

PRELIMINARY DRAFT -- DO NOT QUOTE OR CITE

National Fiscal Policies to Reduce Cyclical Volatility in U.S. States

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States experience cyclical downturns that differ in magnitude and timing from national downturns, and those state-level downturns have significant economic and social costs. Yet, countercyclical policy is often viewed through a national lens, where a worsening of national economic conditions leads to policies designed to lower national unemployment or boost national output. Balanced-budget rules prevent states from undertaking effective countercyclical fiscal policies on their own, but the federal government can and should adopt policies that respond to state-specific needs. For example, cutting federal payroll taxes on a state-by-state basis when unemployment rates rise would substantially reduce the harm of higher unemployment.

We focus on cyclical volatility in states' economies and not on longer-term differences. The crucial policy challenge of *persistently* weak economic conditions in certain places is addressed by Austin et al (2018) and others. The issues considered in this paper lie at the intersection of countercyclical national fiscal policies—which address short-term national economic performance—and place-based policies of economic development—which address long-term regional issues. Our focus on policies to address state-level economic downturns is shared by Deep and Lawrence (2008), Peek et al (2018), and Fiedler et al (2019), among others.

1. State Economies Are More Cyclically Volatile than the National Economy

State business cycles differ from national business cycles in several respects: State recessions are sometimes much deeper than national recessions; state recessions often occur with somewhat different timing than national recessions; and states occasionally experience recessions when no national recession occurs at all.

Unemployment rates vary widely across states, even excluding the most-extreme 20 percent of observations on a population-weighted basis (see figure 1). We focus in this paper on the period since 1990, or roughly the past 30 years. During the past three decades, the national unemployment rate has varied between 3.5 percent (in September 2019) and 10.0 percent (in October 2009). Meanwhile, state unemployment rates have ranged from 2.1 percent (in Virginia in October and November 2000 and in Vermont in May through August 2019) to 14.6 percent (in Michigan in June 2009). Examining the 10 most populous states (based on 2018 population) offers a similar view (see figure 2).

State unemployment rates tend to cluster more closely when the national unemployment rate is low than when it is high. That impression (from figures 1 and 2) is confirmed by an explicit comparison of the national unemployment rate with the standard deviation of unemployment rates across states (see figure 3). This pattern is even more stark in the past dozen years than in the preceding period. In this way, state unemployment rates are similar to national unemployment rates of different demographic and education groups, being more tightly grouped when economies are cyclically strong and further apart when economies are cyclically weaker.

State unemployment rates vary because of both short-term and long-term differences in economic performance. Average state unemployment rates for the 1990 to 2018 period varied from 3.2 percent in Nebraska to 7.2 percent in California and Alaska. Clearly, understanding and addressing these long-term differences is crucially important. But unemployment rates also varied significantly over time within states. During the same period, a state's unemployment rate was 2 percentage points or more higher than that state's long-term average roughly 15 percent of the time (weighting by states' populations).

At times of national recession, some states experience much larger increases in unemployment than the nation as a whole. For example, in the last recession, the national unemployment rate increased by roughly $5\frac{1}{4}$ percentage points relative to its 2005-2007 average, but 6 states experienced increases in the unemployment rate of more than $6\frac{1}{2}$ percentage points and 4 had increases of more than $7\frac{1}{2}$ percentage points (see figure 4a). Meanwhile, 11 states had increases of less than $3\frac{1}{2}$ percentage points. This divergence was not unique to the last recession, but can be seen in previous recessions as well (see figures 4b and 4c).

States occasionally experience recessions that are not related to national recessions. For simplicity, we define a recession as a period when the unemployment rate rises more than $\frac{3}{4}$ percentage point above its average over the preceding year and remains elevated for at least a year—a pattern that has occurred at the national level in the past half-century only in connection with official recessions as declared by the National Bureau of Economic Research. By this definition, since the mid-1970s, 9 states have experienced a recession that was not part of national recessions. Most of these recessions were experienced by oil-producing states—Arizona, Colorado, Louisiana, Mississippi, Oklahoma, Texas, and Wyoming—when the price of oil plunged in the mid-1980s (see figure 5). In addition, Hawaii fell into recession in the mid-1990s, South Carolina in 2003, and Wyoming in 2016. Some states in New England fell into recession prior to the 1990 national recession, and a number of states where homebuilding had been especially strong fell into recession prior to the national Great Recession. However, the so-called mini-recession of 2016 (Irwin, 2018) left only a small imprint on the unemployment rates of manufacturing and oil-producing states.

Movements in unemployment rates do not capture all of the cyclical variation in labor markets, for either the country as a whole or for individual states. At the national level, the increase in unemployment in the last recession was accompanied by a striking decline in labor force participation rate. The participation rate for prime-age workers fell from over 83 percent in 2009 to under 81 percent in 2015; it has since reversed nearly all of that decline, which confirms the view that the decline was cyclical in nature. As a result, many analysts have focused more on movements in the aggregate employment-population ratio, which includes movements in both the unemployment rate and the labor force participation rate. However, cross-state differences in employment-population ratios are much more heavily influenced by longer-term demographic considerations than unemployment rates, which complicates interpretation and their use for

policy purposes. (In ongoing work, we are examining movements in state-level employment-population rates adjusted for demographic change.)

2. Cyclical Volatility in States Has Significant Economic and Social Costs

A large literature has demonstrated the costs of joblessness to individuals and their families. Jobs are important for the income they provide. This is especially true because cash benefits from our government safety net programs for people who are not working are quite limited. Yagan (2018) shows that income losses have only a small effect on federal benefits received. Indeed, over the past few decades, presidents and Congresses have deliberately shifted the focus of federal programs that provide cash or near-cash benefits away from people who are not working and toward people who are working. In addition, there are ongoing discussions among federal and state officials about imposing or tightening work requirements on additional benefits. Jobs are also important for the sense of purpose, identity, and dignity they offer. People want to do meaningful things with their lives, and they want to contribute to their families and their communities; working in a job is one of the foremost ways to achieve those goals. Thus, reducing joblessness has greater benefits than simply reducing the loss of income from joblessness.

The larger increases in unemployment visible in state data compared with national data have significant negative consequences for people's well-being. Specifically, analyses of countercyclical policy often presume that deviations from the natural rate of unemployment are increasingly costly as they get larger. As a consequence, monetary policy rules are usually designed to minimize the sum of squared deviations of the unemployment rate from the natural rate, although Romer (2012, page 531) argues "that these assumptions [of quadratic costs of deviation of inflation and output from their target values] are only shortcuts, and that our understanding of how policy should be conducted is likely to change substantially as our understanding of the microeconomic foundations of the goals of policy evolves."

