Is This Time Different?
The Safety Net Response to the Pandemic Recession*

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Abstract

We examine the responsiveness of the safety net to the Pandemic Recession and compare it to that in the Great Recession. Using monthly state-level administrative caseload data from five large transfer programs–SNAP, TANF, Medicaid, SSI, and UI–and measuring responsiveness by the state-level caseload response to cross-state variation in measures of the business cycle–we find that the safety net response during the Pandemic Recession was greater than occurred during the Great Recession for the most important recessionary-relief programs–UI and SNAP. But we find that the two smaller programs, TANF and SSI, were less responsive during the Pandemic, and we find that Medicaid caseloads are generally unresponsive to the business cycle. We also consider the effect of Pandemic state-level policies, such as school and business closures, on caseloads, finding that states with stricter government Pandemic policies had greater caseload increases.

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Between February and April 2020, the Covid-19 Pandemic induced a large economic shock sending 17.4 million US workers into unemployment while millions more experienced income loss, sickness, and panic. The unemployment rate skyrocketed to 14.7 percent within two months and the employment-population ratio fell from 61.2 to 51.3 percent over the same two-month period. It took a year for the unemployment rate to return to 6 percent and the employment-population ratio had only recovered to 57.9 percent by that time. The Pandemic Recession represents the deepest downturn in the U.S. economy since the Great Depression but also the fastest labor-market recovery in modern business cycle history. The federal government responded to the downturn by enacting legislation in March 2020, December 2020, and March 2021 providing a massive $5 trillion increase in spending, with a significant fraction of this going toward traditional safety net programs.

In this paper we address the question of whether the safety net responded differently to changing labor-market conditions in the Covid Pandemic compared to the Great Recession, a question which has not been addressed in the existing literature. The Great Recession was the most severe downturn prior to the Pandemic since the Great Depression but the nature of the economic downturn was different in the Great and Pandemic recessions, and the governmental response was also different. The caseload responses in the two recessions, which are our subject, may differ for several reasons. They may differ because eligibility rules in some of the programs have changed over time, as we review in the first section of the paper. In addition, at least in the two recessionary periods, the Congressional response greatly differed, as we will describe. The timing of recession onset was different, with the onset of the Great Recession being much more gradual than the sudden and dramatic downturn at the beginning of the Pandemic Recession. Lagged responsiveness of safety net caseloads may generate differences in response. The especially large Pandemic UI expansions and SNAP policy changes may have altered take-up decisions of other programs during the Pandemic. And the Pandemic lockdown and school-closing policies could have had indirect effects on caseloads which were not present in prior periods. We consider all these hypotheses for explaining differential safety net responsiveness in the two recessions.

We use monthly, state-level administrative data from January 1999 through March 2022 to estimate the magnitude of the caseload response to state-specific downturns in employment (or labor-force participation) and increases in unemployment. We focus only on caseloads rather than expenditures because monthly, state-level expenditures are not available for most safety net programs. We examine five specific programs that should be expected to respond to the Covid labor-market downturn and compare that responsiveness to that in the Great Recession: Unemployment Insurance (UI), Supplemental Nutrition Assistance Program (SNAP), Temporary Assistance for Needy Families (TANF), Medicaid, and applications to Supplemental Security Income (SSI). While UI is the primary program designed for labor-market downturns, the other four programs are also intended to support those with low incomes, and we compare their responsiveness to that of UI. Our econometric model relates changes in caseloads of the programs at the state level to contemporaneous and lagged state-level measures of economic conditions, while controlling for observed and unobserved state-level heterogeneity and flexible time effects. We alternatively measure the business cycle using employment per capita, the unemployment rate, and the labor force participation rate, and because the Great Recession and the Pandemic Recession had different levels and patterns of economic conditions, a key test of our model is whether caseload responsiveness per unit of economic conditions (current and lagged) differed across the two.

Our results suggest that this time was indeed different for the largest and most important programs designed for recessionary relief, the UI and SNAP programs. The UI caseload response was at least 50 percent larger during Covid than during the Great Recession, and the SNAP response was almost double that of the Great Recession (all measured as the percent caseload increase per percent downturn in the labor market). However, both TANF and SSI were substantively more cyclical during the Great Recession. The former likely stems from the direct action of Congress to expand TANF funding during the Great Recession, which was not extended during the Pandemic, while the smaller SSI response in Covid-19 is possibly linked to policy decisions to effectively shutter local office operations for several months after the start of the Pandemic. And we find that the Medicaid program is essentially unresponsive to the business cycle, for reasons we ascribe to policy decisions regarding that program. These patterns hold whether we measure the business cycle using employment per capita, the unemployment rate, or the labor force participation rate, as well as for alternative dating of the Great Recession. We also consider the role of Pandemic state-level policies, such as school and business closures, on caseloads, finding that states with stricter government Pandemic policies had greater caseload increases but that this does not explain the greater caseload responsiveness during the Pandemic.

While there have been no comparisons of the responsiveness of the safety net in the Pandemic Recession (PR) and the Great Recession (GR), there is a rich and important literature on the safety net responsiveness to each alone, which sometimes makes additional comparisons to earlier periods. While Moffitt (2013) just showed the large increase in safety net spending in the GR, Anderson et al. (2015), Ziliak (2015), Bitler and Hoynes (2016), and Ganong and Liebman (2018) all found the GR to have significant safety net responsiveness to the economic downturn. Anderson et al. (2015) found that TANF did not respond more in the GR than in non-GR years but UI, SNAP and the EITC responded more, while Ziliak (2015) showed that 50 percent of the SNAP caseload increase in the GR was a result of economic conditions, Bitler and Hoynes (2016) found that the TANF program was less responsive in the GR than in earlier periods but SNAP and UI were more responsive, and Ganong and Liebman (2018) found that two-thirds of the increase in SNAP caseloads in the GR was a result of the economic downturn. The safety net responsiveness in the PR has been examined in a number of papers (Bitler et al. (2020b); Ganong et al. (2020); Moffitt and Ziliak (2020); Rees-Jones et al. (2020); Hembre (2023); Ruffini and Wozniak (2021); Larrimore et al. (2022); Bitler et al. (2023); Larrimore et al. (2023)), many just discussing the nature of the government stimulus programs in the Pandemic but some estimating the large responsiveness of the safety net to the downturn. And there is a more general literature over longer periods estimating safety net responsiveness to recessions prior to the PR in general and sometimes comparing the responsiveness in different recessions (Ziliak et al. (2000); Ziliak et al. (2003); Bitler and Hoynes (2010); Bitler et al. (2017); Bitler et al. (2020a), Hershbein and Stuart (2022)). This work repeatedly confirms the strong safety net responsiveness in recessions, sometimes for single programs like SNAP and sometimes in terms of the effect of the safety in dampening increases in child poverty (Bitler et al. (2017)), and in one case emphasizing the greater responsiveness of social insurance programs than means-tested programs (Bitler et al. (2020a)).

Relative to this literature, our paper makes several contributions to the work on welfare caseload responses to recessions. The most important is the afore-mentioned direct comparison of the Covid Pandemic to the Great Recession. A second is that we examine programs not often examined in this literature, such as Medicaid and SSI, and we have new findings on Medicaid during the Pandemic.[1] And many papers only examine one program as well (most often SNAP). A third contribution is that our econometric model allows lags in the responsiveness of the safety net to the business cycle, an important feature of the Pandemic given the rapid monthly changes in the labor market to which programs could only respond to with a lag.[2] A fourth contribution is that our model tests for interactions between caseload expansions of different programs; that is, whether effects of one program's response to the business cycle affect other programs' responsiveness. This can occur, among other reasons, if participating in one program lowers the administrative hassles and burdens in program application and recertification for another program (Herd and Moynihan, 2019). An additional contribution to the PR literature specifically is that we examine whether state-specific Covid shutdown policies affect safety net responsiveness (we find that they do, as noted above).

In the next section below, we describe in a fair amount of detail and length how safety net programs have changed since 2000 as well as outline the Congressional response in the two recessions. Our equation does not represent government policies directly (except for Pandemic closure policies) but it is important to know those policy differences to be able to interpret the reasons for the estimated differences in responsiveness in the two recessions, and we interpret our findings as resulting from the policy differences we document. We then provide a summary of our econometric model, detail our data, provide a descriptive analysis, and then present the main results we obtain from it. We conclude with a brief summary.

[1] But Bitler et al. (2020a) examined SSI caseloads but not applications, as we study, and Hershbein and Stuart (2022) examined Medicaid.

[2] While several papers in the early welfare caseload literature allowed for lagged responsiveness, e.g. Ziliak et al. (2000) and Klerman and Haider (2004), Hershbein and Stuart (2022) is the only paper in the recent literature we are aware of to add this flexibility in response timing, but only for earlier recessions and not for the Covid and Great Recessions periods as we do here.

II A Brief History of the Safety Net since 2000

Because our study is an examination of how the responsiveness of the safety net to business cycles has changed over time, we devote this section to a review the history of safety net programs since 2000. We focus on the programs whose caseloads we study in our paper–regular and total UI (total UI includes Congressional add-ons to the program during recessions), SNAP, TANF, Medicaid, and SSI. Based on our review, we also state our priors for whether each program should be expected to have become more or less responsive over time and whether greater in the Pandemic than the Great Recession, and we later compare our results to these priors. For more complete overviews, see the surveys in Moffitt (2016) and Moffitt and Ziliak (2019).

UI

The UI program is a state-level contributory social insurance program for individuals who are involuntarily unemployed. Eligibility requires certain minimums for weeks worked and/or earnings levels in the quarters preceding the occurrence of unemployment. Benefits are a fraction of covered earnings prior to unemployment and individuals are eligible for only a maximum number of weeks. The exact eligibility requirements and benefit provisions vary by state. While there was very little trend in these provisions from 2000-2010, since 2010 a number of states have tightened eligibility requirements and have reduced the maximum number of eligible weeks, ostensibly to reduce the trust fund debt incurred during the Great Recession. There has also been a long-run trend toward reduced recipiency of UI benefits among the unemployed, with the pre-Pandemic recipiency rate of about 28 percent. All these factors could generate a long-run reduced responsiveness of UI caseloads to the business cycle.

Extra weeks of benefits are provided during times of high unemployment. First, the Extended Benefit (EB) program provides additional weeks of benefits automatically if the unemployment rate in a state rises above certain levels. However, at least in non-recessionary periods, the EB benefits are rarely triggered (Burtless and Gordon (2011)). Second, Congress passed legislation providing for additional UI support both during the Great Recession and the Pandemic Recession. During the Great Recession, the support was primarily in the form of additional weeks of benefits funded by the federal government. At its peak, almost 99 weeks of benefits were permitted. In the Pandemic Recession, a smaller number of extra weeks of benefits were enacted by Congress, but it also added an additional $600 per week to all UI receipts for several months after March 2020 as well as extending coverage to the self-employed, independent contractors, and part-time workers, ordinarily not covered by typical state UI programs or during federally funded expansions in recessions. These provisions were phased out during the course of the Pandemic, but additional UI support was provided through September 2021. Overall, we expect the UI response to be greater in the Pandemic Recession than in the Great Recession because of the unprecedented eligibility and benefit-level expansions.

SNAP

The SNAP program is federally funded but is administered by the states. The federal government sets benefit levels and income and asset eligibility rules; however, the feature of the program which distinguishes SNAP from all others we consider is its near-universal demographic eligibility, for it covers all individuals with sufficiently low economic resources, whether aged or non-aged, childless or with children, and married or nonmarried. This should make it particularly cyclically sensitive compared to the other programs we consider. Over time, the major change in the program rules has arisen from federal regulatory changes and legislation in the late 1990s and early 2000s which allowed states to alter a variety of eligibility and income reporting rules in the program at their discretion, with most of them resulting in increased eligibility. One of the most important changes has been in asset tests. Asset tests typically reduce cyclical sensitivity, but states have gradually reduced the stringency of those tests over the last two decades, with many if not all states relaxing their limits, especially on vehicles. While several states started that relaxation in the early 2000s, many more did so during the Great Recession with some doing away with them altogether. Most states did not return to their prior levels after the Recession was over, at least not completely. These relaxations of asset limits should be expected to increase the responsiveness of SNAP caseloads to business cycle movements over time.

