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Unemployment insurance claims and COVID-19

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ABSTRACT

We explore the effect of various factors on interstate differences in weekly unemployment insurance claims, focusing specifically on the determinants over the initial period of the pandemic in the U.S. We consider the effects of COVID-19 cases, state policies enacted in response to COVID-19, relevant provisions of Federal Coronavirus Aid, Relief and Economic Security (CARES) legislation, and the nature of state economies. We find that during the initial weeks of the pandemic, unemployment claims were driven by consumer reactions to the coronavirus. We find that over the March 21-April 25 period states with greater employment in industries most affected by the virus and which issued orders closing nonessential businesses experienced greater weekly unemployment claims. We find mixed evidence that unemployment benefits affect the number of unemployment claims. However, we find no evidence that the ability to work at home mitigated the increase in unemployment rates during this period, nor evidence that the CARES Act's Payroll Protection Program influenced the level of new unemployment claims.

1. Introduction

Beginning in mid-March 2020 and continuing throughout the spring, the U.S. experienced very large increases in weekly unemployment insurance claims. Initial weekly unemployment claims increased the week ending March 14, but the first substantial increases in initial unemployment claims occurred in the week ending March 21.[1] There are substantial differences across states in the magnitude of the increase in unemployment insurance claims since March 14. Initial unemployment claims reflecting the week ending March 21 as a percentage of state insured employment ranged from 1.6 percent in South Dakota to 7.8 percent in Hawaii. Cumulative initial weekly claims as a percentage of state insured employment over the period March 21 through April 25 ranged from 8.1 percent in South Dakota to 31.4 percent in Georgia.

In this paper we explore various explanations of interstate differences in the magnitude of weekly unemployment insurance claims for the weeks ending March 14 through April 25. Specifically, we focus on three factors. First, we explore the impact of COVID-19. Second, we consider the effects of state economic structures and state orders closing non-essential businesses. Lastly, we examine the impact of the Coronavirus Aid, Relief and Economic Security (CARES) Act legislation. Before moving on, we review recent research related to our research.

There are several recent working papers focusing on some aspect of COVID-19. Rojas et al. (2020) explore the effect of COVID-19

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[1] DOL Press Release February 27, 202 available at: https://oui.doleta.gov/press/2020/022720.pdf and May 14, 2020, available at: https://oui.doleta.gov/press/2020/051420.pdf. Assessed May 25, 2020.

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cases and school closures on state job markets and find that these two factors explain some of the variation across states in unemployment patterns. However, they suggest that the reduction in employment was mainly a nationwide response to COVID-19 cases, and that specific state policies and state-specific COVID-19 cases had a comparatively modest effect. Aum, Yoon (Tim) Lee, and Yongseok (2020) use data for Korea to estimate the effect of COVID-19 cases on local employment, and apply this estimate to the U.S. They suggest that at most half of the job losses in the U.S. can be attributed to lockdowns. Béland, Brodeur, and Wright (2020) examine the effect of COVID-19 and stay-at-home orders on unemployment rates. They find that unemployment effects are smaller for workers who can work remotely and are significantly larger for states that implemented stay-at-home orders. Baek, McCrory, Messer, and Mui (2020), explore the effect of stay-at-home orders on unemployment insurance claims over a three-week period, controlling for other possible explanations. They find that each additional week of stay-at-home orders increased cumulative initial unemployment claims by 1.9 percent of the initial employment level. Goolsbee and Syverson (2020) use cell phone data to determine the degree to which individuals reacted to the presence of the virus in their area or to government stay-at-home orders. Their findings suggest that various government-imposed restrictions on movements accounted for only about 12 percent of the decline in consumer mobility. Their analysis shows that individuals began to limit their travel prior to the shutdown orders and that the degree to which they limited their mobility was tied to the number of COVID-19 cases in their county. Forsythe, Kahn, Lange, and Wiczer (2020) use data from Burning Glass to analyze the effect of the government shutdowns on job vacancy postings. The authors track per-capita changes in employment by week. Their findings indicate a 44 percent drop in job vacancy postings between mid-March and the end of April. This same sharp decline in employment was also documented based on a similar analysis of other data sources such as the Current Employment Statistics, the Current Population Survey, and the unemployment insurance (UI) claims data. The paper also considers the change in the employment situation across states using simple best-fit lines, which appear to be simple trend lines, and concludes that the difference in employment loss across the states was generally not attributable to a state's shut-down orders but was a result of the rise in COVID-19 cases nationally, a drop in demand by consumers, and disruptions in the supply chain.