A rising marginal cost of increases in unemployment can be justified by several considerations. First, increases in unemployment can lead to disproportionately large increases in *long-term* unemployment, which is especially costly because of the erosion in skills and labor-force attachment that occurs as a spell of joblessness lengthens. In the Great Recession, long-term unemployment rose more sharply as the unemployment rate rose to high levels (moving to the right along the bottom edge of the crescent in figure 6), and the labor force participation rate declined only when the unemployment rate rose substantially (moving to the right along the top edge of the outline in figure 7). Second, when more people are out of work, there is a greater chance that the families, friends, and business associates of a jobless person are also suffering from economic hardship and thus are less able to support the jobless person. Third, when more people are out of work, the importance of work in the social structure of a community is more likely to diminish, with negative long-term consequences. Fourth, when more people are out of

work, government budgets become more strained, which makes providing support for a jobless person more difficult.

Given this structure of the cost of unemployment, addressing the large increases in unemployment that occur at the state level is especially important for people's well-being. For an illustrative calculation, suppose that the natural unemployment rate for the country during the Great Recession was the 4.6-percent average unemployment rate experienced during 2007 (the year before the recession began), and recognize that the national unemployment rate peaked at 10.0 percent in October 2009. A standard loss function used to analyze countercyclical policy would show the cost of elevated unemployment at its peak as some factor times $(10.0-4.6)^2$, or some factor times 29. Applying the same formula to each month during the recession and recovery yields an estimated cost of for the entire period of elevated unemployment of that same factor times 994. If one instead applies that formula separately to each state and aggregates using state populations in the 2010 Census as weights, the estimated cost of elevated unemployment during the recession and recovery equals that same factor times 1196. That is, incorporating the variation in state unemployment rates, and therefore capturing the exceptionally high rates reached in some states, generates an estimated cost of elevated unemployment that is 20 percent larger than the estimated cost using only national data.

This calculation is simply a version of the argument that economic downturns are much more costly than would appear from observing changes in aggregate income and consumption because those changes are not shared equally across the population. Thus, we offer the calculation as an illustration of the concentrated costs of elevated unemployment and not as a specific estimate to be given great weight. One could obtain different estimated costs by disaggregating to different degrees. Indeed, Charles et al (2016) analyze changes in labor markets in metropolitan areas, and the logic of our paper suggests that countercyclical policy could usefully be targeted more precisely than just states. However, designing federal fiscal policies that would vary across metropolitan areas would be even more difficult than designing such policies to vary across states, and we do not pursue this more ambitious approach.

Increases in unemployment are costly in part because they are not reversed quickly. Beraja et al (2019) and Yagan (2019) provide evidence of significant hysteresis in job loss, which can also be seen in national data for the Great Recession. Moreover, despite the significant costs of joblessness, people do not move readily to find work, and indeed move significantly less than they did a few decades ago. Potential explanations for the decline in mobility include the challenges of job-matching for two-earner couples, the spread of state-based occupational licensing, large differences in house prices in different regions, and the loss of social networks of nearby family and friends if one moves. The research literature is exploring these and other possibilities; see Bayoumi and Barkema (2019), Marinescu and Rathelot (2018), Molloy et al (2011), Yagan (2019), and Zabek (2019), among others. The bottom line for our purpose is that economic policies that create jobs where people are living and seeking work are especially valuable. (Austin et al (2018, pages 184-5) explain that policies that increase job availability in

areas with high unemployment will reduce the incentive to move; given the inefficient nature of cyclical job loss and the low underlying rate of migration, increasing employment in areas with temporarily high unemployment seems useful nonetheless.)

3. Cyclical Volatility in States Can Be Addressed through Expansionary Fiscal Policy

Fluctuations in unemployment within states reflect various factors, some of which can be addressed effectively by boosting the demand for goods and services through expansionary fiscal policy, and some of which cannot. Expansionary fiscal policy is best suited for reducing excess unemployment in a state when the principal source of that unemployment is a broad shortfall in demand for goods and services that has reduced the demand for workers and left few open jobs—and poorly suited when the principal source is a structural economic shift that has left workers without the skills needed for the specific jobs that are open.

For example, the dramatic growth of Chinese exports to the United States during the past few decades has led to a significant decline in U.S. manufacturing employment. Some of the workers who have lost manufacturing jobs have skills that are transferable to non-manufacturing jobs and have moved into such jobs, but other workers who have lost manufacturing jobs do not have the skills needed for other jobs. Matching that latter group with new jobs relies partly on new education and training, and this structural obstacle cannot be overcome solely by increasing the demand for workers broadly. However, increasing the demand for workers broadly can *help* in overcoming the structural obstacle because firms that are especially eager to hire workers have an incentive to provide training themselves. Moreover, the workers who lose manufacturing jobs and do not readily find other jobs reduce their purchases of other goods and services, which leads to job loss outside of manufacturing, and that problem can be overcome by increasing the demand for workers broadly.

The evidence suggests that a significant part of fluctuations in unemployment stems from weak demand for workers broadly rather than from structural obstacles. At the national level, both the unemployment rate and labor force participation rate show significant reversion after recession-induced movements, wage growth tends to slow during recessions and pick up during recoveries, and much of the employment loss during recessions occurs in sectors outside the ones where a shock has initially hit. All of those patterns are consistent with recessions primarily representing shortfalls in the aggregate demand for goods and services. At the state level, Beraja et al (2019) offer a thorough analysis of both national and regional patterns of employment and wages, and conclude: “At least for the Great Recession, most of cross-region variation in economic conditions have been found to be driven by cross-region variation in demand shocks.” See also the evidence summarized in Yagan (2019).

4. National Fiscal Policies Can be Tailored to Reduce States’ Cyclical Volatility

State governments cannot undertake adequate countercyclical policies alone, because they face balanced-budget rules of various sorts. Indeed, because economic downturns tend to push state government budgets into deficit—as tax revenues decline and spending for Medicaid and other income-based programs increases—states often need to make procyclical budget changes to move their budgets back toward balance.

By their nature, national fiscal policies generally provide greater support to states in weaker economic positions. Uniform federal tax rules across states lead to smaller revenue collections from states with lower incomes, and uniform federal benefit programs across states lead to larger benefit payments to states with lower incomes. Therefore, uniform fiscal policies across states provide some insurance against economic downturns and reduce states' cyclical volatility.

However, the amount of cross-state redistribution in our national fiscal system is an accident of tax rules and spending programs that were designed based on other considerations—just as the strength of the automatic stabilizers on a national level is an accident of fiscal decisions that were made based on other considerations. For evidence and discussion, see Asdrubali et al (1996), Bayumi and Masson (1995), Deep and Lawrence (2008), and Peek et al (2018), among others. (Peek et al (2018) note that monetary policy has different effects in different parts of the country, in part because of differences in the structure of economic activity—places where production is concentrated in goods and services for which demand is more interest-sensitive generally experience stronger effects from changes in monetary policy—and in part because of differences in banking structures and financial conditions. However, the geographic distribution of those effects is not directly under the control of the Federal Reserve.)