During the Great Recession, Congress temporarily increased SNAP maximum benefits by an average of 13.6 percent. SNAP changes to benefits during the Pandemic Recession were quite different. Initially, Congress allowed states to issue emergency allotments which provided all eligible recipients the maximum benefit amount.[3] This policy increased the average per-person SNAP benefit by 48 percent between February and May 2020, but it did nothing to help the nearly 40 percent lowest-income SNAP recipients already receiving the maximum amount. The December 2020 Bill temporarily increased SNAP benefits for all recipients by 15 percent and a permanent increase in benefits that averaged 21 percent was effectuated by the Administration, taking effect in October 2021. Lastly, to aid the lowest income families, legislation in January 2021 provided an additional $95 emergency allotment to SNAP families that were previously qualified for the maximum benefit amount, equating to a 21 percent benefit increase for a family of two. Other policy changes were those extending eligibility to college students during the Pandemic, suspending rules affecting able-bodied adults without dependents in both periods, and adjustments in re-certification and interview policies. On this basis, we would expect SNAP responsiveness to be larger in the Great Recession than in the Pandemic Recession, at least for most of 2020, but as our sample period extends into 2022 and more expansive policies were enacted for SNAP in 2021 thus making a clear prediction more circumspect.

TANF

The TANF program is a state-administered cash and in-kind welfare program for families with children, financed by a block grant from the federal government and supplemental funds from state and local governmental and non-governmental sources. Eligibility for the cash assistance portion of TANF is restricted to low-income families, though some states have generous income-eligibility criteria for non-cash assistance. It is a small program in terms of expenditures relative to the others we consider and has work requirements and time limits for the cash-assistance portion of the caseload which vary from state to state (although work requirements have been greatly reduced because of so-called caseload reduction credits). It has a reputation for being unresponsive to the business cycle because the block grant does not vary with the unemployment rate and, in fact, the block grant has been held fixed in nominal terms since 1996, as well as because of work requirements in the program. However, Congress added $5 billion in temporary supplemental funds to the states during the Great Recession that amounted to nearly one-third the size of the annual block grant. The Congressional response was more

[3] States were allowed to extend these allotments by request after the initial period and most did so.

muted during the Pandemic Recession, offering only $1 billion with substantial restrictions on uses later in the Pandemic as part of the American Rescue Plan Act in March 2021. But most states quickly changed a number of policies after the Pandemic started, including suspending some types of job search requirements or sanctions for noncompliance, modifying and extending time limits policies, and others (Shantz et al., 2023). Provided that potential recipients respond more to the availability of funds rather than complicated eligibility rules, we would expect the TANF caseload to respond more during the Great Recession compared to the Covid-19 Recession.

Medicaid

The Medicaid program is the nation's program for providing subsidized medical care to a variety of low-resource recipients, including low-income disabled adults, low income seniors for Medicare supplements, nursing home care, and, for our purposes, families and individuals without private health insurance who are low income. It is financed by a federal-state matching grant but, while the federal government provides minimal standards for the care and eligibility for all types of groups, states have great leeway in setting both and hence the program generosity varies widely across states. Its main role in the business cycle is to provide health insurance to workers who have lost their jobs.

Since 2000, there have been three notable changes during non-recessionary periods which could affect its cyclical responsiveness. First, a number of pieces of federal legislation in the 1980s and 1990s required states to increase eligibility for children and at higher income levels, and these phase-ins were still being completed in the 2000s. States were also allowed to cover more adult caretakers and not just children. Second, the program had asset tests prior to the 2010 Affordable Care Act (ACA) which could have reduced its cyclical sensitivity, and application procedures that required documentation of assets are fairly onerous. But most asset tests disappeared after the ACA. Third, the ACA also expanded eligibility starting in 2014, both to higher income families and to additional types of families–most notably nondisabled, childless low-income adults–although some options were at the discretion of the states and some states opted not to adopt them. All of these changes over time should be expected to increase cyclical sensitivity.

Congress provided additional emergency aid during the Great Recession as well as increasing the federal matching rate for Medicaid. It also provided subsidies to laid-off workers to purchase private health insurance, which could have reduced the demand for Medicaid. During the Pandemic Recession, March 2020 legislation required states to not terminate from the rolls any current recipients and increased the matching rate to accommodate the increased expenditures (Dague and Ukert, 2023). This had a major impact on increasing caseloads beyond what would normally be expected in a recession. While, in a sense this implies that Medicaid responsiveness might have been greater in the Pandemic, we predict the opposite because the caseload was allowed to increase regardless of the state of the business cycle. We therefore expect Medicaid to have been less cyclically sensitive in the Pandemic Recession than in the Great Recession.

SSI

Finally, the SSI program for the non-aged is aimed at individuals with disabilities who also have low income. While disability itself should not be expected to be particularly cyclically sensitive, applications in some disability programs have been found to be sensitive because many individuals with disabilities work and some fraction of those are eligible for disability programs if they lose their jobs, including SSI (Nichols et al., 2017). We therefore only study applications. Children with disabilities also qualify for SSI if parental income is below the eligibility cutoff and thus may display counter-cyclical tendencies. However, the decision on an award of benefits involves a long and cumbersome process and, consequently, SSI caseloads themselves may not respond over a short horizon (or respond in the opposite direction expected (Schmidt and Sevak, 2004)). That long application process could also reduce applications from individuals who expect to return to work in the short term or medium term. SSI also includes a restrictive asset limit of $2,000 for singles and $3,000 for couples that has been held fixed in nominal terms since 1989, which could reduce cyclical responsiveness. Congress has not added significant benefits to the program during either recession, although a small $250 one-time supplement was granted to recipients in the Great Recession. We expect SSI applications to be exhibit modest cyclicality but little prior work has investigated this question.[4]

[4]We focus on safety net programs directed to individuals with limited incomes (and assets). While the Social Security Disability Insurance (SSDI) Program is designed to provide assistance to those with prior labor-market history who are no longer able to maintain gainful employment due to disability, eligibility is not means-tested like SNAP, TANF, Medicaid, and SSI, nor directly related to macroeconomic shocks like UI. Thus, we do not include SSDI in the set of programs we study. Maestas et al. (2015) and Maestas et al. (2021) have found SSDI caseloads to be countercyclical, including in the Great Recession.

Additional Policies

With these major programs described, we should also note that federal legislation in the Pandemic provided other benefits to low income families which could have had an effect on the safety-net responsiveness of other programs. Flat lump sum payments under the Economic Impact Payment program in the Pandemic Recession, for example, could have reduced the need for transfer program benefits and reduced applications. The temporary Child Tax Credit expansion in 2021 could have had a similar effect in that year. Congress also provided direct assistance to firms through the Paycheck Protection Program (PPP), which boosted employment and could have reduced the need for assistance from transfer programs. In the Great Recession, the temporary reduction in the payroll tax rate, as well as some modest income tax rebates and liberalizations of the Earned Income Tax Credit and the Child Tax Credit, could also have had an effect in reducing the need for transfer benefits for some individuals. We do not have state-level data on receipt of these benefits, but because these other benefits were greater in the Pandemic than in the Great Recession we expect this force to work to reduce responsiveness of the programs we examine in the Pandemic.

In summary, our review of past program developments and legislation leads us to expect UI to have been more responsive in the Pandemic than in the Great Recession and SNAP, TANF and Medicaid to have been less responsive, although in some cases our priors are mixed. We expect other benefits to have been greater in the Pandemic which could have reduced responsiveness then, and we expect SNAP to be, overall, the most responsive program and for TANF and SSI applications to be the least responsive.

III Methodology

Our data, discussed in detail below, consist of monthly state-level data from January 1999 to March 2022 on caseloads per capita, a measure of the business cycle, and a few slowly-changing demographic variables (interpolated to months from annuals using the CPS). We do not start earlier than 1999 because major structural changes in the welfare system in 1996 resulted in a different system after that date as highlighted in previous work by Bitler and Hoynes (2016).

Capturing the effects of those systematic changes is beyond the scope of our goal in comparing the Pandemic and Great Recessions.[5]

To determine the relationship between the business cycle and caseloads, we specify our baseline model as a two-way fixed effects model with dynamic business-cycle response of the form:

$$y_{it} = \beta + \Sigma_{s=0}^{S} \gamma_s EPOP_{i,t-s} + \delta X_{it} + \alpha_i + \theta_t + \mu_i t + \epsilon_{it} \tag{1}$$

where y_{it} is the log per-capita caseload in state i and month t for each of our programs and $EPOP_{it}$ is the log employment-population ratio in state i in month t. We begin with our preferred business cycle measure, the employment-population ratio because the unemployment rate does not capture movements in and out of the labor force, and all transfer programs except UI cover out-of-the-labor-force individuals. However, we estimate models with the unemployment rate and labor force participation rate as well, for comparison.

Allowing lagged responsiveness in the specification allows us to incorporate learning about program eligibility, application submission and processing times, and because welfare offices were overwhelmed in the early months of the Pandemic and often were closed or held only limited in-person meetings, resulting in major delays. Moreover, most welfare programs certify eligibility for a certain period of time, say 6 or 12 months, when households are then required to recertify, which could introduce lags between economic recovery and caseload exit. We set S equal to 6 months, meaning we allow six lags of the business-cycle indicator, which is consistent with many programs' recertification windows in non-recessionary times, as well as the typical 26 week eligibility for UI. But we conduct sensitivity tests for alternative lag lengths.

In addition to controlling for state-level demographic variables (X_{it}), we include state fixed effects (α_i) and month-year fixed effects (θ_t), which we will term "date" fixed effects.[6] We additionally include state-specific linear time trends (μ_i) to capture long-run state-specific trends in program participation. Our coefficient of interest in Equation (1) is γ_s, which we expect to be negative in all cases (positive when we use the unemployment rate), signaling the countercyclical

[5] We are also unable to obtain monthly Medicaid or SSI state data prior to 1999.

[6] Excluding demographic controls from our models results in minimal changes to our coefficients of interest. We have t=1,2,...267 unique month-year combinations.

responsiveness of caseloads to the business cycle.

Our main question is whether caseload responsiveness to the business cycle was different in the Pandemic and the Great Recession, and secondarily whether it was different than in non-recessionary periods. To answer these questions we interact $EPOP$ in Equation(1) with dummy variables for the Great Recession (GR) and the Pandemic recession (COV), labeling the interaction coefficients γ^{GR} and γ^{COV}:

$$\begin{aligned} y_{it} \;=\; & \beta + \Sigma_{s=0}^{S}\gamma_s EPOP_{i,t-s} + \Sigma_{s=0}^{S}\gamma_s^{GR} EPOP_{i,t-s} * GR + \Sigma_{s=0}^{S}\gamma_s^{COV} EPOP_{i,t-s} * Covid + \\ & \delta X_{it} + \alpha_i + \theta_t + \mu_i t + \epsilon_{it} \qquad (2) \end{aligned}$$

In Equation(2) the effect of the business cycle in non-recessionary periods is given by the γ_s parameters, while the differential response during the Great Recession is represented by the γ_s^{GR} parameters and that during the Pandemic Recession is represented by the γ_s^{COV} parameters (meaning the total response in the Great Recession is the sum of γ_s and γ_s^{GR}, and in the Pandemic is γ_s and γ_s^{COV}).