Our work contributes to this growing body of literature in several aspects. First, unlike some of the previous work, our research utilizes the weekly initial unemployment filings. Béland et al. (2020) use Current Population Survey data, which does not allow for consideration of weekly changes, and may not accurately reflect unemployment in March of this year since under the CARES Act workers who were laid off were not required to search for work to obtain benefits, and thus would not be considered in the labor force. Second, we consider various state orders, including orders closing non-essential business, stay-at-home orders, orders closing bars and restaurants, and orders closing schools. Rojas et al. (2020) consider only school closing orders, which we suggest should not have an effect on employment and is what we find. Baek et al. (2020) consider stay-at-home orders for a very short three-week period, but no other policies. Our results for orders closing non-essential businesses are consistent with their findings. Our findings regarding stay-at-home orders are consistent with Goolsbee and Syverson (2020), but they do not consider a specific state order or policy. Forsythe et al. (2020) consider only stay-at-home orders, and conclude that these orders had little effect on unemployment insurance claims, but their regressions do not appear to include any control variables. In addition, we conduct our analysis for those weeks when only a few states have implemented closing mandates as well the entire period March 14 - April 27. Third, our research provides insight into the effect of industry and employment mix in states on unemployment claims rates. Although some recent papers have considered the effect of the share of the workforce that is able to work at home, other papers have not considered the effect of the industry mix. Lastly, our work considers policies implemented by the CARES Act, and is unique in providing some insight into the impact of the weekly $600 supplement to unemployment insurance benefits on the unemployment rate across the states. To our knowledge, no other study to date focuses on this effect of the CARES Act. Our research considers a larger set of policies and economic factors than existing research and thus we present new findings. We also present results that are contrary to the conclusions of some of the prior research regarding the effects of state policies.

The next section contains a discussion of the changes in the U.S. economic and policy environment that begin in March. Section 3 discusses factors we expect will explain the interstate differences in weekly unemployment claims and the data used to measure the factors. Section 4 presents our finding, while a summary section concludes.

2. The evolving economic and policy environment

On March 1, 2020, there were only 30 confirmed cases of COVID-19 in the U.S. A week later there were 451 confirmed cases, while by March 22, the number had jumped to 33.6 thousand. Over those three weeks, the rate of increase averaged 40 percent per day. In response to the increase in COVID-19 cases states began to declare States of Emergency, the World Health Organization declared a global pandemic on March 11, and President Trump declared a National Emergency on March 13.

Beginning around March 6, colleges and churches began to close, major events were cancelled, and states started closing public schools beginning on March 12. In-restaurant dinning was prohibited beginning March 15; 31 states issued such orders by March 21. State orders to shelter-in-place were implemented later, beginning on March 19, with California being the first. The orders in other states were not imposed until March 23 or later. These orders also closed non-essential businesses, although a few states issued separate orders closing non-essential businesses. In many states, some local governments closed their schools and restaurants and imposed shelter-in-place orders before their state government did.

There was a dramatic and precipitous decrease in economic activity beginning about March 12. Between March 8 and 21, small

business revenue in the U.S. fell 23.6 percent.[2] Likewise, the Weekly Economic Index was positive (1.13) for March 14, but then turned negative (-3.13) for the week of March 21, and fell to -10.38 for the week of April 11.[3]

In early March, with predictions that a major economic collapse was coming, Congress began considering legislation to address the expected fallout. Congress passed the resulting legislation, the CARES Act, which the President signed on March 27. Of particular relevance to our research, the $2 trillion bill provided funding for the Payroll Protection Program (PPP) and significantly modified the UI program.

The PPP provides loans to qualifying small entities.[4] The loan is forgiven if the entity maintains its payroll for a minimum of eight weeks and spends at least 75 percent of the original loan amount on eligible payroll expenses.[5,6] In addition, the CARES Act includes major modifications to the existing UI program. Of particular relevance is that the legislation supplements the weekly benefit paid by the state by $600 for individuals who become unemployed after the Act was signed (March 27) and before July 31, 2020.