National fiscal policies can be tailored to provide even greater support for states undergoing more significant cyclical downturns. Doing so would have two significant advantages: It would alleviate some of the higher costs of concentrated increases in unemployment discussed above, and it would increase the national effectiveness of countercyclical policy.

On the latter point, note that a dollar of fiscal stimulus will tend to spur more additional economic activity in places with more temporarily unused resources. In places with more workers who have become unemployed, businesses can fill job openings more quickly and at lower wages, and in places with more plant and equipment that has become idle, businesses that hire workers can expand production more quickly and at lower cost. Therefore, boosting the demand for goods and services in those places will tend to lead to larger increases in output and less upward pressure on prices. See Austin et al (2018), Bartik (2015), and many textbook discussions of the shape of the Phillips curve.

To make a meaningful difference in cyclical downturns, national fiscal policies that are targeted at states with larger downturns would need to satisfy three criteria: It would need to be feasible at a scale that is noticeable in states' economies; it would need to scale up and down gradually, as

states' economies deteriorate and improve; and it would need to be broadly perceived as fair in order to be politically sustainable. We address these criteria in turn.

First, national fiscal support focused on states with larger cyclical downturns would need to occur at large scale to make a significant difference in outcomes. Consider the magnitude of the shortfall in output in the Great Recession. Based on the Congressional Budget Office's latest estimates of potential GDP, actual GDP fell short of potential for an entire decade, from 2008:Q1 through 2018:Q1. The estimated cumulative shortfall represented nearly one-quarter of one year's GDP, or more than \$4 trillion given GDP in those years. The estimated output gap exceeded \$500 billion at an annual rate in nearly every quarter for almost 5 years, between 2018:Q4 and 2013:Q2. Based instead on CBO's estimates of potential GDP *on the eve of the recession*, the shortfall over the 2008-2018 decade is roughly four times as large, and continues today because of hysteresis in the effects of the recession. How much of the downward revision to CBO's estimates of potential output reflects the impact of the recession and how much the impact of other factors is not clear. But making a significant difference in the depth or duration of the Great Recession clearly required fiscal policies involving hundreds of billions of dollars.

Looking ahead, the negative economic forces driving the next recession will probably be less intense than the forces driving the last one, which was the worst economic downturn since the Great Depression. On the other hand, the low current level of interest rates means that the Federal Reserve Board will have less room to cut rates than it did in past downturns, which will leave more of the countercyclical burden to be borne by fiscal policy. For more on this issue, see Gagnon and Collins (2019). On balance, meaningfully reducing the severity of the next recession will again require national fiscal policies involving hundreds of billions of dollars.

Second, national fiscal support should scale up and down gradually, because economic downturns occur in continuous rather than discrete ways. At the national level, increases in the unemployment rate around recessions generally occur over a period of a few years—between the fall of 2007 and the fall of 2009, between the end of 2000 and the middle of 2003, between the summer of 1990 and the summer of 1992, and so on. Similarly, increases in the unemployment rate for states occur gradually over time. Therefore, to be most useful, countercyclical policy should begin quickly when unemployment starts to rise, but should increase in magnitude as (and if) a downturn worsens. Decreases in the unemployment rate are much slower than increases, so withdrawing fiscal stimulus gradually is even more important than applying it gradually. Again at the national level, the unemployment rate has tended to retrace only about half of its recessionary runup in the two years after it peaked, and state-level increases in unemployment show substantial persistence as well. Therefore, countercyclical policy should diminish when unemployment falls significantly but should not cease until an economy is more fully healed.

Building such gradual adjustments into a federal tax provision or spending program can be complicated, depending on the nature of the taxes or spending to be adjusted. Such adjustments are most straightforward for existing tax provisions or spending programs with sliding scales,

such as a tax rate or subsidy rate that vary depending on a taxpayer's income. Gradual adjustments are more difficult to build into tax provisions or spending programs that have fixed rather than varying parameters or for which people or organizations are eligible only if they pass discrete tests. And gradual adjustments are especially difficult to achieve if one aims to establish new tax rules or spending programs, because new rules and programs generally impose substantial fixed costs on the federal government and on others, and those costs are hard to justify if the rules and programs operate on a small scale.

Third, national fiscal support focused on particular states would need to be broadly perceived as fair in order to be politically sustainable. Any tax provision or spending program that treats people with similar individual characteristics differently depending on where they live will engender skepticism about fairness. To overcome that skepticism, it is important to emphasize the insurance nature of the policies we are describing and to link the differences in treatment to relevant and observable conditions. For example, offering more generous unemployment insurance benefits to people in states with higher unemployment rates treats people with similar individual characteristics differently—but in a way that is related to differences in the observable difficulty of finding new jobs and that will tend to benefit people in different states at different times in the way that insurance does. (On this logic, Deep and Lawrence (2008) proposed a formal insurance policy to be offered to all state *and local* governments to protect against drops in income. Their proposal would establish a revenue-neutral “risk-pooling” arrangement among subnational governments.)

With these criteria in mind, what policy options are available?

One approach to tailoring national fiscal policies to provide greater support for states undergoing more significant cyclical downturns is to strengthen state-based aspects of existing federal programs. In particular, Fiedler et al (2019) propose increasing federal payments for state Medicaid programs in states that are suffering from cyclical downturns. That proposal is especially important in two ways: One is that Medicaid programs involve substantial amounts of funding, so increasing federal support would involve enough resources to make a noticeable difference in macroeconomic outcomes. The second is that federal support for state Medicaid programs is already set by law so that states with lower per-capita income receive more support, and building on that structure would be fairly straightforward to implement and would have some natural political appeal. Strengthening state-based aspects of other benefit programs—for example, building on Chodorow-Reich and Coglianesse (2019)'s proposal for making unemployment insurance respond more strongly to increases in unemployment—would be important for the recipients of those benefits and could play a small role in enhancing macroeconomic stabilization. However, those other benefit programs generally do not involve enough funding to make a significant difference to macroeconomic outcomes.

Even the Medicaid proposal, however, suffers from some limitations: The funds would flow to state governments rather than individuals in affected states; relieving pressure on state

government budgets would be useful for providing macroeconomic stimulus and for protecting state government programs, but it might not have the broad political appeal of providing funds to individuals. In addition, the plan would provide economic stimulus by increasing federal spending and not by reducing taxes; again, that approach might limit the political appeal, and it also would miss the opportunity to “hedge our bets” on the strength of different fiscal multipliers. Moreover, the plan focuses on health care policy toward lower-income Americans, which has been a particular partisan battleground over the past decade; this also might limit the political appeal.