As described in subsequent sections, we additionally add lagged caseloads from other programs to each program's equation to test for program interactions, and we also test for the importance of state-level Covid shutdown and other policies.[7]

IV Data

To measure the social safety net we utilize monthly, state-level administrative caseload data between January 1999 and March 2022 for six programs: SNAP, TANF, regular UI, total UI (see below), Medicaid, and SSI (applications only), counting the two UI programs as separate programs. SNAP caseload data are provided by the Food and Nutrition Service in the U.S. Department of Agriculture, TANF caseload data are provided by the Administration of Children and Families in the Department of Health and Human Services, and UI claims data are provided

[7] One potential limitation of our econometric framework using aggregate state-level data is that we are not able to identify whether caseload levels are affected by changes in program take-up (participation conditional on eligibility) over the business cycle. See Ganong and Liebman (2018) for an application to SNAP during the Great Recession.

by the Department of Labor. UI data are reported separately for regular claims and for claims for recession-specific expanded programs, the latter including the Temporary Extended Unemployment Compensation (TEUC 2002-2004), Extended Benefits (EB), Emergency Unemployment Compensation (EUC 2008-2013), Pandemic Unemployment Assistance (PUA 2020-2021), and Pandemic Emergency Unemployment Compensation (PEUC 2020-2021) programs. We construct two separate UI caseload variables, one for the regular program and for total UI (including regular and recession expansions) which will allow us to determine whether their responsiveness to the business cycle is different.[8] Both UI caseloads include initial and continuing claims. SSI application data come from the Social Security Administration State Agency Monthly Workload Data which separately reports applications for children, concurrent applications with SSDI, and others (including the elderly and prime-age workers ineligible for SSDI). Medicaid enrollment data, including the Children's Health Insurance Program (CHIP) enrollment, for 1999 through 2012 come from the Centers for Medicare and Medicaid Services, and from 2014 through 2022 from the Kaiser Family Foundation.[9] Detailed information on the data collection and cleaning is provided in the Data Appendix B.

Per-capita caseloads are computed using annual state population data from the US Census Bureau, which we interpolate linearly across months within years. Monthly state-level employment data for the $EPOP$ variable are provided by the Bureau of Labor Statistics. We seasonally-adjust our data series to filter out the influence of state-level seasonal employment patterns and focus our analysis on the longer-term shifts in labor market conditions. This adjustment is provided in Appendix B.8.

To isolate the labor market effects on caseloads, we include controls for state-level demographic and policy variables. Using the Current Population Survey Annual Social and Economic Supplement, we control for the state-level household demographic characteristics including the share of households that are adults, adults in poverty, seniors, seniors in poverty, Black, Hispanic, below the poverty line, and below 200 percent of the poverty line. We also

[8] While significant unemployment fraud claims have been documented during the COVID period, our estimates are unaffected by these if fraud claims are independent of changes in state-level business cycles.

[9] We have been unable to locate monthly state-level Medicaid enrollment data from October 2012 to December 2013.

control for the political party of the Governor, which may influence state-level program policies, and the log number of Covid-19 cases per capita. Because the demographic and political-party variables are only observed annually we linearly interpolate across months within years.

We break our analysis into three periods: the Pandemic Recession, Great Recession, and non-Recessionary periods, focusing on differences between the Pandemic and Great Recessions. We use as a starting point the NBER recession dates, with the Pandemic Recession beginning in March 2020 and the Great Recession beginning in January 2008. The economic contraction only lasted for 2 months during the Pandemic Recession as opposed to 18 months during the Great Recession, but labor markets remained depressed for many months following each contraction. To capture the full Pandemic Recession period, we include all months between March 2020 and September 2021, so we include 17 months of the economic expansion following the large initial economic contraction. We end our Pandemic Recession period in September 2021 to align with the expiration of expanded UI programs. The economic expansion following the trough of the Great Recession lasted over ten years without a clear transition to an ending point, so we extend our Great Recession definition for 17 months into its expansionary phase (to align with the Pandemic), through November 2010, for a total of 35 months. However, given the somewhat arbitrary nature of this definition, we consider two alternative Great Recession definitions: including only the contractionary phase through June 2009, and extending it until the expanded UI benefits expired in 2013.[10]

Table 1 shows the means of the $EPOP$ variable and our dependent variables for per capita program caseloads (plus those of the Covid policies, to be discussed later), both overall and for our three periods separately. We should note immediately that a comparison of employment and caseloads across the three periods is affected by long-term trends, as we will graphically show below (and which is controlled for in our regression model). For example, $EPOP$ was not much different in the Great Recession and in non-recessionary periods, but this is because employment stayed low for many years after the Recession ended. But that it was lower in the Pandemic than in the Great Recession represents a genuine cyclical difference.

[10]Note that our "non-Recessionary" period does include a brief mild recession in 2001. Our main results are quite similar if we exclude this recession and restrict our sample to the years 2004 to present.

The largest program we study is Medicaid, followed by SNAP, UI, and TANF. SSI enrollment (not shown in the table) is larger than TANF during our sample period but SSI applications are the smallest program outcome we study. Several programs, such as SNAP, total UI, and Medicaid have similar caseload levels during the Great Recession compared to non-recessionary periods, however this is partly attributed to the same long term trends we just mentioned (see Figure 2 below) and partly because of eligibility expansions that were enacted during the Great Recession and remained in place past our initial Great Recession end period (2010), an issue we discuss further below. The national EPOP generally declined throughout this period and was lower in the Pandemic Recession than in the Great Recession. Per-capita caseloads were much higher during the Pandemic Recession than the Great Recession except for TANF (because of a long-term decline) and SSI.

V Results

We begin our analysis by describing the basic trends in our caseload data set, focusing on a comparison between the Pandemic and Great Recessions. We then systematically evaluate the US social safety net relationship to the business cycle and its evolution over the course of the last two decades using the equation specifications described previously.

A Descriptive Analysis

Figure 1 shows the national patterns of our three business-cycle indicators of employment per capita ($EPOP$), labor force participation rate (LFP), and the unemployment rate (UR), with the unemployment rate depicted on the right axis. The long-term declines in $EPOP$ and LFP have been well documented, and our data confirm that trend (Moffitt, 2012; Abraham and Kearney, 2020). The large 5.4 percentage point peak-to-trough decrease in the $EPOP$ during the Great Recession has been documented in prior work and it recovered slowly over the following ten years, never regaining its pre-recession level. In contrast, the sudden 10 percentage point drop in the $EPOP$ during the initial three months of the Pandemic Recession was sharper than any three-month drop in the Great Recession, and the Pandemic recovery was also more rapid than in the Great Recession, switching to an expansion after only three months, generating the so-called V-shaped Recession. By March 2022 the $EPOP$ remained 0.87 percentage points below the pre-Pandemic level. The LFP gradually declined by about 4 percentage points after the Great Recession, and then an abrupt 4 additional points with the onset of the Pandemic, and only recovered about half of the decline by March 2022. The UR spiked by about 6 and 10 points with the Great Recession and Pandemic Recession, respectively, but the recoveries were quite different with the Great Recession spread out across several years whereas the Pandemic recovery was a fraction of that time.

The left panel in Figure 2 displays the national per-capita caseload trends of each of our six programs between 1999 and 2022, with each series indexed to its January 2001 value. The grey regions represent our two recessionary periods and note that the two UI series (regular and total) are scaled on the right axis because of their large fluctuations. Caseloads from almost all programs rise during or soon after recessions begin and fall during expansionary periods. In some cases there are also clearly long run program trends, for SNAP, Medicaid, and TANF have strong long-run caseload trends in addition to business cycle fluctuations (SNAP and Medicaid participation have roughly doubled over this twenty year period while TANF participation has declined by seventy percent). The major exception to the recession/expansion relationship is SNAP, which continued to rise after the Great Recession ended, peaking in 2013. This trend was noted at the time and hypothesized to result from continued liberalization of SNAP eligibility rules and sluggish recovery and wage growth (Hardy et al., 2018; Ganong and Liebman, 2018).

Comparing the Pandemic Recession to the Great Recession, SNAP rose substantially more (60 percent) during the Great Recession than during the Pandemic Recession (20 percent), while the opposite was the case for regular UI. Total UI caseloads grew tremendously in both periods–by 9.5 times during the Great Recession and by 14.75 times during the Pandemic, relative to the month preceding each recession. Both TANF caseloads and SSI applications surprisingly fell during the Pandemic (although the former after an initial brief rise), while both rose during the Great Recession. Medicaid rose during both recessions but continued rising afterward, reflecting long-run upward trends. These patterns are roughly in line with the expectations for relative responsiveness in each program in the two recessions outlined in Section II above.

The right panel in Figure 2 zooms in on the Pandemic Recession (and indexed to January 2019) period whose monthly pattern is important. From this figure we can see that UI, SNAP, and TANF each jumped quickly between February and June 2020, with regular and total UI increasing by 8.5 and 14.75 times, respectively, SNAP increasing by 17 percent, and TANF increasing by 9 percent. Regular UI and TANF both quickly approached pre-Pandemic levels upon entering the economic expansion, but total UI and Medicaid caseloads remained elevated or grew significantly into the expansion. By September 2021, regular and total UI caseloads returned to their pre-Pandemic level as expanded UI programs began to expire. After their initial jump early in 2020, SNAP caseloads slowly declined through the remainder of the Pandemic Recession, dropping 5.5 percent by September 2021 from their Pandemic peak. TANF cases can be seen more clearly in this Figure to have briefly jumped, then quickly receded and by September 2021 were 15 percent below pre-Pandemic levels. The Medicaid caseload steadily increased by 19 percent throughout the Pandemic, likely due to the recertification policy change mentioned previously.

SSI applications display a surprising decrease during the Pandemic, declining on average by 13 percent. This trend is mirrored, though smaller, in the SSI caseloads as Social Security Administration monthly reports show a 0.5 percent decline in caseloads from February 2020 to September 2021.[11] The decline in SSI caseloads may have been the result of major backlogs in SSI offices which occurred in the Pandemic, partly the result of the closure of many offices. The latter meant that applications had to be made remotely, which is likely more difficult for those with disabilities.[12]

To more easily compare the safety net response of the Pandemic Recession to the Great Recession, Figure 3 plots the EPOP and caseloads for each recession, with the Pandemic Recession in solid (green) lines relative to February 2020 and the Great Recession in dashed (orange) lines relative to December 2007. Consistent with Figure 1, there was a sharp EPOP shock induced by the Pandemic followed by a rapid recovery whereas the EPOP fell gradually in the Great Recession but continued to decline and eventually eclipsed the Pandemic decline. While the EPOP trajectories between these two recessions were different, the trajectories of the

[11] Monthly SSI caseload reports are only available beginning in January 2020.

[12] Deshpande and Li (2019) found that applications to disability programs fall when offices are closed.

caseloads were different as well in a way that is consistent with the EPOP patterns. During the Pandemic, most programs experienced a sudden increase followed by a steady decline (Medicaid and SSI the exceptions for reasons already noted), while the Great Recession saw a slow and steady increase in caseloads as the recession lengthened. After 19 total months, the aggregate EPOP change is similar between the Pandemic and Great Recessions but caseloads in the Great Recession for SNAP, TANF, Medicaid, UI, and SSI were still above their initial values and, in fact, still rising. This might suggest the influence of lagged values or trends since EPOP was still falling in the Great Recession at this point but rising in the Pandemic. Strikingly, during the Pandemic Recession, SSI and TANF caseloads significantly declined after 19 months, while they rose during the Great Recession.

B Regression Analysis

B.1 Baseline Estimates

The regression analysis proceeds first with estimates in Table 2 from the dynamic model of Equation (1) with common γ regression coefficients across all recessionary periods. We show the sum of the six γ_s coefficients to reflect the cumulative effect of the business cycle, but in Appendix Table A.2 we present the full set of individual regression coefficients. The dependent variable is the log of the caseload per capita, and the business cycle is measured by the log of employment per population ($EPOP$), and thus the business-cycle coefficients are elasticities. All models use Huber-White robust standard errors.

Table 2 shows that all programs excluding Medicaid display a counter-cyclical relationship between $EPOP$ and caseloads, with each one percent decline in the $EPOP$ being associated with between a 0.56 (SSI) and 4.7 (total UI) percent increase in caseloads.[13] The effect for Medicaid is positive but with a high standard error. These estimates suggest that on average the safety net is quite responsive to business-cycle conditions. We find UI to be the most responsive and SSI (and Medicaid) the least responsive, with SNAP and TANF in the middle. The responsiveness of

[13](Bitler et al. (2020a)) found SSI to be acyclic but using SSI caseloads rather than applications, as we use. As they noted, long delays between application and enrollment in SSI are likely the reason for the lack of responsiveness of caseloads.