3. Description of variables

We construct a data set consisting of state-level variables for the period March 14 - April 27. Our interest is in explaining interstate differences in initial weekly UI claims. Our dependent variable is new weekly UI claims.[7] To control for differences in claims due to the size of state economies, we divide UI claims by UI covered employment in each state for February 2020. We use the same base employment level for all weeks of UI claims data so that the ratio does not depend on changes in employment level. We denote the variable as *UI-new*.

There are several possible factors that might explain the divergence of unemployment insurance claims across the states. These factors include the incidence of COVID-19, state and federal policies, and state economic characteristics.

As the incidence of COVID-19 increased, individuals appear to have changed their consumption patterns and avoided crowded businesses and events, which in turn led to an increase in UI claims. Our principal measure of the incidence of COVID-19 is the number of confirmed cases per capita, although in some regressions we use the number of COVID-19 deaths.[8] We divide both cases and deaths by state population and denote the variables as *COVID-cases* and *COVID-deaths*, respectively. We use the values as of the beginning of the UI reporting week.

Most states adopted policies aimed at controlling the spread of coronavirus. These policies included adopting orders that barred in-restaurant dining, and orders that closed non-essential businesses. The expectation is that these mandates increased UI claims. A variety of sources were used to determine the effective dates of these orders. Dates of the closing of in-restaurant dining were pieced together from several sources, including local newspapers and executive orders. This variable, denoted *Restaurant*, equals zero for the UI reporting weeks the state does not have such a mandate, and one otherwise. We obtain dates of orders closing non-essential businesses from a variety of sources, but principally the Kaiser Family Foundation.[9] We create a dummy variable, *Closed*, that equals zero for the UI reporting weeks that the state has not issued an order closing non-essential businesses, and one otherwise.[10]

We expect that interstate differences in UI claims reflect the dependence of the state's economy on industries that are most immediately impacted by the virus, such as the travel, entertainment, and hospitality industries. Dey and Loewenstein (2020) estimate the percentage of workers in each state directly affected by COVID-19 shutdowns; we use these data, denoted *Exposure*.[11] To account for the impact specific to the dining industry, we create a separate variable. Using BLS's QCEW data, we calculate the share of a state's private sector employment in the food services and drinking establishment industry (NAICS 722) and denote it as *F&D-Exposure*.

The CARES Act increases weekly unemployment insurance benefits by $600, effective March 27. Fredriksson, Peter and Martin

[2] Data are from Opportunity Insight at Harvard University and are available at https://tracktherecovery.org/, and are based on hourly employment mainly at restaurants, food and beverage, retail and service businesses. Accessed July 6, 2020.

[3] The WEI is an index of real economic activity using timely and relevant high-frequency data. It represents the common component of ten different daily and weekly series covering consumer behavior, the labor market, and production. The WEI is scaled to the four-quarter GDP growth rate; for example, if the WEI reads -2 percent and the current level of the WEI persists for an entire quarter, one would expect, on average, GDP that quarter to be 2 percent lower than a year previously. The WEI is available at https://fred.stlouisfed.org/series/WEI. For details see Lewis, Mertens, and Stock, (2020).

[4] Details of the PPP program can be found at: https://www.sbc.senate.gov/public/_cache/files/9/7/97ac840c-28b7-4e49-b872-d30a995d8dae/F2CF1DD78E6D6C8C8C3BF58C6D1DDB2B.small-business-owner-s-guide-to-the-cares-act-final-.pdf.

[5] The 75 percent requirement was reduced to 60 percent and the eight weeks was extended to 24 weeks for periods after our study period.

[6] Granja, Makridis, Yannelis, and Zwick, (2020) explore the effective targeting of the PPP.

[7] https://oui.doleta.gov/unemploy/claims.asp.

[8] Data on the number of confirmed COVID-19 cases and deaths by day and state were obtained from Johns Hopkins University (https://coronavirus.jhu.edu/map.html).

[9] https://www.kff.org/coronavirus-policy-watch/stay-at-home-orders-to-fight-COVID-19/.

[10] Orders to shelter-in-place are highly correlated with orders closing non-essential businesses, so we use the later. We ignore orders closing schools since they are not expected to have a direct effect on the state's economy.