To complement existing proposals, we examine here the possibility of varying payroll tax rates based on the unemployment rate in employees’ states of residence. This approach satisfies all three criteria described earlier: First, it is feasible at scale. Varying payroll tax rates by state would introduce additional complexity for employers; however, compliance with state tax laws already requires employers to track the state of residence for each employee, so varying the payroll tax rate based on that information is feasible. And payroll tax revenue exceeds \$1 trillion per year, so the scale is substantial. Second, payroll tax rates can be scaled up and down gradually, and indeed were changed by law to provide economic stimulus during the Great Recession (though not at the state level). Third, the approach might well be viewed as fair, because it would represent insurance for states—some states would benefit at some times, and other states at other times—and would cut employment taxes more in states with especially high unemployment—which has an appealing logic.

5. Varying Payroll Tax Rates Based on State Unemployment Rates

To explore both the mechanics and the macroeconomic effects of varying payroll tax rates based on state unemployment rates, we simulate the following specific proposal: For each percentage point by which the six-month moving average of a state’s unemployment rate rises above a baseline rate, the employee share of the payroll tax (including the tax paid by self-employed workers) is reduced by one percentage point beginning two months later; as a state’s unemployment rate later declines, the process reverses, and the tax rate reverts gradually to its regular level. The six-month moving average is used to minimize the effects of short-term variation in the unemployment rate, which is especially visible in state-level data. The two-month lag is the minimum necessary for adjusting tax rates because the unemployment rate for month t is not known until month $t+1$, and policy adjustments cannot be made before month $t+2$. A state’s baseline rate is the twelve-month moving average of the state’s unemployment rate at the point when the six-month moving average of the unemployment rate exceeds the sixth lag of the twelve-month moving average by a percentage point. This formula for the baseline is complicated, and may seem unnecessarily so; however, a long moving average is appropriate for capturing underlying (pre-recessionary) economic conditions, and the sixth lag of the moving average is needed to avoid a supposed baseline that rises as the unemployment rate rises in recession.

(Because payroll tax revenues are deposited in the Social Security trust funds, and because Social Security payments depend under law on the balances in those trust funds, we assume that an amount equal to the reduction in revenues for the trust funds would be transferred to the trust funds from the federal government's general fund, thereby leaving the trust funds unaffected by this policy; this approach was followed during the Great Recession.)

Here is how this formula plays out: As the unemployment rate rises, there is no change in policy until the six-month moving average exceeds the sixth lag of the twelve-month moving average by a percentage point. At that point, the baseline unemployment rate is defined as that lagged t moving average, and it does not change further as the business cycle continues. The payroll tax rate is cut two months later by one percentage point. If the six-month moving average later exceeds the baseline by two percentage points, the payroll tax rate is cut by another percentage point, and so on. Suppose that the six-month moving average rises to three percentage points above the baseline, causing the payroll tax rate to be cut by three percentage points, and then rises another one-half percentage point before beginning to decline. When the six-month moving average falls below three percentage points above the baseline, the payroll tax rate rises by a percentage point. Later, when the current rate falls below two percentage points above the baseline rate, the payroll tax rate rises by another percentage point; and when the current rate falls below three percentage points above the baseline rate, the payroll tax rate rises by another percentage point to its original value. Subsequent declines, if any, do not cause an increase in the payroll tax rate above its original value.

We estimate the macroeconomic effects of this proposal as follows. Payroll tax rates were reduced by two percentage points during 2011 (a reduction that was later extended). The staff of the Joint Committee on Taxation estimated that the resulting revenue loss would be \$112 billion (see Congressional Budget Office (CBO, 2010)). Separately, CBO (2011) estimated that a reduction in payroll taxes paid by employees would increase GDP cumulatively by \$0.10 to \$0.90 for every dollar of budgetary cost. The midpoint of those figures represents a multiplier of 0.5, which appears consistent—for this type of policy change—with the reviews of the relevant literature by CBO (2014), Chodorow-Reich (2019), and Ramey (2019). Combining that midpoint with the estimated revenue loss, the two-percentage-point payroll tax cut would be estimated to raise GDP by \$56 billion, which was 0.36 percent of GDP in 2011. We assume that this boost to GDP occurs over time, in line with CBO (2012). Based on the traditional Okun's law relationship in which one percent higher GDP leads to a one-half percentage point lower unemployment rate, that cut in the payroll tax rate would reduce the unemployment rate by 0.18 percentage points. Again, we assume that this effect occurs over time, as shown by Ball et al (2012). Thus, a 1 percentage point cut in the payroll tax rate paid by employees would ultimately lower the unemployment rate by roughly 0.1 percentage points.

We examine what the impact of this proposal would have been during the Great Recession, beginning with its impact if the formula had been applied to the country as a whole and then

turning to its impact if the formula had been applied on a state-by-state basis. Had the formula been applied to the country as a whole, the payroll tax rate paid by employees and self-employed workers would have been reduced by one percentage point in October 2008 and again by one percentage point in February 2009, April 2009, July 2009, and December 2009 (see figure 8). By December 2009, the employee payroll tax rate would have been 1.2 percent (compared with the actual 6.2 percent). Then the payroll tax rate would have been increased in August 2010, February 2012, June 2013, April 2014, and April 2015, returning it to 6.2 percent. This reduction was much greater than the reduction in the payroll tax rate that actually occurred. The payroll tax rate would have been below the actual by 18.75 point-years, more than six times the actual reduction of 2.80 point-years. The reduction in tax revenue would have been roughly \$900 billion, compared with \$112 billion estimated for the cut that did occur.

If this formula had been applied on a state-by-state basis, the reduction in the weighted-average national rate would have been similar to the reduction when applied on a national basis (see figure 9).

If the formula had been applied on either a national or state-by-state basis, the unemployment rate would have been lower than it actually was (see figure 10). The difference in effects between the national and state-by-state application is not clearly visible in the figure, but calculations analogous to the illustrative estimate of costs presented earlier show that the state-by-state approach indeed reduces the cost of higher unemployment by a somewhat larger amount. With the state-by-state approach, different states would have experienced very different changes in the payroll tax rates paid by employees in their states (see figure 11).

6. Conclusion

U.S. states experience significantly different cyclical patterns of joblessness, and those differences warrant a national fiscal policy response. Enacting stronger cross-state fiscal redistribution is feasible and would reduce costly increases in unemployment in states.