TANF is perhaps surprising given our expectations in Section II, but it is primarily a result of the tiny caseload magnitude (see Table 1) which makes even small changes in the caseload large in percentage terms. The lack of cyclicality of Medicaid will be seen momentarily to reflect significant responsiveness during non-recessionary periods but a lack of responsiveness during recessionary periods, as suggested in our discussion in Section II.

Turning to the more central question of whether the response of the safety net differed across the major recessions over the past two decades, in Table 3 we report estimates from Equations (2), allowing the γ coefficients on $EPOP$ to vary by period (again, only showing the sums of the six lag coefficients).[14] The first row shows that all programs, including Medicaid, are countercyclical during non-recessionary periods. The sizable responsiveness of TANF remains but is a result of the factor we noted previously.

The second and third rows of Table 3 display the marginal responsiveness of the safety net during the two largest recessionary periods of our sample: the Pandemic and Great Recessions. The γ estimates in the second row show that three of the programs (SNAP, UI, and total UI) were each roughly fifty percent more countercyclical during the Pandemic Recession than in non-recessionary periods while the other three (Medicaid, TANF, and SSI) were less countercyclical. The estimates in the third row show that responsiveness in the Great Recession was quite different, with no difference from that in non-recessionary times for UI and SSI (meaning that caseloads rose but in the same proportion to the magnitude of the downturn), a smaller responsiveness than in non-recessionary times for SNAP and Medicaid, and a greater responsiveness than in non-recessionary times only for TANF and Total UI.[15]

Our main interest is in comparing these Pandemic and Great Recession safety net responses. To make this comparison easier, the fourth row of Table 3 presents a difference-in-difference estimate comparing the marginal business-cycle response in the Pandemic Recession to the Great Recession (the difference in rows two and three). The results show that three of the six programs (SNAP and the two UI programs) were more cyclically responsive in the Pandemic than during

[14]The full set of individual coefficients for this table are available in Appendix Table A.3.

[15]The TANF results differ from those of Bitler and Hoynes (2016), who found TANF to be less responsive in the GR than in earlier periods. The difference could be because their non-recessionary period is different than ours and they used a Great Recession period defined as 2007-2012, different than ours (which we explore below). Our results for other programs are very similar to theirs for relative responsiveness in the GR and non-recessionary periods.

the Great Recession. Adding these marginal differences to the non-recessionary effects, SNAP was twice as responsive and UI was 63 percent (and 70 percent for total UI) more responsive during the Pandemic compared to the Great Recession. Medicaid was also more cyclically responsive during the Pandemic, but this is because it was essentially unresponsive during the Pandemic and counter-responsive during the Great Recession and, in this sense, should be regarded as unresponsive in any case. But for TANF and SSI, the net responsiveness in the Pandemic and Great Recession was negative in both cases but larger during the Great Recession. In all cases the differences are large relative to their standard errors, indicating that, indeed, "this time was different", as our paper title asks.[16]

These results are mostly consistent with our a priori expectations discussed in Section II for the relative responsiveness of each program in the Pandemic and the Great Recession, with the partial exception of SNAP. We expected SNAP to be less responsive in the Pandemic, but this was based on its relatively weaker expansion in the early months of the Pandemic. But the generosity of the program was significantly expanded in the later periods of the Pandemic, and it may be simply that this dominated the weaker response in the earlier months. Also, again for TANF, while we expected that the program would be less responsive in the Pandemic than in the Great Recession, and our results confirm this, we thought it would be close to completely non-responsive in the former and this is not shown by the results.[17]

Table 4 shows results when using the unemployment rate and the labor force participation rate as business cycle indicators instead of the employment-population ratio.[18] Measuring the business cycle with the unemployment rate, as shown in the upper panel, indicates in the first row that most programs are also cyclically responsive to the percent unemployed per se, except for Medicaid (note that all coefficient signs are the opposite to those of Table 3, and that the

[16] As we noted previously, the Covid policies for Economic Incentive Payments, the Child Tax Credit, and the many other federal benefit expansions were expected to reduce the responsiveness of other programs during the Pandemic. That we find a greater responsiveness during Covid either means that those programs had little cross-state variation or that our estimates may even understate the ceteris paribus responsiveness in the Pandemic relative to the Great Recession.

[17] For SSI applications, we expected caseloads to be mildly countercyclical, as we have found in the Great Recession but not in the Pandemic. As we noted earlier, the decline in SSI applications may have been a result of the closure of Social Security offices.

[18] One reason our primary specifications use $EPOP$ instead of the unemployment rate are potential measurement issues for unemployment at the beginning of the COVID period.

coefficient magnitudes are noncomparable). The Covid-specific responses also show the same general patterns as the EPOP, although, interestingly, the regular UI program did not respond to unemployment per se any differently than in non-recessionary periods (but the total program did), which is surprising given the large federal supplement provided to regular UI recipients during the Pandemic. The results also show that the total UI program was less responsive during the Great Recession than non-recessionary times. However, the relative responsiveness of caseloads to the unemployment rate in the Pandemic vs the Great Recession was the same in direction and significance as when using the EPOP.

Results using the labor force participation rate directly measure the impact of being in or out of the labor force per se on caseloads. In non-recessionary periods, neither UI program is responsive to labor force participation, which is not surprising since eligibility requires being unemployed. However, in terms of relative Pandemic vs Great Recession effects, the last row of the table shows relative impacts very close to those for EPOP, which is perhaps also not too surprising given the strong correlation of the two (see Figure 1).

B.2 Additional Specifications and Results

We test whether our estimates in Table 3 are sensitive to the dynamic lag structure of $EPOP$. Hamilton and Herrera (2004) argue that choice of lag length should be guided by priors based on policy or institutional features, and our baseline choice of 6 months was related to typical eligibility and recertification intervals of the programs. However, to examine this assumption we first ignore lags entirely and use only the $EPOP$ in the same month, and the we adopt a shorter 3-month window, and subsequently extend the lag length to 9-month and 12-month lags instead of a 6-month lag. Appendix Table A.4 presents the results and demonstrates that the differential responsiveness of the two recessions (the last row in each specification) are the same sign and close in magnitude to those in our baseline specification using a 6-month lag. The no-lag specification attenuates the magnitude of the relative responsiveness for all programs except Medicaid, whose responsiveness is slightly greater with no lags. The 3-month lag specification yields results very close to those for the 6-month lag specification. At the 9- and 12-month intervals the cyclicality becomes slightly larger than in the 6-month baseline model, but again the qualitative results in the baseline specifications that SNAP and UI are more responsive in the Pandemic Recession than the Great Recession, TANF and SSI are less responsive, and Medicaid is acyclical across the two recessions holds in every case. [19]

An additional test we perform is whether the safety net response to the business cycle during the Pandemic Recession to the Great Recession is sensitive to how we define the recessionary periods. We define the Pandemic Recession as March 2020 through September 2021, 19 months, even though the (strong) economic contraction was only during the first two months. While economic conditions gradually improved throughout 2021, the expiration of expanded UI programs in September 2021 provided a natural demarcation to end our Pandemic Recession period. In our primary specification, we compared our Pandemic Recession to the Great Recession, defined beginning in January 2008 (in line with the NBER recession definition) and ending in November 2010 to allow an analogous 17-month expansionary period after the contraction ended in June 2009. We consider how two alternative Great Recession definitions change our findings when compared with our primary definition: only including the contractionary period of the Great Recession through June 2009 and extending the Great Recession through December 2013 when expanded UI and SNAP benefits expired.[20] Results from these alternative period definition comparisons are presented in Appendix Table A.5.

A number of interesting changes occur in our coefficient estimates when altering our Great Recession definitions, reflecting the evolving safety net response over the course of the Great Recession period. When limiting our Great Recession period to the initial contraction through June 2009, we find that the difference in Pandemic-Great Recession relative responsiveness is attenuated for all programs, i.e. less negative or more positive. This occurs because more weight is placed on the Great Recession downturn without allowing for any subsequent recovery as we permit with our baseline specification (and introduces a noncomparability with our Pandemic Recession definition, which includes the expansionary period). Extending the Great Recession period through 2013 accentuates differences between the Pandemic and Great Recession periods

[19]We additionally ran specifications altering the lag length for only the Pandemic Recession while keeping the non-recessionary and Great Recession periods at a 6-month lag. The results are not substantively different when the Pandemic Recession is allowed to have lags that vary between zero and 12 months.

[20]We note that Bitler and Hoynes (2016) define the Great Recession as 2007 to the end of their sample in 2012, similar to our expanded definition.

for all programs but UI, though qualitatively this specification is very similar to our baseline estimates. We conclude that our baseline specification captures the comparative responsiveness of the two recessions reasonably consistently.

B.3 Caseload Interactions

Caseload interactions may be important for understanding caseload trends and the business cycle. Programs may be complements if signing up for one program lowers the cost burden of signing up for additional programs (either through increased awareness and information or reduction in additional paperwork hassle), leading to a positive correlation across caseloads. But a positive correlation could also reflect unobserved state-specific policies or economic conditions not captured by our state and month fixed effects and trends that lead all programs to move in the same direction. On the other hand, programs are more likely to be substitutes if participation in one program lowers the benefits or eligibility from alternative programs (Schmidt and Sevak, 2004). For example, if participating in UI lowers TANF benefits or surpasses TANF income eligibility thresholds (through increased countable UI income), we would expect that states with higher UI participation to have lower TANF participation, ceteris paribus.

To help us determine whether program participation across multiple programs reveals a more complementary or substitution association, we append to Equation (2) lagged caseloads and their interactions with the Great Recession and Covid-19 in Equation (3) as

$$
\begin{aligned}
y_{it}^{k} \quad = \quad & \beta + \Sigma_{s=0}^{j}\gamma_s EPOP_{i,t-s} + GR * \Sigma_{s=0}^{j}\gamma_s^{GR} EPOP_{i,t-s} + Covid * \Sigma_{s=0}^{j}\gamma_s^{COV} EPOP_{i,t-s} + \\
& \Sigma_{m=1,\neq k}^{6}\phi_{km}\frac{\Sigma_{s=1}^{6} y_{i,t-s}^{m}}{6} + GR * \Sigma_{m=1,\neq k}^{6}\phi_{km}^{GR}\frac{\Sigma_{s=1}^{6} y_{i,t-s}^{m}}{6} + \\
& Covid * \Sigma_{m=1,\neq k}^{6}\phi_{km}^{COV}\frac{\Sigma_{s=1}^{6} y_{i,t-s}^{m}}{6} + \delta X_{it} + \alpha_i + \theta_t + \mu_i t + \epsilon_{it}.
\end{aligned} \tag{3}
$$

Given the large number of coefficients in this equation, we report the results only in Appendix Table A.6 and present some summary results graphically.[21] Figure 4 first displays

[21]For simplicity, we study caseload interactions only for UI Total, not Regular UI, for five programs altogether. Hence each program's caseload equation has lags for just four other programs.

caseload interaction results for non-recessionary periods, ϕ_{km}, along with 90 percent confidence intervals. We find that most coefficients are positive, implying complementary patterns of each program caseload with respect to lagged caseloads of other programs. Among all program interactions, 16 out of 20 are positive with an average value of 0.097, and 13 of these coefficients are statistically greater from zero. SNAP shows the largest and most consistently positive association with all programs, including an especially strong correlation with TANF. Each percent increase in SNAP is associated with a 0.51 percent increase in TANF in the following period. These findings suggest SNAP may have important participation spillovers. One reason for this may be that since SNAP has a broad eligibility range households may be most likely to assume SNAP eligibility first and perhaps learn of additional program eligibility after, or while, applying for SNAP benefits given that most state SNAP and TANF offices are co-located. However, lacking a more formal structural model of multiple program participation, we hesitate to ascribe a causal interpretation for these findings.

Figure 5 plots the estimates of ϕ_{km}^{GR} and ϕ_{km}^{COV} from Equation (3), revealing how caseload interactions changed between the Pandemic Recession and Great Recession relative to non-recessionary periods. The total effect of the caseload interactions is found by summing the coefficients across Figures 4 and 5 (not depicted), where overall 17 of the 20 programs are complementary during the Great Recession and 14 of the 20 during Pandemic. The overall message from the figure is that, for most programs, there was no large difference in caseload interactions between the Great Recession and the Pandemic, for 14 of the 20 interactions have confidence intervals that overlap. In addition, many interaction coefficients hover around zero, in a positive or negative direction, for both recessions. There are exceptions, for large positive correlations appear for lagged SNAP and Medicaid caseloads on current total UI caseloads during the Pandemic Recession, as well as a scattering of negative coefficients, and hence greater substitution than in non-recessionary periods, especially for the SSI program.