[11] The work by Dey and Loewenstein (2020) builds on the work of Vavra (2020). The following industries are included in the measure: Footnote: NAICS Classification: Restaurants and bars: 7223−7225. Travel and Transportation: 4811,4812, 4853, 4854, 4859, 4881,4883, 7211. Personal Services: 6212, 8121,8129. Entertainment: 7111, 7112, 7115, 7131, 7132, 7139. Other sensitive retail: 4411, 4412, 4421, 4422, 4481, 4482, 4483, 4511,4512, 4522, 4531, 4532, 4539, 5322, 5323, 4243, 4413, 4543. Sensitive Manufacturing: 3352, 3361, 3362, 3363, 3364, 3366, 3371, 3372, 3379, 3399, 4231, 4232, 4239, 3132, 3141, 3149, 3152.

Soderstrom (2008), using individual-level data from Sweden find that regional differences in the generosity of unemployment benefits leads to differences in unemployment rates. To measure the effect of the increase in UI benefits we calculate, using Current Population Survey data, the share of employees in each state earning less than the maximum unemployment insurance benefit, doing so pre- and post-CARES Act. This variable is denoted *Earn-UI*. We expect that the larger the share of workers earning less than the maximum weekly UI benefit, the larger the share of covered workers claiming UI benefits.

The PPP program provides loans which are forgiven if the firm retains its employees. Thus, we expect that interstate variations in PPP loans will affect the number of UI claims. The amount of such loans for each state in the first round of the program was obtained from the Small Business Administration.[12] We divide these by state employment, and denote the variable as *PPP-Amt*.

There is supporting evidence that interstate differences in the ability of workers to work remotely effects the magnitude of the decline in employment (Papanikolaou & Schmidt, 2020). Brynjolfsson et al. (2020) find that states with a higher share of employment in management, professional, and related occupations were more likely to shift toward working from home. We use the BLS's Occupational Statistical Data for May 2018 to calculate the share of employment in management, professional, and related occupations, denoted as *MPR-emp*.[13]

We also expect that self-employed workers have a greater likelihood of working from home, and, using American Community Survey data, calculate the share of the state's labor force who are self-employed, denoted *Self-emp*. However, the CARES Act expanded UI benefits to include self-employed and gig workers. Thus, it is possible that *Self-emp* could be positively or negatively associated with UI claims.

We consider three control variables. It is possible that administrative characteristics of state UI offices may have influenced the reported level of UI claims. There were numerous stories in the press regarding the difficulties that laid off workers experienced in applying for benefits in some states. To account for the effect of administrative processes, we use the number of state unemployment office staff for May 2019 (the most recent data available), divided by state employment (in thousands) as of February 2020.[14] We denote the variables as *Staff-tot*.

The effects of COVID-19 and the various policies could depend on the size of the state's economy. In particular, we expect states with larger employment, denoted *Emp*, and denser populations, denoted *Density,* to have larger UI claims per insured worker.

4. Results

We make use of the variation in the timing of policy adoption to measure the effects of the various factors on UI claims. Specifically, no state had issued orders closing non-essential businesses by March 14, 6 states issued such an order in the following week, and 23 additional states issued such orders in the week ending March 28. This was prior to the passage of the CARES Act. We make use of these weeks to explore the effect of the presence of the virus and state orders closing non-essential businesses on UI claims. We estimate regressions using just certain weeks as well as the panel data for our entire period.

4.1. Weeks of March 14 and March 21- impact of the virus on UI claims

We first explore the extent to which COVID-19 resulted in increases in new weekly UI claims by exploiting the variation in COVID-19 cases across states. We take advantage of the fact that no state had issued orders closing non-essential business or prohibited in-restaurant service prior to March 14 and few had done so by March 21.[15] Therefore, by confining our initial analysis to these weeks we are able to more cleanly test the impact of the virus on unemployment claims without concern for the effect of closing orders.

As suggested above, we expect that interstate differences in UI claims are positively related to the incidence of COVID-19. While the largest increase in new UI claims was for the week ending March 21, when claims increased by 1062.0 percent over the previous week, there was a sizable increase in the prior week. For the week ending March 14, there was a 26.3 percent increase in initial UI claims, which contrasts with a decrease of 7.8 percent for the week ending March 7. We estimate OLS regressions for which new weekly UI claims per covered worker, *UI-new*, is regressed against COVID-19 cases per capita, *COVID-cases*, as of the beginning of that week.