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Figure 1
Variation in Unemployment Rates across States

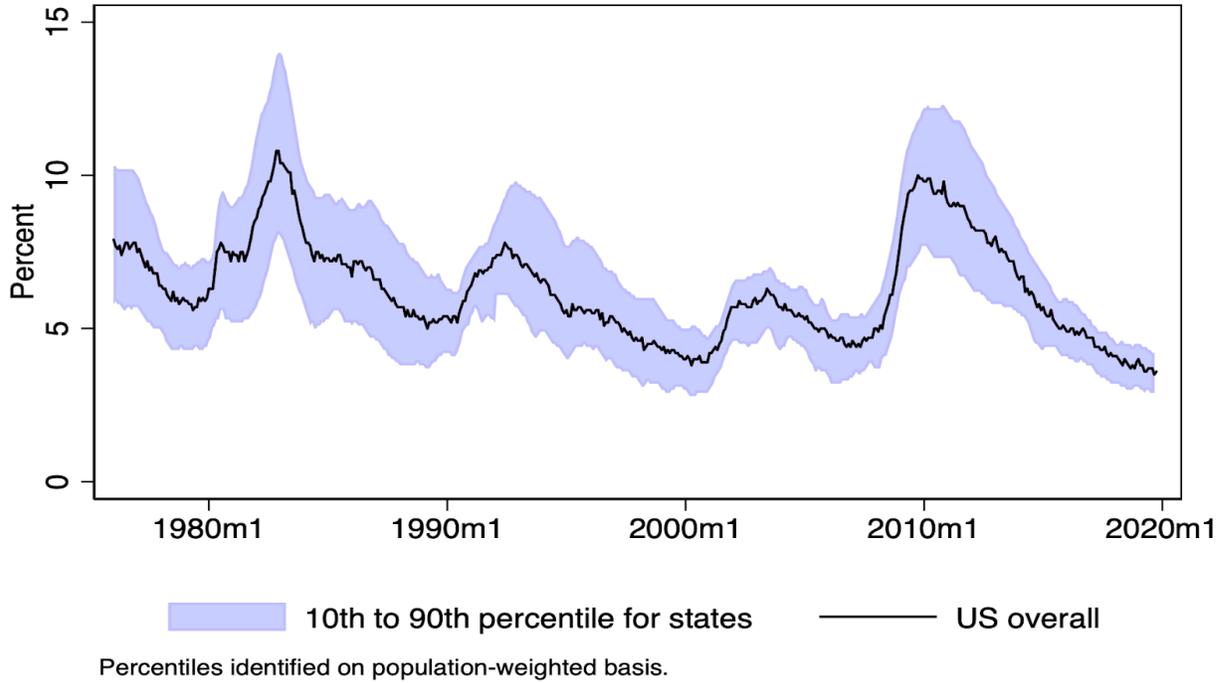


Figure 2
Unemployment Rate for 10 Largest States

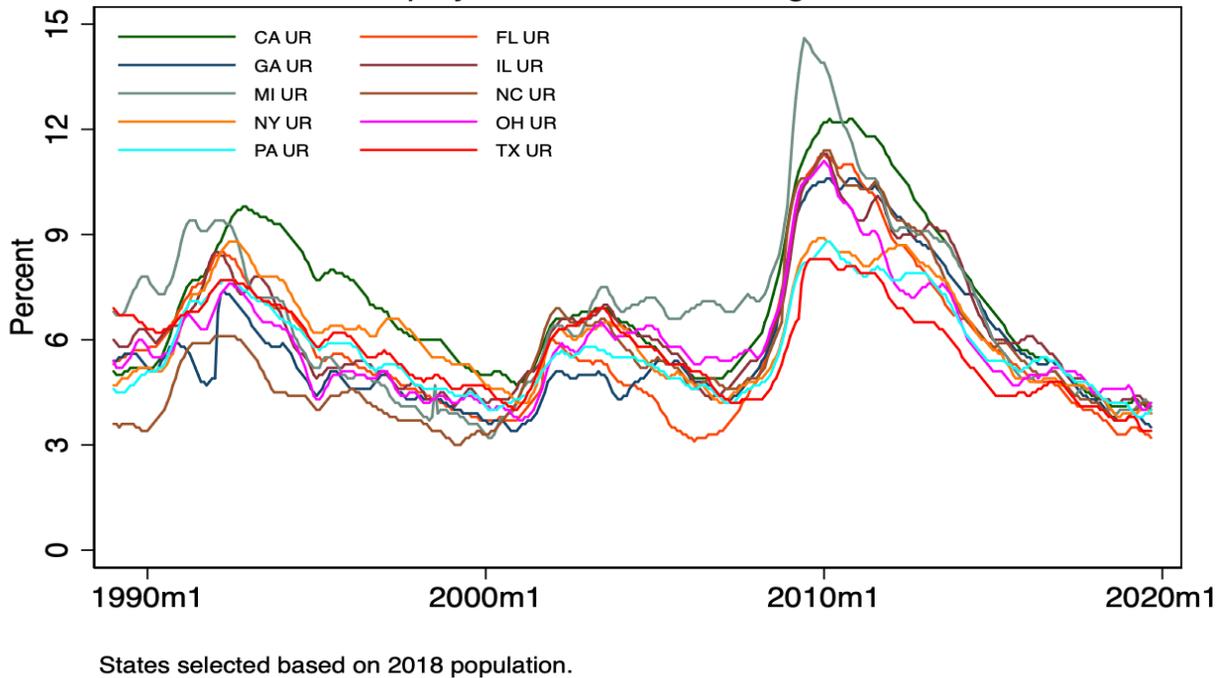
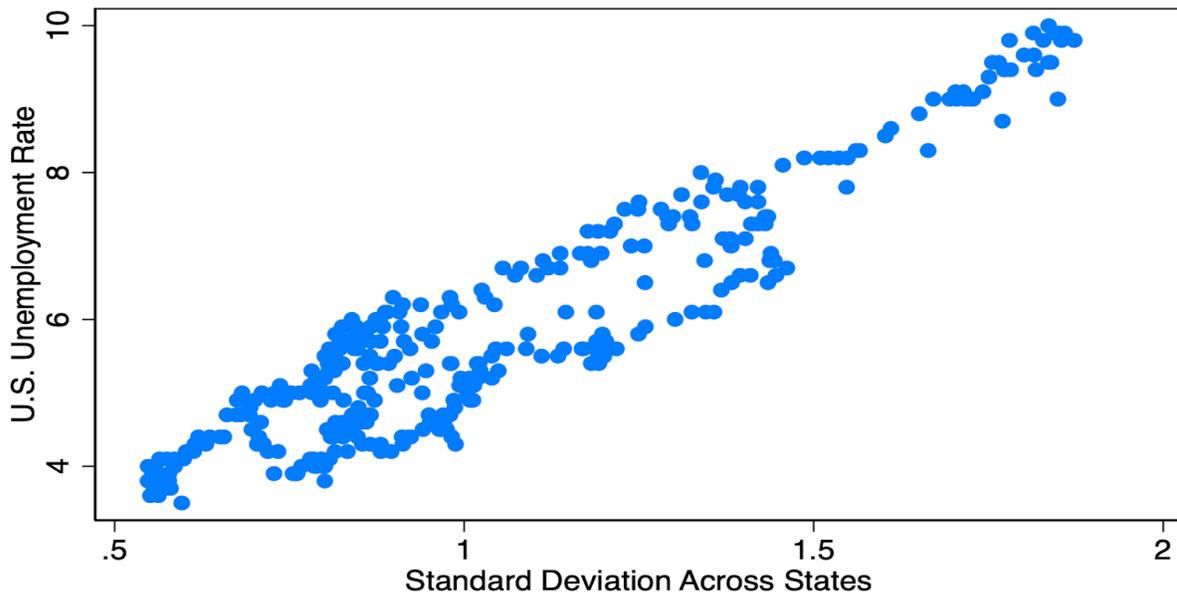
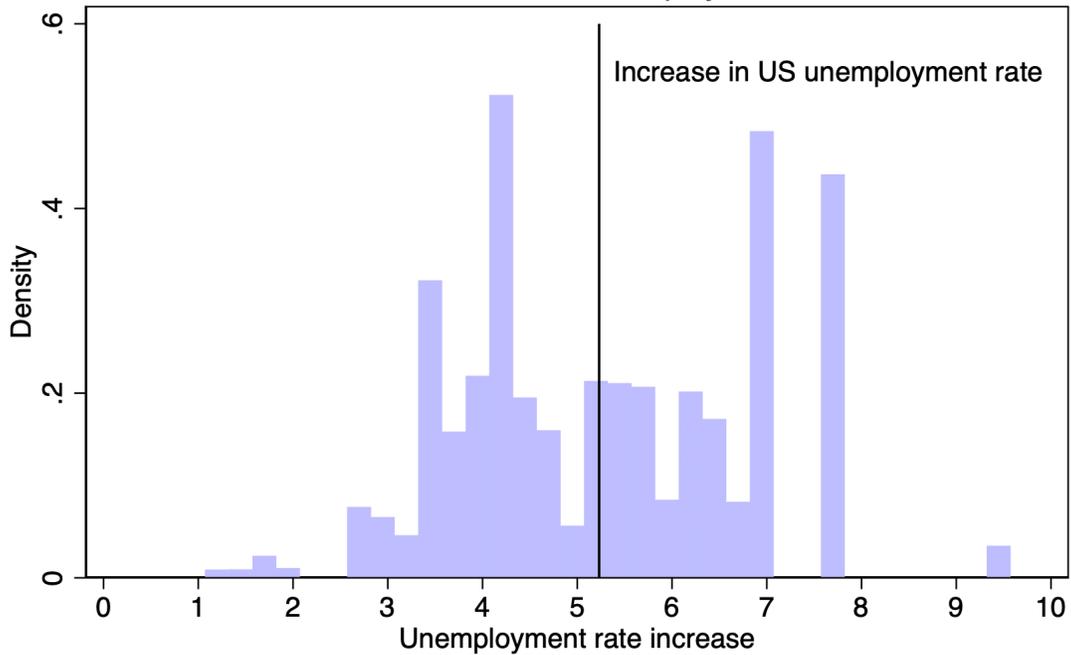