Allowing interactions in the equation has some effect on the estimated responsiveness of caseloads in the absence of interactions. The last four rows of Appendix Table A.6 are generally somewhat smaller than those in Table 3). With the caseload interactions interpreted as causal effects, this implies that the responsiveness we have identified for some programs is partially explained by an indirect effect working through lagged caseload growth in other programs. However, we cannot distinguish whether these estimated changes are directly related to lagged other programs' participation influencing alternative program take-up or whether lagged SNAP caseloads capture state-level labor market effects not already captured in the model.

B.4 Pandemic Policies

As we noted in the Introduction, some of the greater responsiveness of caseloads in the Pandemic than in the Great Recession may have been a result of the Pandemic policies enacted by many states which led to lockdowns, reduced economic activity, and possibly increased applications to, and receipt of, safety net programs. Pandemic policies varied across states, allowing us to identify their effects on caseloads during the Pandemic from that cross-state variation and hence allowing us to enter those policy variables into our regressions and determine whether our coefficients on the recession variables are affected. However, in addition to an interest in whether those coefficients are affected, it is also of interest to know whether those Pandemic policies affected caseloads independently.

To analyze the potential impact of Covid policy restrictions on caseloads we use the Oxford Covid-19 Government Response Tracker (OxCGRT) dataset, compiled by researchers at Oxford University (Hale et al., 2021). The OxCGRT data tracks 20 state-level Covid policies throughout the Pandemic and includes a wide range of state policy responses from school and workplace closings to contact tracing and vaccination policies. The OxCGRT aggregates these individual indicators into three categorical indices: containment and health, economic support, and government stringency index and a composite index from these three indices. We create a dummy variable which splits states into above- and below-median Covid policy index strictness. Table 1 shows that (essentially by construction), a little over 50% of states had high values of the four indices. Figure 6 displays the trends in caseloads surrounding the Pandemic Recession split by the Pandemic policy strictness indicator, showing that less strict states showed a greater increase in Medicaid, UI, and SSI caseloads during the Pandemic relative to more strict states, although both TANF and SNAP display an increased caseload response among more strict policy states.

Table 5 presents regression coefficients from estimating Equation 2 above that includes measures of Covid policy stringency to measure how they affected caseloads during the Pandemic. In the top section is our aggregate Covid Policy Index, showing that SNAP, TANF, and UI all are positively related to the Covid policy index while SSI and to a lesser extent Medicaid are negatively related to Covid policies. Inclusion of the Covid policy index has a minimal effect on our $EPOP$ (γ) estimates. The lower section of the table shows the three separate component indices, showing that Government Stringency policies, such as stay-at-home orders and school closures, are most positively associated with caseload increases for all programs except total UI. Alternatively, the Containment and Health index, including policies such as contact tracing and vaccination policies, is negatively associated or not different from zero with all programs except total UI, which has a strong positive association. Lastly, the Economic Support Index, including policies such as debt relief and income support, is our weakest predictor of caseload changes during Covid, although it has a moderately negative association with both UI and total UI. While some of these results are difficult to interpret, we conclude that there is considerable evidence that Pandemic policies affected caseloads.[22]

However, the coefficients on the employment per capita variables, and how they differ between the Pandemic recession and the Great Recession, are essentially unchanged after the addition of these policy variables. They therefore do not play a role in explaining the greater responsiveness in the Pandemic that is the central result of our analysis.

VI Summary and Conclusions

This study has extended the existing literature on the responsiveness of U.S. safety net programs to economic downturns to the Pandemic Recession, with a comparison to the Great Recession to determine whether responsiveness was greater or smaller during the Pandemic–and therefore whether "this time was different". For the two largest programs which should be expected to be most responsive to the business cycle–SNAP and UI–the answer is decisively in favor of a greater responsiveness in the Pandemic, especially when the additional UI expansions

[22]In Appendix Table A.7, we interact the policy indices with our EPOP variables. In most cases, more strict policies make caseloads more responsive to a decline in EPOP (i.e.,the coefficient becomes more negative), but the magnitudes of the interaction coefficients are small.

on top of the regular UI program in each recession are accounted for. SNAP was almost twice as responsive during the Pandemic than during the Great Recession, and UI was about 50 percent more responsive during the Pandemic. However, two programs, TANF and SSI applications, were less responsive. On a priori grounds, given the relatively weak Congressional appropriation response (in terms of extra TANF funds) in the Pandemic relative to the Great Recession, this TANF result was expected. We had no particular expectations for the responsiveness of SSI applications, but we speculate that the well-documented extended shutdown of Social Security offices during the Pandemic could have made barriers to SSI applications especially difficult. For the Medicaid program, we find essentially no responsiveness in either recession. At least in the Pandemic Recession, this is likely a result of the Congressional mandate that no Medicaid recipient family could be terminated from the program because of newfound ineligibility during the Pandemic, which led to continuously growing caseloads long into the economic recovery period.

We find that these results hold up when we use alternative measures of the business cycle and alternative dating periods of the Great Recession, as well as controls for stringency of Covid-19 policies. For the last of these, Covid policies, we find that stricter policies typically led to increased caseloads, although not particularly more in areas with larger economic downturns. Moreover, we find strong evidence that most of the programs are complements; that is, greater participation in one program is associated with greater participation in another. Interpreted as reflecting easier take-up of eligibles for a program if they are participating in another one, this suggests that “one-stop shopping” and related state efforts to facilitate integration of program application and recertification policies and procedures may help support needy families who are eligible for a program to receive assistance from it.

Despite the large infusion into the social safety net during the Pandemic, nearly 80 percent of the $5 trillion dollar Congressional spending was spent on programs other than those we study. Large funds were appropriated for Economic Impact Payments, direct subsidies to firms who maintained a certain level of their labor force (Paycheck Protection Program), and changes to tax policies such as temporarily expanding eligibility for the Earned Income Tax Credit, the Child Tax Credit, and the Child and Dependent Care Tax Credit. A priori this might have been expected to lead to a smaller responsiveness of safety net programs to the Pandemic instead of the larger responsiveness we find. An indirect implication of this finding is that those other programs were not particularly targeted at states with the largest downturns, which is what our study measures. This does not mean that they did not provide additional support to families and individuals-including those with low-incomes-across the nation as a whole.

As the economy has rapidly recovered after the Pandemic, future research will show how far caseloads in safety net programs will fall, whether they resume their pre-Pandemic trends, or whether the recession has altered long term trends as happened in some programs after the Great Recession. Such research will provide a fuller picture of the long-term evolution of the U.S. safety net and its responsiveness to economic need.

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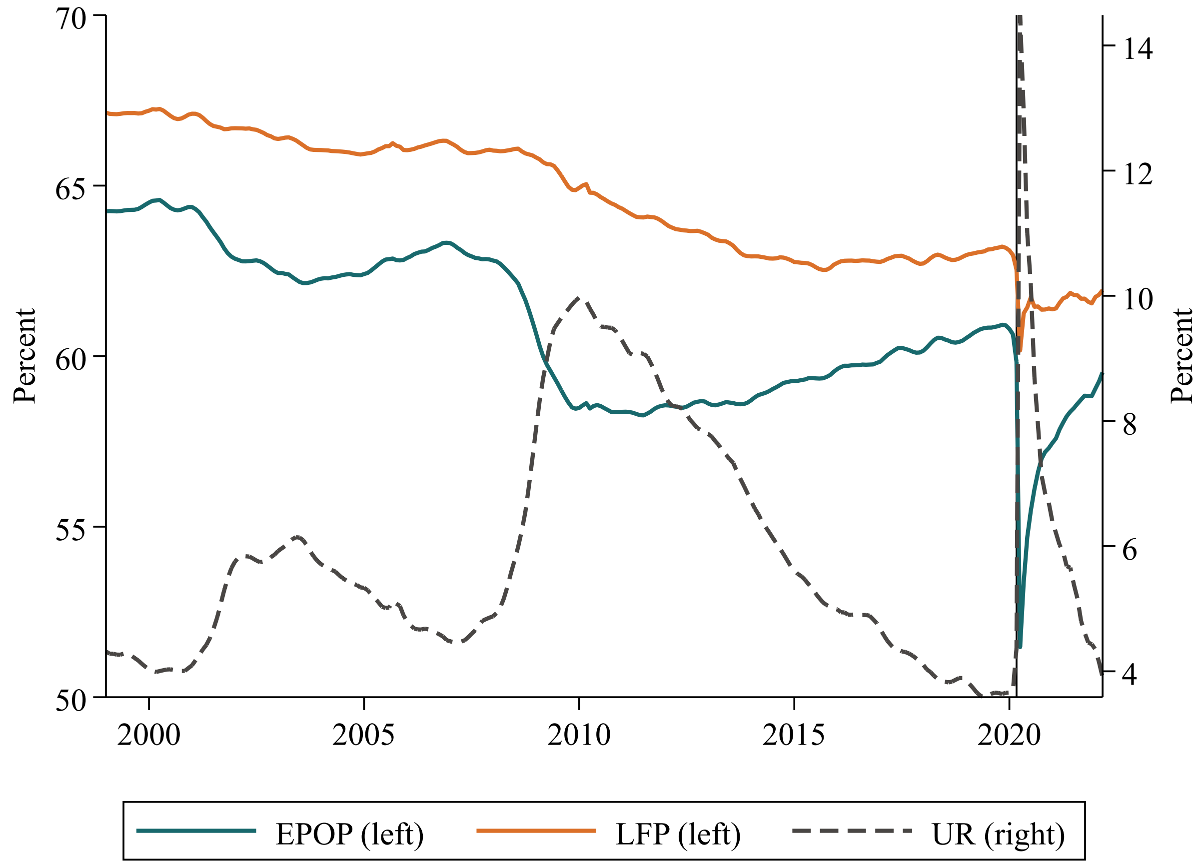
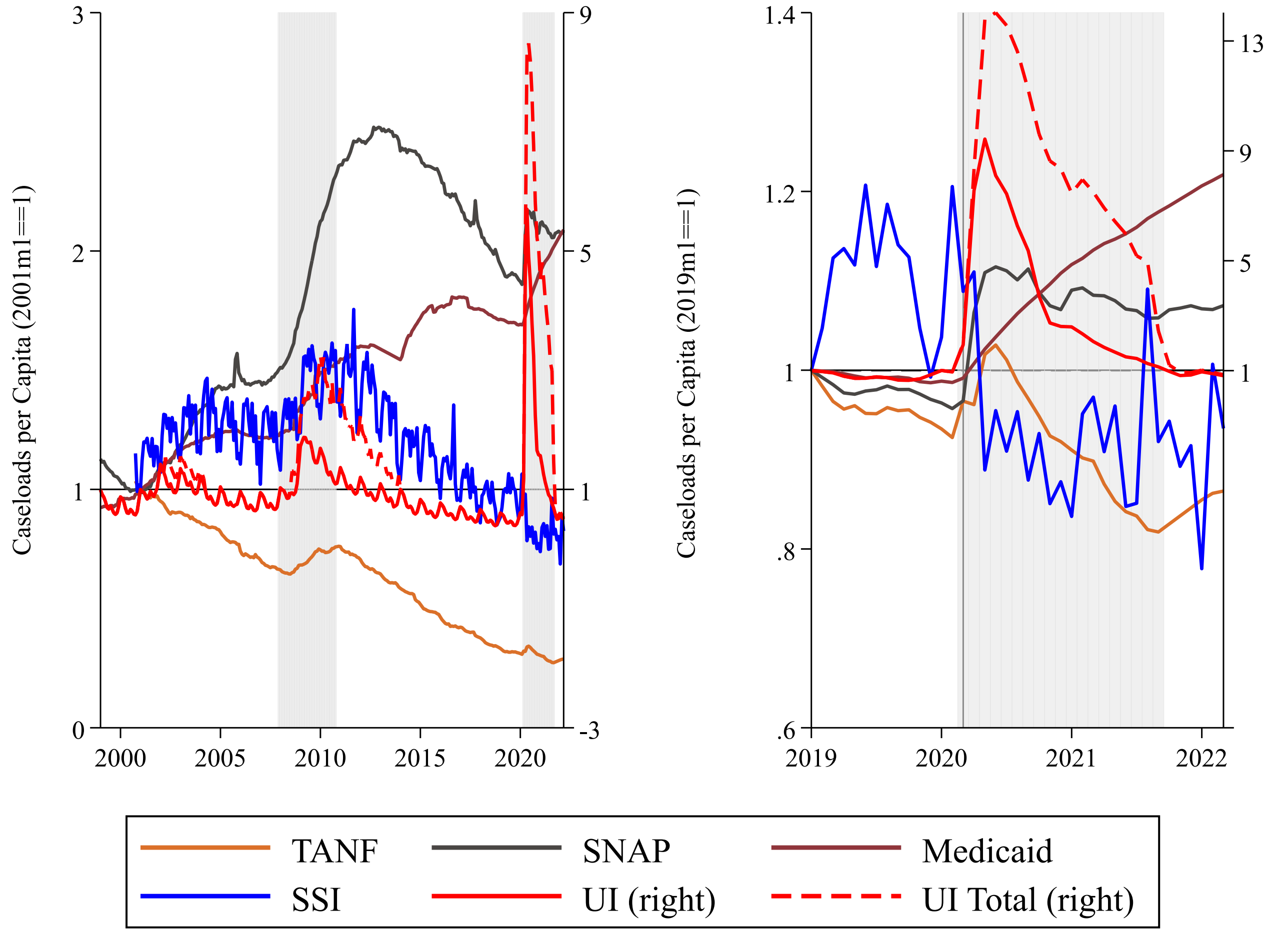
Figure 1: Trends in Labor Market Business-Cycle Measures, 1999-2022



