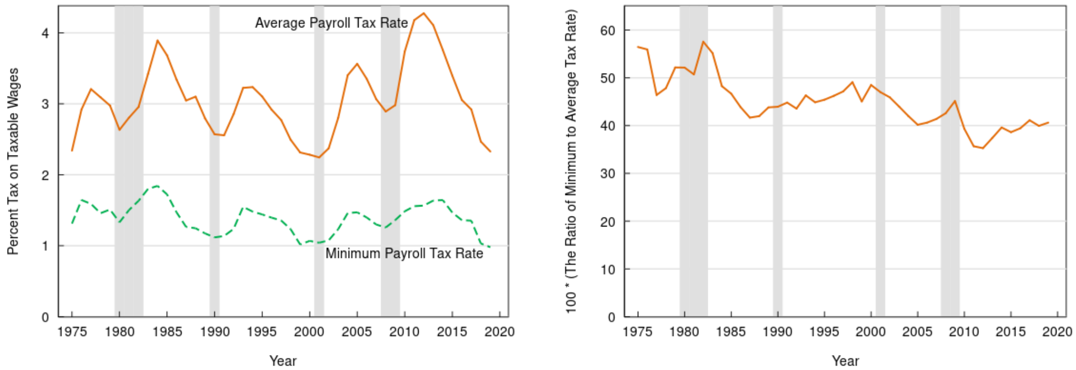

FIGURE 2. MINIMUM AND AVERAGE PAYROLL TAXES OVER TIME

Note: Average and minimum rates are averaged across states, weighted by employment. Gray lines indicate national recessions. The average payroll tax is calculated within the QCEW as the sum of state and federal contributions divided by state taxable wages. The minimum payroll tax is calculated as described in equation 5.

TABLE 1—DETERMINANTS OF MINIMUM TAX RATE CYCLICALITY

	Outcome: Minimum Tax Rate (τ_0)				
	(1)	(2)	(3)	(4)	(5)
Unemployment Rate	0.136		0.213		0.112
	(0.015)		(0.041)		(0.016)
Percent of Wages Taxable		−0.135	0.063		
		(0.051)	(0.081)		
Unemp. Rate × Percent Taxable			−0.032		
			(0.012)		
Average Weekly Benefits				−0.371	−1.174
				(0.164)	(0.733)
Unemp. Rate × 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 the state unemployment rate, lagged 1 year, in percent. The Percent of Wages Taxable is the percent of total wages in the state which are taxable, normalized relative to the standard deviation, averaged over the 5 to 10 years prior to time t. Similarly, Average Weekly Benefits is 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.

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

[5]We 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.

[6]For 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.

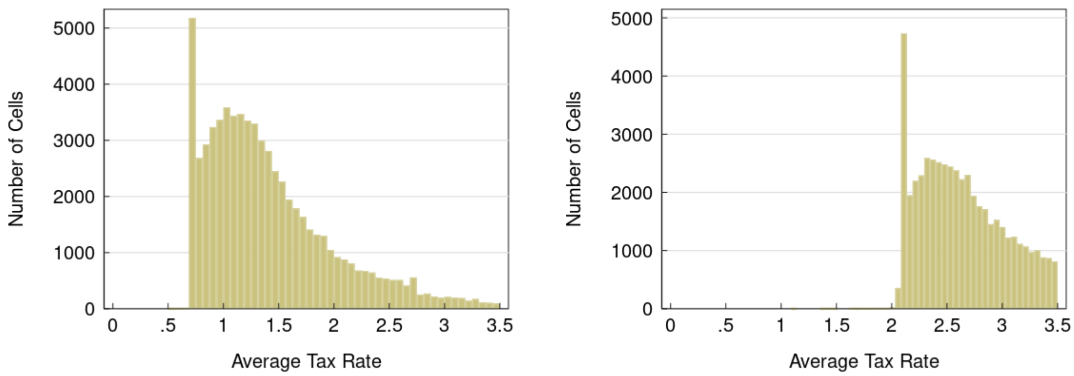

Figure A1. Average County by Industry Tax Rates Near τ_0 in Alabama, 2009 and 2010

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 state 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:

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

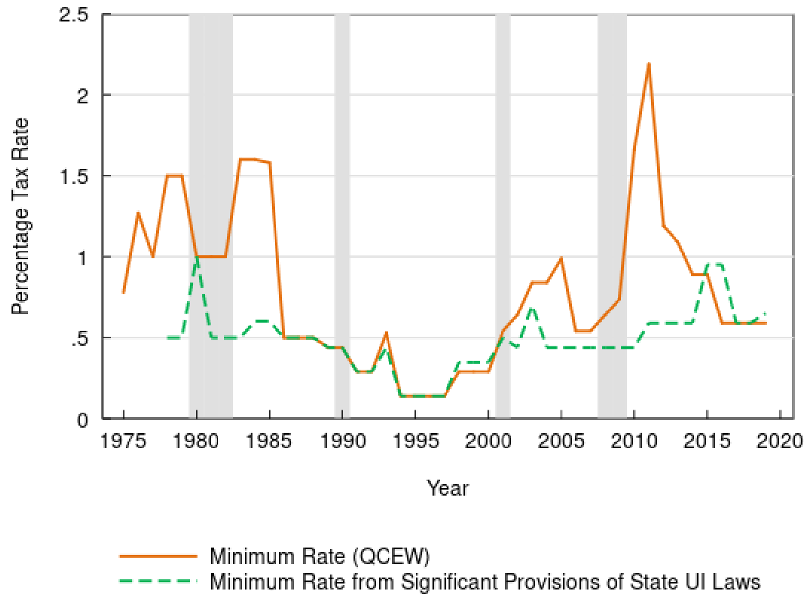

Figure A2. Minimum UI Tax Rates from Our Data vs. Other Datasets

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:

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

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

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

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

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.