Figure 3
U.S. Unemployment Rate and Standard Deviation Across States
1990-2019



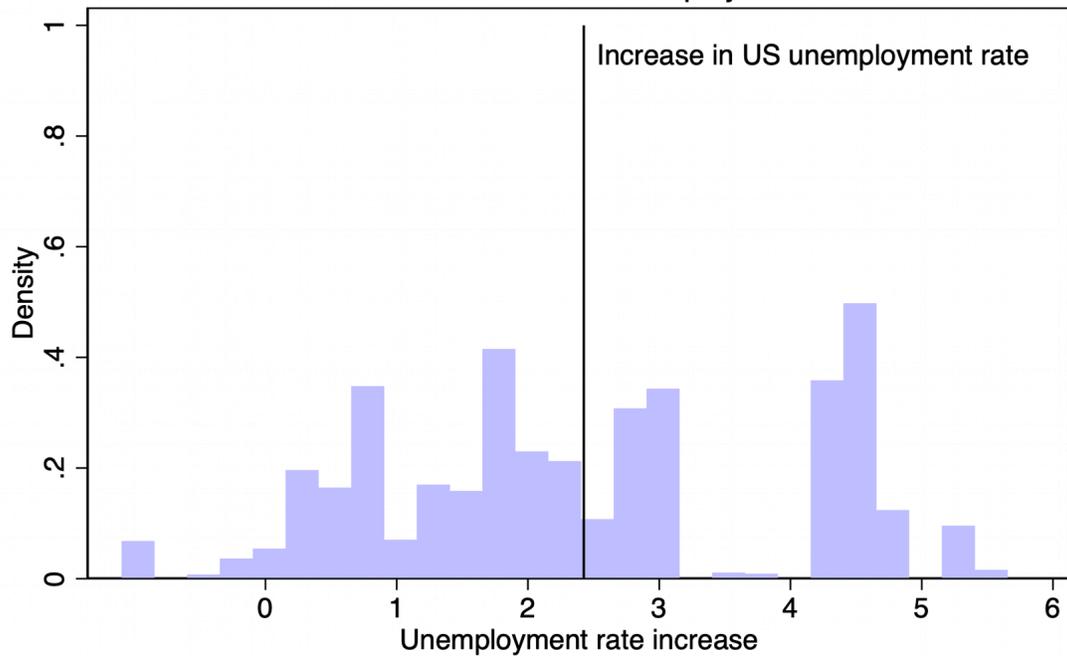
Standard deviations calculated on population-weighted basis.
Hurricane Katrina observations dropped for LA, MS.

Figure 4a
Distribution of Great Recession Unemployment Rate Increases



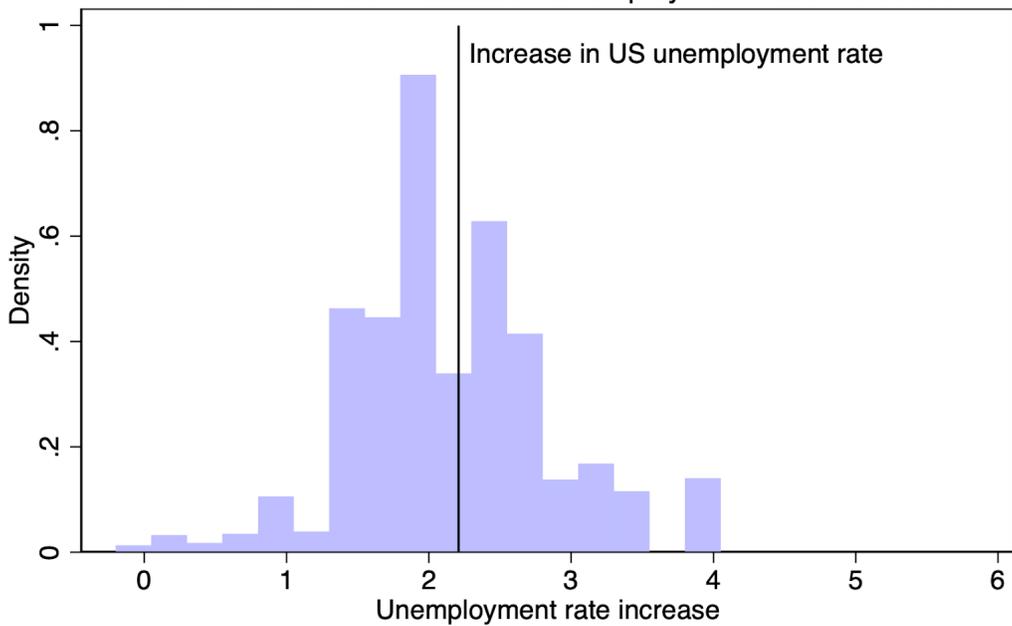
Notes: Population-weighted. Hurricane Katrina observations dropped for LA, MS.