Source: Department of Labor.
Notes: EPOP is employment per population; LFP is labor force participation; and UR is the unemployment rate.

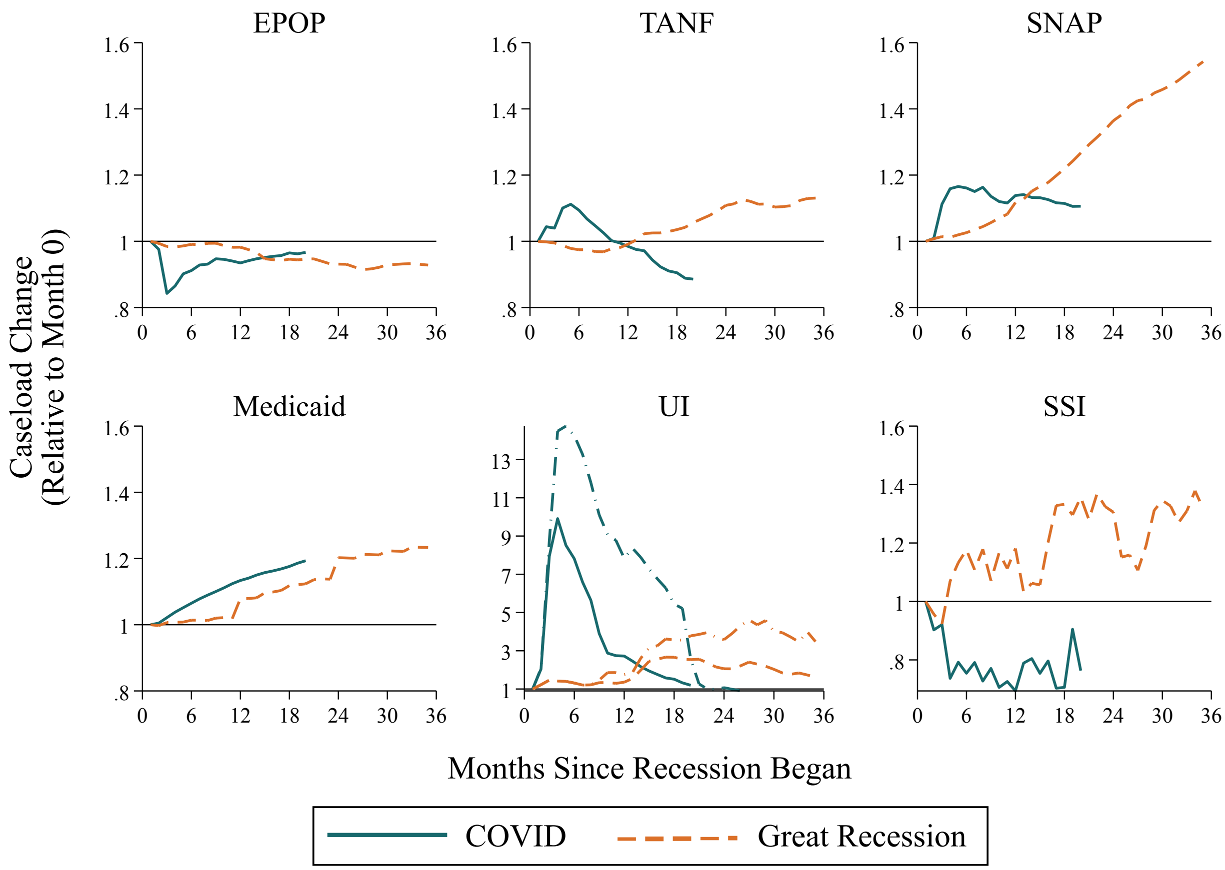
Figure 2: Trends in Safety Net Caseloads, 1999-2022



Sources: ACF, USDA, DOL, SSA, CMMS.

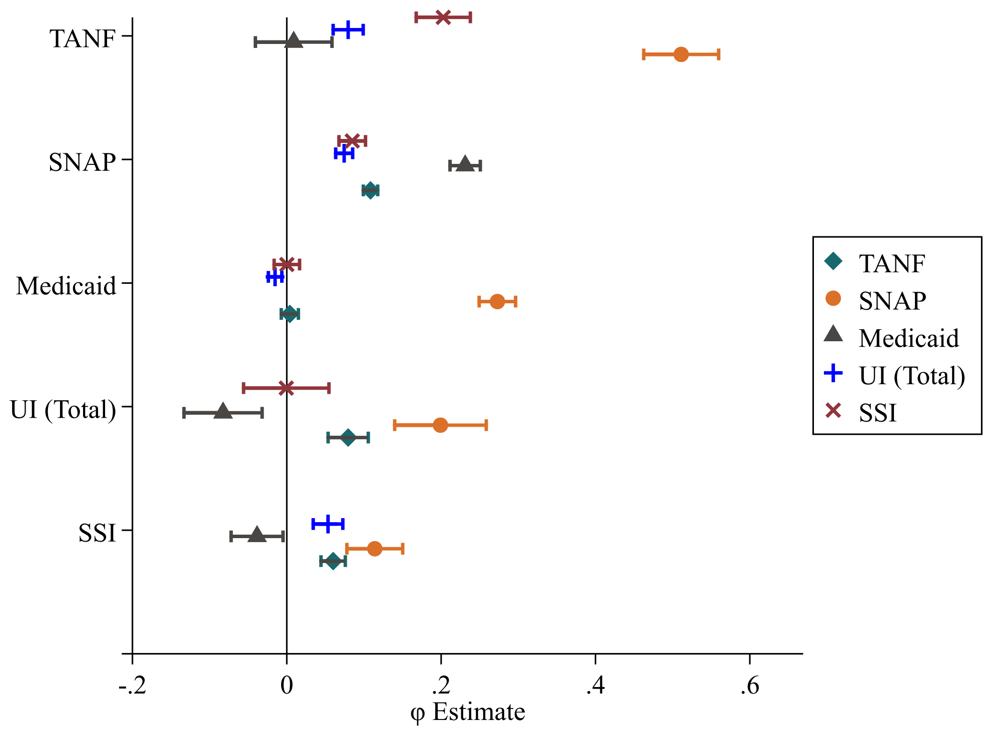
Notes: TANF is Temporary Assistance for Needy Families; SNAP is Supplemental Nutrition Assistance Program; SSI is Supplemental Security Income; UI is regular Unemployment Insurance; and total UI is regular plus expanded Unemployment Insurance.

Figure 3: Comparison of Caseload Change in Covid-19 Pandemic and Great Recession



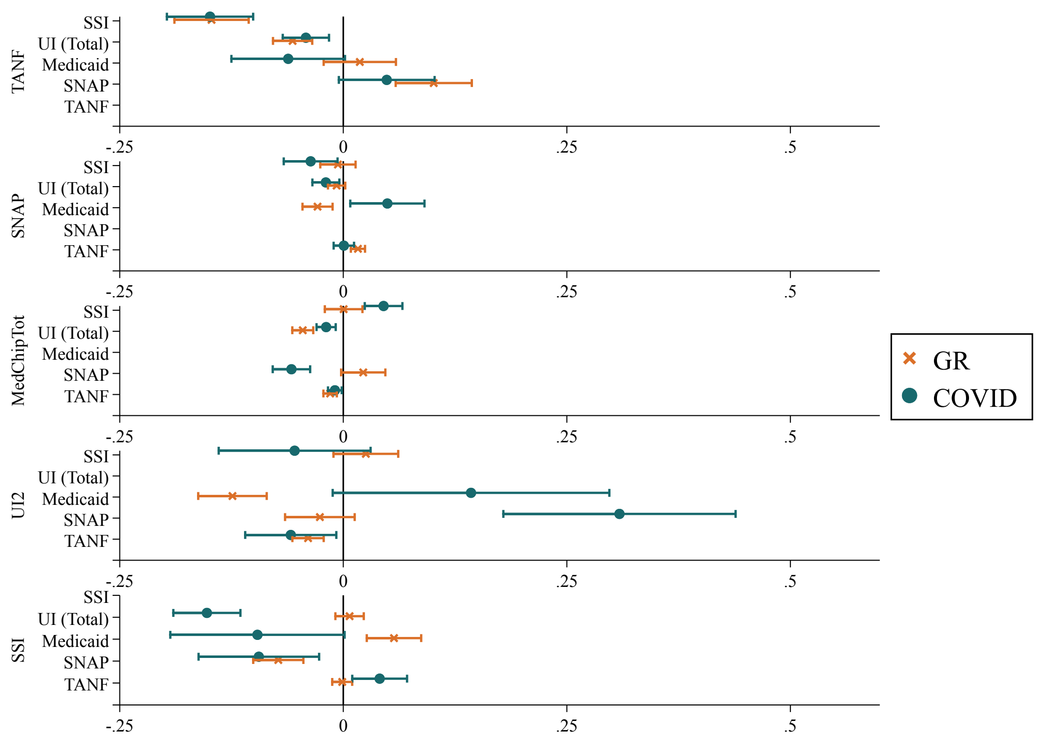
Sources: ACF, USDA, DOL, SSA, CMMS.
Notes: Base month is December 2007 for the Great Recession and February 2020 for the Pandemic Recession. For UI, the solid and dashed lines represent regular UI claims while the dot-and-dashed lines represent total UI claims.