For the week ending March 14 the coefficient on *COVID-cases* is positive and statistically significant (column 1 of Table 1). At their mean values, the coefficient on *COVID-cases* implies that a 10 percent increase in a state's COVID cases per capita in that week would result in an increase in new UI claims per worker of 2.2 percent. The result is robust and holds for several variations. First, we drop the 24 states with no COVID-19 cases as of March 7, i.e., the beginning of the week ending March 14; the result is essentially unchanged. Next, we add the lagged value of *UI-new*, which controls for historic state-level factors that might explain new UI claims in the absence of COVID-19; the coefficient on *COVID-cases* is smaller (131.05) but still positive and statistically significant. We substitute the number of days from the first COVID-19 case in the state; the coefficient on that variable is positive and statistically significant. We also use the change in *UI-new* from the previous week as the dependent variable; the coefficient on *COVID-cases* is positive and statistically

[12] https://home.treasury.gov/system/files/136/SBA%20PPP%20Loan%20Report%20Deck.pdf

[13] Brynjolfsson et al. (2020) use Krantz-Kent's (2019) definition of management, professional, and related occupations, as do we. Dingel and Neiman (2020) generate an alternative measure of the ability to work at home; their measure is similar to Krantz-Kent's. The two measures have a correlation of 0.78.

[14] https://oui.doleta.gov/unemploy/content/futa/fy2020att1.pdf.

[15] California issued its closing order effective March 19, and thus, there were only two days to file claims before the end of week March 21. Orders were effective March 21 for Illinois and New Jersey, March 17 for Nevada, and March 16 for Minnesota and Nebraska.

Table 1
Estimates for New UI Claims.

Dependent variable: *UI-new*					
	Week Ending March 14		Week Ending March 21		Weeks Ending April 18 & 25
Variables	[1]	[2]	[3]	[4]	[5]
COVID-cases	216.396***	122.235***	280.058	184.744	0.272
	(56.321)	(42.698)	(180.045)	(189.388)	(0.671)
Exposure		0.0001***		0.0016*	0.001**
		(0.00003)		(0.0008)	(0.0004)
Earn-UI		0.003***		0.063**	−0.018
		(0.0009)		(0.027)	(0.021)
MPR-emp		0.002		−0.026	−0.066
		(0.003)		(0.089)	(0.048)
Constant	0.001***	−0.004***	0.020***	−0.026	0.035
	(0.0001)	(0.001)	(0.003)	(0.036)	(0.026)
Control Variables Variables		YES		YES	YES
R^2	0.232	0.686	0.047	0.240	0.135
N	51	51	51	51	102

***significant at the 0.01 level; **significant at the 0.05 level; *significant at the 0.10 level. Control variables are: *Staff-tot*, *Emp*, and *Density*. Standard errors in parentheses.

significant.

Beyond the incidence of COVID-19, the discussion in the prior section suggests that new UI claims are also associated with orders closing businesses (although no state had issued such an order before March 14), the importance of those industries negatively affected by COVID-19 in the state, the share of employees earning less than the weekly UI benefits, and the ability to work from home. Column 2 of Table 1 contains the results when we include these factors plus three control variables: *Staff-tot*, *Density*, and *Emp*. The coefficient on *COVID-cases* remains positive and statistically significant but is much smaller than in column 1. The coefficient on *Exposure,* our measure of industries most affected by the pandemic, is positive and statistically significant. Given the mean values of the variables, the coefficient on *Exposure* implies that a 10 percent increase in *Exposure* in given state would lead to a 12.5 percent increase in new UI claims.

Earn-UI reflects the effect of interstate differences in the fraction of workers who earn less than the state's weekly UI benefits. The coefficient on *Earn-UI* is positive, as expected, and statistically significant.[16] The coefficient on *MPR-emp* is positive but not statistically significant.[17] We substitute *F&D-Exposure* for *Exposure* to explore whether the more narrowly defined industry better captures the industries affected by COVID-19. The coefficient on *F&D-Exposure* is positive but not statistically significant, suggesting that even in the early COVID-19 pandemic, more industries than food and drink were affected.