Figure 4b
Distribution of 1990-91 Recession Unemployment Rate Increases



Notes: Population-weighted.

Figure 4c
Distribution of 2001 Recession Unemployment Rate Increases



Notes: Population-weighted.

Figure 5
State-level Recessions Outside of National Recessions

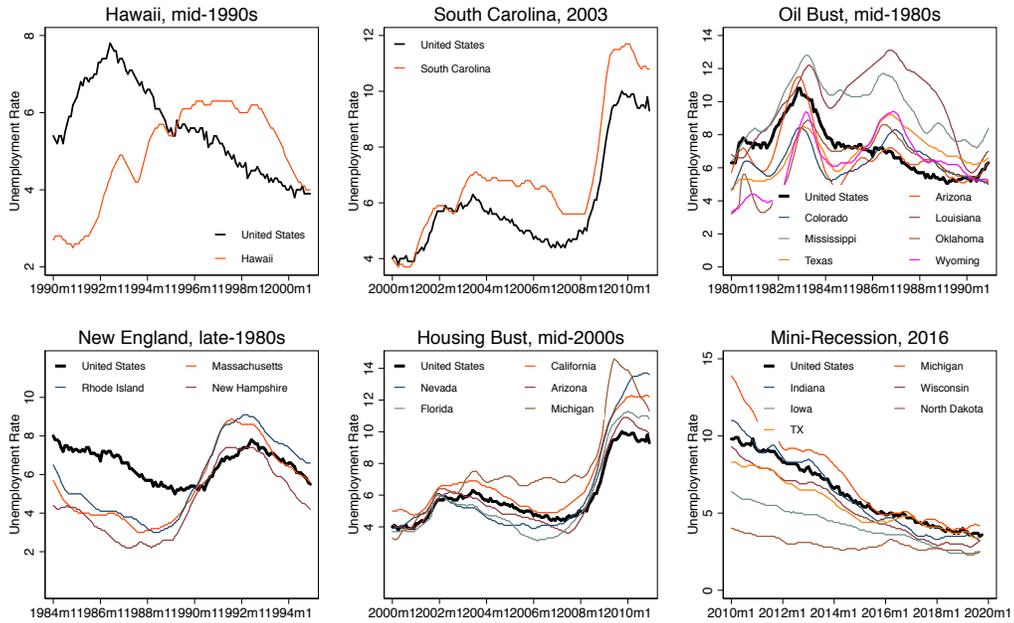


Figure 6
Unemployment Rate and Long-term Unemployment Rate
2007-2019

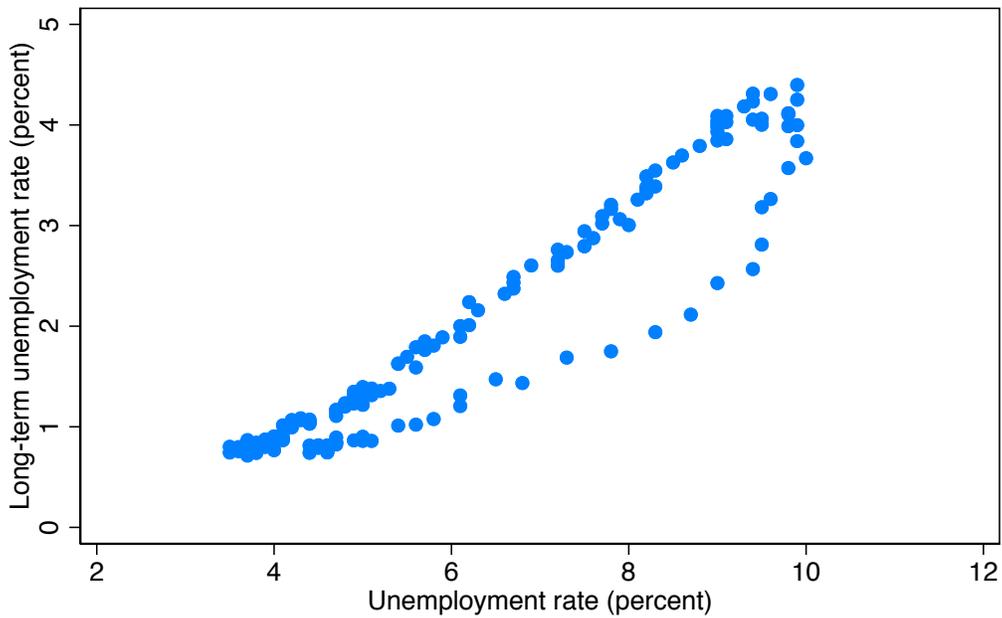


Figure 7
Unemployment Rate and Prime-Age Labor Force Participation Rate
2007-2019