Figure 4: The Effect of Cross-Program Interactions in Non-Recessionary Periods



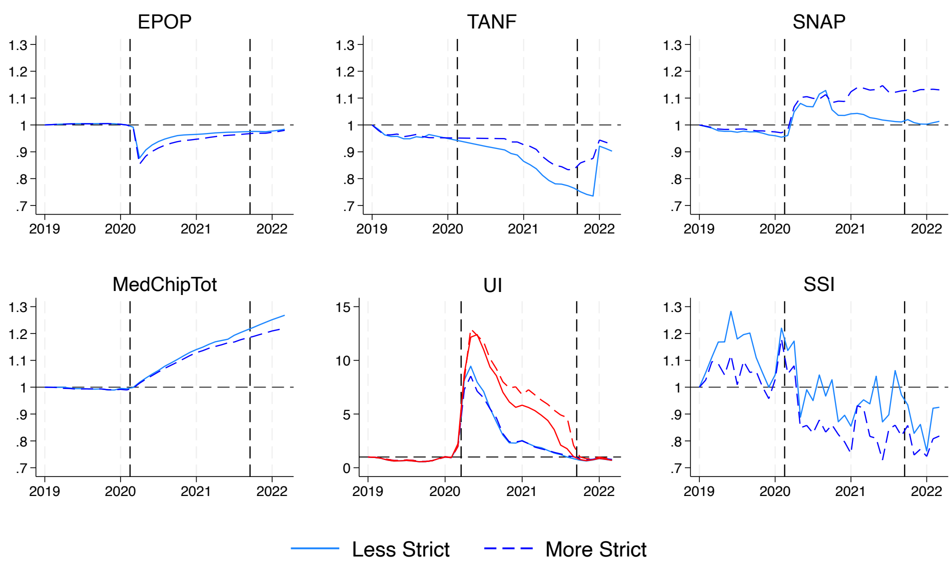
Sources: ACF, USDA, DOL, SSA, CMMS.
Notes: This figure plots the caseload interaction coefficients in non-recessionary periods (ϕ_{km} from Equation (3)). Estimates are separated by program outcome (y_{it}^{k}) on the y-axis and the lagged 6-month average caseload coefficients for program m are plotted with the x-axis. Both the dependent variable and regressors for caseloads are logged so that the display estimates are elasticities between programs. These coefficients are for the non-recessionary periods.

Figure 5: The Effect of Cross-Program Interactions During Recessions



Sources: ACF, USDA, DOL, SSA, CMMS.
Notes: This figure plots ϕ_{km}^{GR} and ϕ_{km}^{COV} from Equation (3). These estimates reflect the marginal changes in the caseload interactions during the Great Recession and Covid periods. The GR and Covid marginal coefficients are grouped first by program outcomes (k) and then within each program by the average lagged coefficient value for each regressor program m. Both the dependent variable and regressors for caseloads are logged so that the display estimates are elasticities between programs.

Figure 6: Caseloads Split by Covid Policy Index



Sources: ACF, USDA, DOL, SSA, CMMS.
Notes: This figure plots average caseload changes relative to January 2019 split by more (solid) and less (dashed) strict Covid-19 policies. For UI, the red lines represent total UI caseloads and the blue lines represent regular UI.

Table 1: Summary Statistics on Business Cycle, Caseloads, and Covid-19 Policies

	(1) Full	(2) COV	(3) GR	(4) Non-Recession
Emp/Pop ratio (x100)	61.8	58	61.3	62.2
	(4.7)	(4.52)	(4.66)	(4.57)
SNAP (per capita)	.0509	.0617	.052	.0499
	(.0225)	(.021)	(.0176)	(.0231)
Medicaid/CHIP (per capita)	.176	.235	.168	.173
	(.0624)	(.0632)	(.0474)	(.0619)
TANF (per capita)	.00436	.00213	.00474	.00443
	(.00263)	(.0013)	(.00252)	(.00264)
UI (Total) (per capita)	.0151	.0502	.024	.0107
	(.0163)	(.0386)	(.012)	(.00685)
UI (Regular) (per capita)	.0111	.025	.0157	.00923
	(.00858)	(.0218)	(.00644)	(.00465)
SSI (Applications per 000s)	.106	.0741	.126	.106
	(.044)	(.0308)	(.0473)	(.0426)
COVID Policy Index	.0476	.559	0	.0118
	(.153)	(.0995)	(0)	(.0682)
Containment and Health Index	.0486	.566	0	.0125
	(.156)	(.0934)	(0)	(.072)
Economic Support Index	.0404	.512	0	.00691
	(.145)	(.212)	(0)	(.0481)
Government Stringency Index	.0421	.53	0	.00751
	(.143)	(.146)	(0)	(.0454)
Observations	13,950	950	1,750	11,250

Notes: Author's calculations of administrative records, 1999-2022. See text for details on sources. Great Recession (GR) period is defined as January 2008 through November 2010. Covid-19 period (COV) is defined as March 2020 through September 2021.

Table 2: The Effect of the Business Cycle on Caseloads

	(1) SNAP	(2) Medicaid	(3) TANF	(4) UI	(5) UI (Total)	(6) SSI
$\Sigma_{s=0}^{6}\gamma_s$	-1.05***	0.03	-1.37***	-2.47***	-4.69***	-0.56***
	(0.06)	(0.06)	(0.13)	(0.15)	(0.17)	(0.10)
Observations	13,618	12,750	13,586	13,650	13,650	12,894

* p<0.10, ** p<0.05, *** p<0.010

Notes: Regression coefficients are elasticities, with robust standard errors. Business cycle is measured by employment per population. All specifications control for state demographics, state fixed effects, month fixed effects, and state-by-month linear trends.

Table 3: The Effect of Great Recession and Covid-19 Business Cycles on Caseloads

	(1) SNAP	(2) Medicaid	(3) TANF	(4) UI	(5) UI (Total)	(6) SSI
$\Sigma_{s=0}^{6}\gamma_s$	-1.06***	-0.15**	-1.34***	-2.31***	-4.19***	-0.66***
	(0.07)	(0.06)	(0.13)	(0.15)	(0.18)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{COV}$	-0.55***	0.18***	0.57***	-1.34***	-2.61***	0.46***
	(0.05)	(0.04)	(0.11)	(0.14)	(0.21)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{GR}$	0.21***	0.31***	-0.33***	0.08	-0.21***	0.03
	(0.03)	(0.03)	(0.06)	(0.06)	(0.07)	(0.04)
$\Sigma_{s=0}^{6}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.76***	-0.13***	0.90***	-1.42***	-2.40***	0.42***
	(0.06)	(0.04)	(0.12)	(0.14)	(0.22)	(0.12)
Observations	13,618	12,750	13,586	13,650	13,650	12,894

* p<0.10, ** p<0.05, *** p<0.010

Notes: Regression coefficients are elasticities, with robust standard errors. Business cycle is measured by employment per population. Total effect of business cycle in Great Recession and Covid-19 is found by summing non-recessionary coefficients with respective marginal effects of recessionary coefficients. All specifications control for state demographics, state fixed effects, month fixed effects, and state-by-month linear trends.

Table 4: The Effect of Alternative Business-Cycle Measures on Caseloads

	(1) SNAP	(2) Medicaid	(3) TANF	(4) UI	(5) UI (Total)	(6) SSI
UR						
$\Sigma_{s=0}^{6}\gamma_s$	0.03***	0.00	0.04***	0.07***	0.11***	0.03***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\Sigma_{s=0}^{6}\gamma_s^{COV}$	0.01**	-0.01***	-0.04***	0.00	0.05***	-0.06***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
$\Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.02***	-0.01***	-0.01***	-0.04***	-0.02***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\Sigma_{s=0}^{6}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	0.02***	0.00***	-0.03***	0.04***	0.06***	-0.05***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
LFP						
$\Sigma_{s=0}^{6}\gamma_s$	-0.25***	-0.73***	-0.17	0.01	0.17	-0.19
	(0.09)	(0.08)	(0.15)	(0.22)	(0.24)	(0.13)
$\Sigma_{s=0}^{6}\gamma_s^{COV}$	-0.62***	0.07	0.44***	-1.46***	-2.70***	0.08
	(0.06)	(0.04)	(0.13)	(0.17)	(0.27)	(0.14)
$\Sigma_{s=0}^{6}\gamma_s^{GR}$	0.15***	0.29***	-0.54***	-0.16**	-0.47***	-0.03
	(0.03)	(0.03)	(0.07)	(0.08)	(0.09)	(0.04)
$\Sigma_{s=0}^{6}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.77***	-0.22***	0.98***	-1.30***	-2.22***	0.11
	(0.07)	(0.05)	(0.14)	(0.18)	(0.28)	(0.14)

* p<0.10, ** p<0.05, *** p<0.010

Notes: UR stands for Unemployment Rate and LFP stands for Labor Force Participation Rate. Regression coefficients are elasticities, with robust standard errors. Total effect of business cycle in Great Recession and Covid-19 is found by summing non-recessionary coefficients with respective marginal effects of recessionary coefficients. All specifications control for state demographics, state fixed effects, month fixed effects, and state-by-month linear trends.

Table 5: The Effect of Covid-19 Policies on Caseloads

	(1) SNAP	(2) Medicaid	(3) TANF	(4) UI	(5) UI (Total)	(6) SSI
COVID Policy Index	0.206***	-0.053*	0.222***	0.123	0.828***	-0.216**
	(0.064)	(0.032)	(0.085)	(0.128)	(0.168)	(0.096)
$\Sigma_{s=0}^{6}\gamma_s$	-1.03***	-0.15**	-1.31***	-2.30***	-4.08***	-0.69***
	(0.07)	(0.06)	(0.13)	(0.15)	(0.18)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{COV}$	-0.50***	0.17***	0.62***	-1.31***	-2.41***	0.40***
	(0.06)	(0.04)	(0.11)	(0.14)	(0.22)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{GR}$	0.21***	0.31***	-0.34***	0.08	-0.23***	0.04
	(0.03)	(0.03)	(0.06)	(0.06)	(0.07)	(0.04)
$\Sigma_{s=0}^{6}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.71***	-0.14***	0.96***	-1.39***	-2.18***	0.37***
	(0.06)	(0.05)	(0.12)	(0.15)	(0.23)	(0.12)
Government Stringency Index	0.285***	0.295***	0.262*	0.560**	-0.487	0.261
	(0.089)	(0.057)	(0.153)	(0.265)	(0.306)	(0.182)
Containment and Health Index	-0.047	-0.400***	0.239	-0.190	1.745***	-0.427**
	(0.112)	(0.075)	(0.200)	(0.326)	(0.389)	(0.216)
Economic Support Index	-0.024	0.011	-0.164***	-0.170***	-0.176***	-0.055
	(0.020)	(0.014)	(0.032)	(0.048)	(0.062)	(0.041)
$\Sigma_{s=0}^{6}\gamma_s$	-1.04***	-0.14**	-1.35***	-2.33***	-4.17***	-0.69***
	(0.07)	(0.06)	(0.13)	(0.15)	(0.18)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{COV}$	-0.48***	0.16***	0.71***	-1.22***	-2.27***	0.42***
	(0.06)	(0.04)	(0.12)	(0.14)	(0.23)	(0.12)
$\Sigma_{s=0}^{6}\gamma_s^{GR}$	0.21***	0.31***	-0.33***	0.09	-0.22***	0.04
	(0.03)	(0.03)	(0.06)	(0.06)	(0.07)	(0.04)
$\Sigma_{s=0}^{6}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.69***	-0.15***	1.04***	-1.31***	-2.05***	0.38***
	(0.06)	(0.05)	(0.13)	(0.15)	(0.23)	(0.12)
Observations	13,618	12,750	13,586	13,650	13,650	12,894

* p<0.10, ** p<0.05, *** p<0.010

Notes: Robust standard errors. Business cycle is measured by employment per population. Total effect of business cycle in Great Recession and Covid-19 is found by summing non-recessionary coefficients with respective marginal effects of recessionary coefficients. All specifications control for state demographics, state fixed effects, month fixed effects, and state-by-month linear trends.

Appendix

A Appendix Tables

Table A.1: Summary Statistics Table, Demographics

	(1)	(2)	(3)	(4)
	Full	Covid	GR	Non-Recession
Share Adults	.619	.6	.627	.619
	(.0169)	(.0143)	(.0139)	(.0163)
Share Adults in Poverty	.126	.11	.133	.126
	(.029)	(.0237)	(.0267)	(.0292)
Share Seniors	.139	.175	.128	.138
	(.0261)	(.0224)	(.0169)	(.0251)
Share Seniors in Poverty	.0728	.0795	.0701	.0727
	(.0146)	(.016)	(.0132)	(.0145)
Share Black	.105	.11	.104	.105
	(.0955)	(.0953)	(.0938)	(.0957)
Share Hispanic	.102	.122	.0975	.101
	(.0996)	(.101)	(.0982)	(.0995)
Share Poor	.222	.203	.23	.222
	(.0465)	(.0424)	(.0438)	(.0469)
Share Poor (200% FPL)	.374	.345	.384	.375
	(.0619)	(.0586)	(.0589)	(.0619)
Democratic Governor	.428	.46	.547	.407
	(.495)	(.499)	(.498)	(.491)
Covid Caseload Rate	.104	1.53	0	2.35e-06
	(.7)	(2.24)	(0)	(.0000991)
Observations	13,950	950	1,750	11,250

Notes: Data are from Current Population Survey Annual Social and Economic Supplement, 2000-2022.