Overall, these results suggest that the presence of COVID-19 in the state led to an increase in new UI claims prior to any state government issued orders closing businesses. This is consistent with information showing a slowing economy prior to the shut down and with data showing an increase in the share of individuals staying at home during this week.[18]

We estimate equivalent regressions using new UI claims for the week ending March 21 (columns 3 and 4 Table 1). In column 3, the coefficient on COVID-19 is positive, somewhat larger than in column 1, but not statistically significant at conventional levels (p-values = 0.126). This result holds if we drop the 2 states with no COVID-19 cases at the beginning of week ending March 21, drop Washington (which is an outlier with the highest value of *COVID-cases*), include the lagged value of *UI-new*, use *COVID-deaths* rather than cases, use days from the first reported COVID-19 case rather than *COVID-cases*, or use the change or percent change in *UI-claims* instead of the level of new UI claims.

Including additional variables in the regression (column 4) results in coefficients that are larger than in column 2, and with larger standard errors. Given that UI claims are larger for March 21 than for March 14, the larger coefficients are not unexpected. The coefficient on *Exposure* implies that a 10 percent increase in employment in a state's exposed industries leads to a 14.5 percent increase in new UI claims, which is similar to what we find for column 2. As with the results in column 3, the results in column 4 are robust to the same alternatives.

By March 21 six states had issued orders closing non-essential business, but three of those orders took effect late in the week ending March 21. We re-estimate the regression in columns 3 and 4 excluding those states. In column 3, the coefficient on *COVID-cases* becomes marginally statistically significant, but there are no substantive changes in the results in column 4.

[16] UI claims filed the week ending March 14 were filed before the Federal government passed the CARES Act that added $600 to the UI weekly benefits. Thus, *Earn-UI* is the share of employees earning less than the pre-CARES weekly UI benefits.

[17] We also consider an alternative measure of the ability to work from home, *Self-emp*. The coefficient is statistically insignificant and does not materially change the coefficients on the other variables.

[18] For instance, mobility data provided by the University of Maryland Social Distancing Index show that 21 percent of the population stayed home on March 7. By March 14 that share had grown to 25 percent and 34 percent by March 21. Maryland Transportation Institute (2020). University of Maryland COVID-19 Impact Analysis Platform, https://data.covid.umd.edu, accessed on July 6,2020, University of Maryland, College Park, USA.

By March 21, 31 states had issued orders closing restaurants for in-restaurant dining. To measure the effect of these orders we first substitute *F&D-Exposure* for *Exposure*. The coefficient on *F&D-Exposure* is unexpectedly negative but is not statistically significant. We next add *Restaurant* (the dummy variable reflecting orders prohibiting in-restaurant dining) to the variables in column 4. The coefficient on *Restaurant* is positive and statistically significant, while the coefficient on *Exposure* remains positive and statistically significant.

The results in Table 1 suggest that UI claims responded to COVID-19 when the virus was not widespread, but as the number of COVID-19 cases increased, the marginal effect became smaller. These results suggest that the presence of COVID-19 led customers to change spending patterns, resulting in substantial decreases in travel, entertainment, in-store shopping, personal services, etc. Thus, states with industries that were likely to be affected by such behavior had larger new UI claims for the week ending March 21. States with larger share of workers earning less than UI benefits had larger numbers of UI claims, but the ability to work from home did not seem to affect the size of new UI claims for these first two weeks.

The mechanism by which COVID-19 affected spending patterns, and thus UI claims, is unclear *apriori*. It could be that the effect is due simply to the presence of COVID-19 in the U.S. and that its presence in a particular state is irrelevant. The results in columns 1 and 2 of Table 1 do not support this hypothesis. Even states with no COVID-19 cases had an increase in UI claims per covered worker for the week of March 21, which, on average, was 41 percent of the increase in states with COVID-19 cases. We create a dummy variable equal to one if the state had COVID-19 cases and zero otherwise and replaced *COVID-cases* with this dummy in regressions reported columns 1 and 3. The coefficients are statistically insignificant, and the regression R^2's are much smaller, implying that it was not just the presence of COVID-19 that led to UI claims.