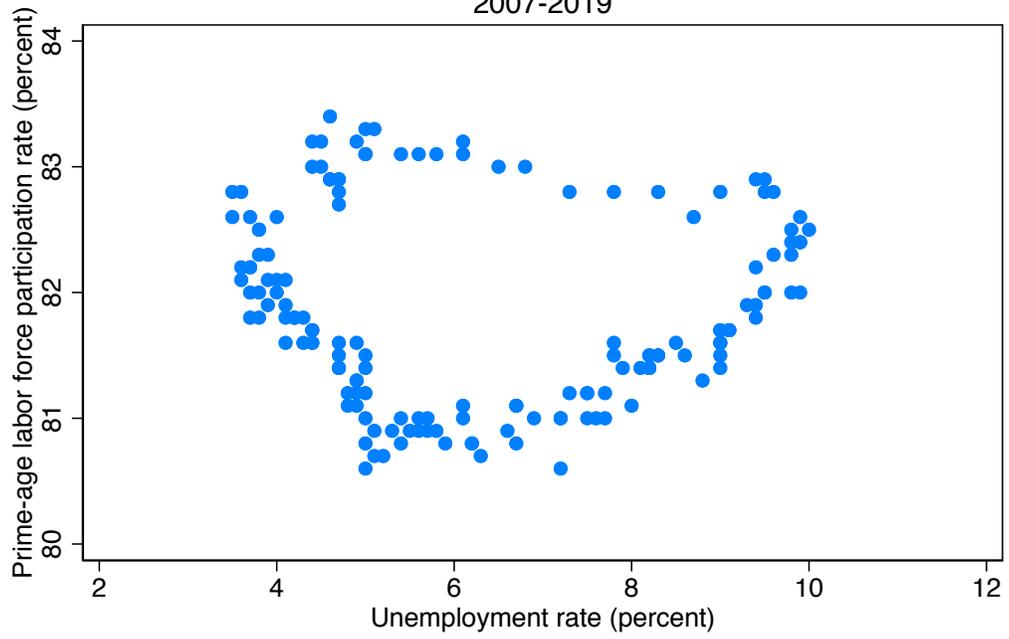


Figure 8
U.S. Unemployment Rate and Payroll Tax

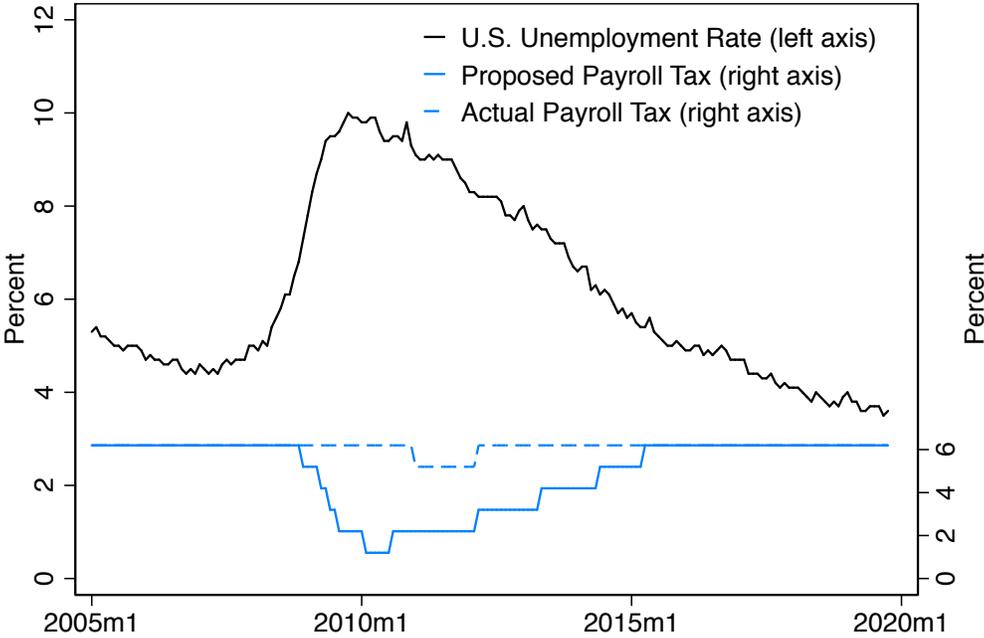
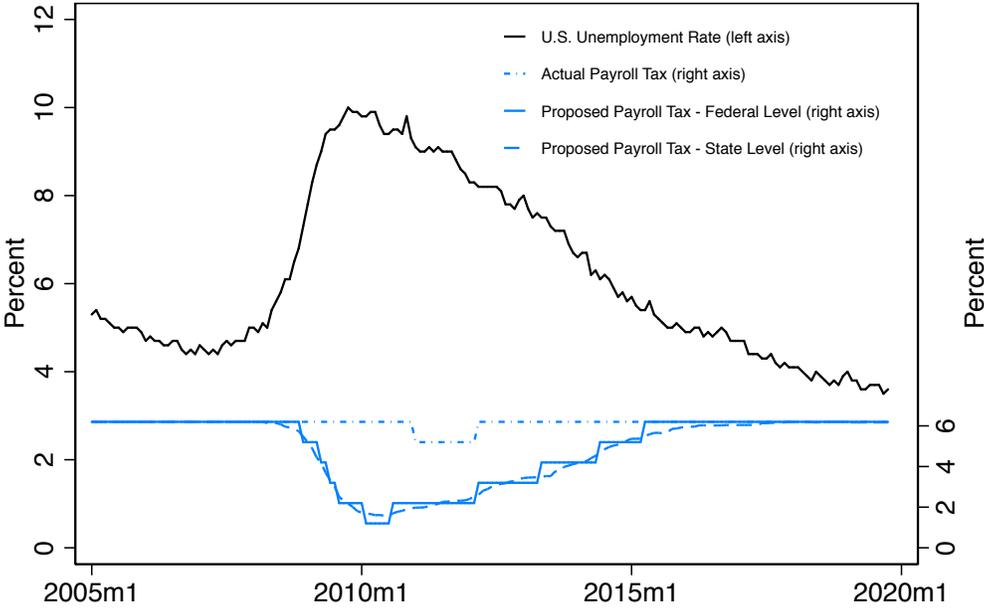


Figure 9
U.S. Unemployment Rate and Payroll Tax



State-level tax is population-weighted average across states.

Figure 10
U.S. Unemployment Rate:
Actual and with Proposed Payroll Tax Cuts

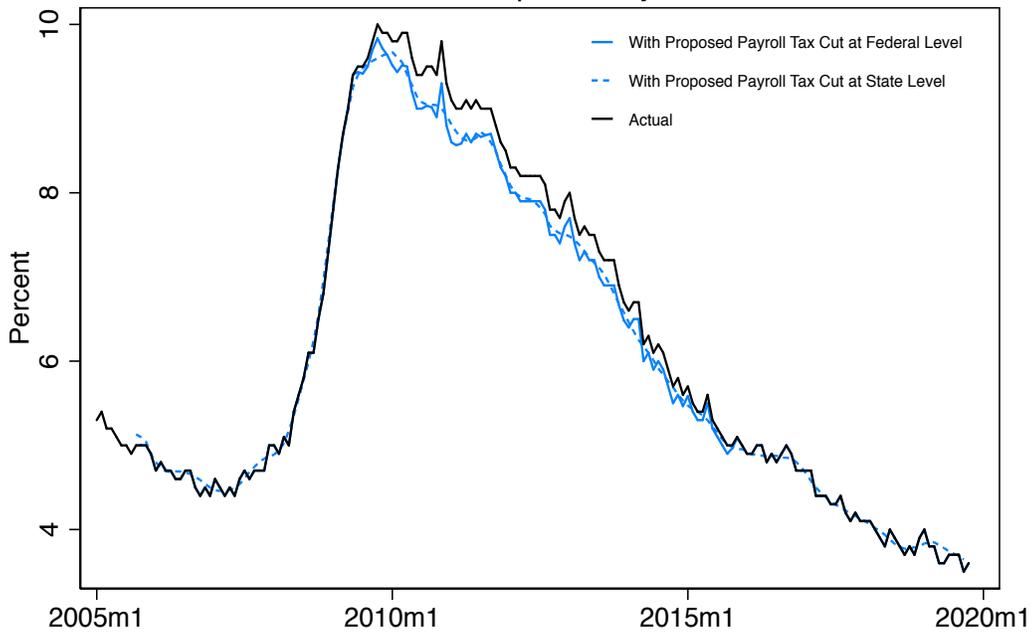


Figure 11
Examples of Proposed State Payroll Tax Changes