By April 7, all states that adopted orders closing non-essential businesses had done so. Thus, as a robustness check we estimate the two regressions reported in columns 1 and 2 in Table 1 using data for the two weeks April 18 and April 25. The coefficients on *COVID-cases* in both regressions are positive but much smaller in value and with large p-values, 0.97 and 0.69 (results for the regression equivalent to column 1 are not tabled). These coefficients are consistent with the marginal effect of COVID-*cases* becoming smaller, perhaps zero, as *COVID-cases* increase. Column 5 presents the regression that include other variables and controls. Only the coefficient on *Exposure* is statistically significant. Since states had issued orders closing non-essential businesses, we include *Closed* (a dummy equal to one if such an order had been issued); this does not materially change the regression.

4.2. Week of March 28 – impact of closing orders on UI claims

To determine the impact of closing orders on UI claims in a state, we first estimate a regression using new UI claims for the week ending March 28 (column 1, Table 2), including the 6 states that adopted closing orders prior to March 21. The two principal variables are *Exposure* and *Closed*.[19] The coefficients on *Exposure* and *Closed* are both positive and statistically significant. The coefficient on *COVID-cases* is positive, but smaller than in columns 1–4 in Table 1 and not statistically significant. The results are essentially unchanged if we exclude the 6 states that adopted a closing order the week prior to the week ending March 21or include the lagged value of new UI claims per insured worker. The results are largely unaffected by the inclusion of control variables (not reported).

Next, we estimate regressions using data for the three weeks, March 14, March 21, and March 28 (columns 2, Table 2). The coefficient on *Closed* is positive and statistically significant, as is the coefficient on *Exposure*. As with column 1, the implication is that state ordered closings of non-essential businesses resulted in increases in UI claims. Using the average number of new UI claims for March 28, the coefficient on *Closed* implies that such orders account for a third of the increased UI claims. The results are essentially unchanged if we exclude the 6 states that adopted closing orders prior to week ending March 21.

In addition to mandating stay-at-home orders, closing bars and restaurants, and closing non-essential businesses, states also closed schools. While we are unable to tell a story that links mandating school closing to increases in unemployment insurance claims, we nonetheless explore the potential effects of school closing orders. To do that we substitute a dummy variable, *School*, equal to one if the state had mandated school closing for *Closed* in the regressions reported in Table 2. While the coefficients on *School* are positive, the p-values are 0.829 and 0.591 for the regressions similar to those in columns 1 and 2, respectively. We also include *School* in the two equations; the resulting p-values for coefficients on *School* are equivalent, while the coefficients on *Closed* remain statistically significant at better than the one percent level. School closing orders were imposed earlier than the orders closing non-essential businesses, so that in the week of March 14th 23 states had imposed school closing orders. We thus estimate a regression equivalent to that in column 1 of Table 2 but for the week of March 14 using *School*. Again, the coefficient is positive, but the p-value is 0.707. Thus, as we expected, we find no evidence that school closings are statistically significantly related to unemployment insurance claims.

4.3. Full period analysis

We now make use of the panel nature of the data using weekly new UI claims data for the entire period, i.e., the week ending March 14 through the week ending April 25. Results are in Table 3, where column 2 are the results for regressions that include control variables (regressions include week fixed effects). The coefficient on *COVID-cases* is positive but not statistically significant, which is consistent with the expectation that COVID-19 had a marginal effect on UI claims when the number of cases was small. The *Exposure* and *Closed* coefficients are positive and statistically significant, implying again that orders closing businesses affected the number of UI

[19] Given a concern that *Closed* is a proxy for *COVID-19 cases*, we estimate a Cox proportional hazard model and find that the adoption of closing orders is not a function of *COVID-cases*.

Table 2
Estimates for New UI Claims for Weeks Ending March 14, March 21, and March 28.

Dependent variable: *UI-new*		
Variables	[1]	[2]
COVID-cases	40.875	47.810
	(43.434)	(37.127)
Exposure	0.002**	0.001***
	(0.0006)	(0.0003)
Closed	0.013***	0.011***
	(0.004)	(0.003)
Earn-UI	−0.0008	0.021**
	(0.020)	(0.010)
MPR-emp	0.072	0.026
	(0.041)	(0.021)
Constant	−0.003	−0.036
	(0.023)	(0.013)
R^2	0.405	0.702
N	51	153

***significant at the 0.01 level; **significant at the 0.05 level.
Standard errors in parentheses. [1] uses observations for week ending March 28 only. [2] uses observations for three weeks: March 14, March 21, and March 28, and includes week fixed effects.

Table 3
Estimates for Weekly New UI Claims; Weeks Ending March 21 Through April 25.

Dependent variable: *UI-new*		
Variables	[1]	[2]
COVID-cases	0.127	0.146
	(0.534)	(0.556)
Exposure	0.001**	0.002***
	(0.0003)	(0.0004)
Closed	0.009***	0.009***
	(0.002)	(0.002)
Earn-UI	0.039**	0.045**
	(0.017)	(0.018)
MPR-emp	0.028	−0.021
	(0.024)	(0.041)
PPP-amt	−1.02e-06	−5.10e-07
	(2.13e-06)	(2.19e-06)
Control Variables		X
N	306	306

***significant at the 0.01 level; **significant at the 0.05 level.
Robust standard errors in parentheses. Regressions include week fixed effects. Controls variables are: *Staff-tot*, *Emp*, and *Density*.

claims, as did the share of employment most likely impacted by the consumer response to COVID-19.

Earn-UI is positive, as expected, and statistically significant. We also interact *Earn-UI* with a dummy variable equal to one for weeks after the passage of the CARES Act. The coefficient is negative but statistically insignificant, implying that the marginal effect of *Earn-UI* did not change with the increase in UI benefits due to the CARES Act. In fact, the coefficient on *Earn-UI* was unchanged when we include the interaction term. The coefficient on *PPP-amt*, while positive, is not statistically significant, suggesting the PPP did not affect UI claims.

We estimate several alternatives. Substituting *Self-emp* for *MPR-emp* yields a negative and statistically significant coefficient. We also estimate a regression that includes a trend variable; the coefficient is negative and statistically significant, capturing the fact that the number of new weekly UI claims falls over time. We add the interaction of *Exposure* and *Closed* to the regression; the coefficient is positive and statistically significant, suggesting that the effect of *Closed* depends on the magnitude of the state's economy likely to be affected by closing orders. We substitute *F&D-Exposure* and the interaction of *F&D-Exposure* and *Restaurant* for *Exposure* and the interaction of *Exposure* and *Closed*. Neither coefficient is statistically significant, suggesting that UI claims are driven by the closure of more than just food and drink establishments.

5. Summary and conclusions

In this paper, we focus on the determinants of the interstate difference in unemployment insurance claims over the initial period of the pandemic, i.e., the week ending March 14 through the week ending April 25. In particular, we attempt to measure the effects of

COVID-19 cases, state policies enacted in response to COVID-19, relevant provisions of Federal CARES legislation, and the makeup of the state economy on UI claims. By taking advantage of the variation across states in the timing of the implementation of orders closing non-essential businesses and in industry mix, we identify the impact of these different factors on state unemployment insurance claims.

We find that during the initial week of the pandemic (the week ending March 14), unemployment claims appear to be driven by consumer reactions to the coronavirus. That is, we find that consumers adjusted their behavior prior to the government shutdown orders. On the other hand, we find the marginal effect of COVID-19 cases diminishing during the subsequent weeks, perhaps becoming zero at the margin. Thus, in the following weeks UI claims are largely driven by the shutdown orders and the nature of the state's economy, and not by the presence of the virus.

During the week ending March 14 and 21, we find that states with greater employment in industries most affected by the virus and with a larger share of workers making less than the weekly unemployment benefit amount saw higher new UI claims. These results continue as we focus on the following week ending March 28. As of this week, 29 states had issued shutdown orders closing nonessential businesses. For this week, we find that those states closing nonessential businesses experienced a larger number of UI claims per covered worker. Contrary to some recent research though, we find that the share of workers able to work at home does not mitigate the increase in new UI claims.

Lastly, we examine the initial unemployment claims over the full March 14 through April 25 period. The results support our previous findings that UI claims were affected by both the nature of the state's economy and issuance of state closing orders. We find no evidence that the PPP program affected UI claims. However, we find mixed evidence that *Earn-UI* affects the number of initial UI claims.

Declaration of Competing Interest

The authors report no declarations of interest.

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