Table A.2: The Effect of the Business Cycle on Caseloads: Baseline Pooled Model Coefficients

	(1) SNAP	(2) Medicaid	(3) TANF	(4) UI	(5) UI (Total)	(6) SSI
γ_0	-0.187	0.157*	-0.484**	-1.189**	-1.219**	-0.123
	(0.162)	(0.091)	(0.225)	(0.555)	(0.604)	(0.309)
γ_1	0.101	-0.013	0.011	-0.557	-1.179	-0.441
	(0.275)	(0.114)	(0.297)	(0.862)	(0.961)	(0.446)
γ_2	-0.246	0.023	-0.081	-0.413	-0.248	0.571
	(0.370)	(0.109)	(0.313)	(0.842)	(0.974)	(0.464)
γ_3	0.025	0.003	-0.075	-0.069	-0.144	-0.077
	(0.311)	(0.110)	(0.340)	(0.701)	(0.863)	(0.459)
γ_4	-0.012	0.001	-0.135	-0.419	-0.306	0.195
	(0.253)	(0.112)	(0.387)	(0.630)	(0.786)	(0.432)
γ_5	0.033	-0.005	-0.074	-0.292	-0.138	-0.080
	(0.258)	(0.118)	(0.439)	(0.682)	(0.864)	(0.409)
γ_6	-0.768***	-0.136	-0.548	0.469	-1.459**	-0.602*
	(0.195)	(0.095)	(0.347)	(0.500)	(0.613)	(0.333)
Share Adults	-0.452**	-0.270	-2.405***	-4.586***	-5.802***	0.097
	(0.224)	(0.250)	(0.428)	(0.440)	(0.514)	(0.379)
Share Adults in Poverty	0.175	0.311	-0.510	-3.075***	-3.728***	0.121
	(0.256)	(0.288)	(0.526)	(0.505)	(0.629)	(0.455)
Share Seniors	-1.787***	1.783***	-3.056***	-8.606***	-10.907***	-1.777***
	(0.289)	(0.301)	(0.574)	(0.593)	(0.684)	(0.483)
Share Seniors in Poverty	1.682***	-2.071***	-3.921***	-1.900***	-2.738***	2.105***
	(0.301)	(0.332)	(0.596)	(0.524)	(0.661)	(0.492)
Share Black	-1.243***	-1.376***	-0.021	1.295***	0.327	-0.447
	(0.200)	(0.156)	(0.376)	(0.329)	(0.380)	(0.316)
Share Hispanic	-1.994***	-0.258**	-1.198***	-2.179***	-2.027***	-1.506***
	(0.120)	(0.120)	(0.223)	(0.201)	(0.251)	(0.175)
Share Poor	-1.039***	-0.772***	2.518***	2.075***	3.951***	-0.530*
	(0.168)	(0.178)	(0.355)	(0.319)	(0.375)	(0.296)
Share Poor (200% FPL)	2.580***	0.927***	1.519***	-0.288	-1.778***	0.611***
	(0.109)	(0.126)	(0.240)	(0.219)	(0.275)	(0.228)
Democratic Governor	0.024***	0.024***	0.008*	0.007*	0.011***	0.011***
	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.003)
Ln COVID Caseload Rate	-0.001	0.000	-0.035***	-0.005	0.031	-0.049***
	(0.008)	(0.005)	(0.010)	(0.023)	(0.027)	(0.018)
constant	-0.665**	-3.732***	4.534***	10.814***	21.134***	-5.654***
	(0.294)	(0.281)	(0.569)	(0.663)	(0.771)	(0.514)
$\Sigma_{s=0}^{6}\gamma_s$	-1.05***	0.03	-1.39***	-2.47***	-4.69***	-0.56***
	(0.06)	(0.06)	(0.13)	(0.15)	(0.17)	(0.10)
Observations	13,618	12,750	13,650	13,650	13,650	12,894

* p<0.10, ** p<0.05, *** p<0.010

Notes: Robust standard errors. Business cycle measured by employment per population. All specifications control for state fixed effects, month fixed effects, and state-by-month linear trends.

Table A.3: The Effect of the Business Cycle on Caseloads:By Period Model Coefficients

	(1) SNAP	(2) Medicaid	(3) TANF	(4) UI	(5) UI (Total)	(6) SSI
γ	-0.208	0.230*	-0.564*	-1.664**	-1.341	0.006
	(0.180)	(0.126)	(0.312)	(0.713)	(0.838)	(0.383)
γ_1	0.186	-0.007	0.016	-0.137	-1.087	-0.691
	(0.339)	(0.165)	(0.419)	(1.109)	(1.265)	(0.538)
γ_2	-0.244	0.025	-0.047	-0.289	-0.257	0.330
	(0.444)	(0.166)	(0.435)	(1.143)	(1.280)	(0.566)
γ_3	-0.050	0.019	-0.130	-0.396	-0.261	-0.079
	(0.414)	(0.167)	(0.435)	(0.945)	(1.076)	(0.540)
γ_4	-0.070	0.030	-0.012	-0.382	-0.475	0.618
	(0.323)	(0.168)	(0.442)	(0.779)	(0.935)	(0.518)
γ_5	0.052	-0.047	-0.092	0.014	0.281	-0.078
	(0.305)	(0.172)	(0.491)	(0.784)	(0.990)	(0.475)
γ_6	-0.723***	-0.398***	-0.517	0.541	-1.045	-0.765**
	(0.246)	(0.134)	(0.381)	(0.569)	(0.704)	(0.364)
γ^{COV}	-0.204	-0.107	0.378	0.079	-0.669	0.040
	(0.127)	(0.091)	(0.247)	(0.393)	(0.522)	(0.215)
γ_1^{COV}	-0.104	-0.007	0.048	-0.429	-0.187	0.261
	(0.209)	(0.131)	(0.355)	(0.600)	(0.715)	(0.337)
γ_2^{COV}	-0.070	0.007	0.001	-0.320	-0.210	0.239
	(0.235)	(0.136)	(0.369)	(0.635)	(0.666)	(0.370)
γ_3^{COV}	0.046	-0.014	0.120	0.267	-0.059	0.101
	(0.252)	(0.136)	(0.326)	(0.594)	(0.639)	(0.345)
γ_4^{COV}	-0.009	0.008	-0.083	-0.154	-0.057	-0.409
	(0.255)	(0.134)	(0.278)	(0.544)	(0.647)	(0.353)
γ_5^{COV}	-0.003	0.002	0.021	-0.309	-0.354	-0.029
	(0.239)	(0.139)	(0.293)	(0.527)	(0.630)	(0.352)
γ_6^{COV}	-0.206	0.294***	0.081	-0.472	-1.078**	0.255
	(0.171)	(0.101)	(0.217)	(0.370)	(0.445)	(0.234)
γ^{GR}	-0.108	-0.119	-0.018	-0.244	-0.028	-0.039
	(0.097)	(0.098)	(0.226)	(0.208)	(0.240)	(0.141)
γ_1^{GR}	0.020	-0.024	-0.096	-0.002	0.120	-0.077
	(0.141)	(0.138)	(0.314)	(0.295)	(0.358)	(0.218)
γ_2^{GR}	0.006	-0.001	-0.037	-0.005	-0.043	0.062
	(0.145)	(0.140)	(0.303)	(0.303)	(0.378)	(0.250)
γ_3^{GR}	-0.009	0.001	-0.047	-0.030	0.033	-0.138
	(0.147)	(0.141)	(0.296)	(0.325)	(0.397)	(0.229)
γ_4^{GR}	0.010	-0.008	-0.031	-0.129	-0.306	0.255
	(0.148)	(0.142)	(0.300)	(0.342)	(0.398)	(0.166)
γ_5^{GR}	0.010	-0.000	-0.026	0.147	0.035	-0.069
	(0.150)	(0.143)	(0.305)	(0.340)	(0.374)	(0.173)
γ_6^{GR}	0.284***	0.464***	-0.084	0.346	-0.021	0.040
	(0.109)	(0.103)	(0.219)	(0.239)	(0.261)	(0.144)
Share Adults	-0.575***	-0.529**	-2.181***	-4.568***	-5.562***	0.014
	(0.222)	(0.251)	(0.431)	(0.434)	(0.501)	(0.381)
Share Adults in Poverty	0.723***	0.356	-1.091**	-1.895***	-1.630***	-0.206
	(0.256)	(0.289)	(0.532)	(0.498)	(0.605)	(0.446)
Share Seniors	-1.723***	1.698***	-3.069***	-8.343***	-10.390***	-1.895***
	(0.285)	(0.301)	(0.576)	(0.578)	(0.660)	(0.478)
Share Seniors in Poverty	1.355***	-2.228***	-3.545***	-2.428***	-3.474***	2.245***
	(0.299)	(0.330)	(0.600)	(0.511)	(0.629)	(0.490)
Share Black	-1.278***	-1.375***	0.025	1.223***	0.190	-0.388
	(0.200)	(0.155)	(0.376)	(0.326)	(0.373)	(0.316)
Share Hispanic	-2.054***	-0.153	-1.151***	-2.404***	-2.542***	-1.410***
	(0.120)	(0.120)	(0.224)	(0.202)	(0.243)	(0.176)
Share Poor	-1.081***	-0.805***	2.589***	2.016***	3.877***	-0.548*
	(0.166)	(0.177)	(0.355)	(0.315)	(0.369)	(0.298)
Share Poor (200% FPL)	2.494***	0.847***	1.612***	-0.410*	-1.911***	0.628***
	(0.109)	(0.125)	(0.238)	(0.211)	(0.259)	(0.228)
Democratic Governor	0.023***	0.024***	0.009**	0.004	0.005	0.012***
	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.003)
Ln COVID Caseload Rate	-0.002	0.001	-0.033***	-0.009	0.023	-0.050***
	(0.007)	(0.005)	(0.010)	(0.023)	(0.027)	(0.019)
constant	-0.569*	-2.823***	4.227***	10.149***	18.853***	-5.185***
	(0.304)	(0.295)	(0.585)	(0.672)	(0.783)	(0.531)
$\Sigma_{s=0}^{6}\gamma_s$	-1.06***	-0.15**	-1.35***	-2.31***	-4.19***	-0.66***
	(0.07)	(0.06)	(0.13)	(0.15)	(0.18)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{COV}$	-0.55***	0.18***	0.57***	-1.34***	-2.61***	0.46***
	(0.05)	(0.04)	(0.11)	(0.14)	(0.21)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{GR}$	0.21***	0.31***	-0.34***	0.08	-0.21***	0.03
	(0.03)	(0.03)	(0.06)	(0.06)	(0.07)	(0.04)
$\Sigma_{s=0}^{6}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.76***	-0.13***	0.90***	-1.42***	-2.40***	0.42***
	(0.06)	(0.04)	(0.12)	(0.14)	(0.22)	(0.12)
Observations	13,618	12,750	13,650	13,650	13,650	12,894

* p<0.10, ** p<0.05, *** p<0.010

Notes: Robust standard errors. Business cycle measured by employment per population. All specifications control for state fixed effects, month fixed effects, and state-by-month linear trends.

Table A.4: The Effect of Alternative Business-Cycle Lag Structures on Caseloads

	(1) SNAP	(2) Medicaid	(3) TANF	(4) UI	(5) UI (Total)	(6) SSI
Static						
γ	-0.752***	0.005	-1.243***	-2.169***	-3.473***	-0.534***
	(0.066)	(0.055)	(0.116)	(0.172)	(0.222)	(0.099)
γ^{COV}	-0.415***	0.028	0.554***	-0.928***	-1.745***	0.418***
	(0.049)	(0.032)	(0.089)	(0.133)	(0.206)	(0.100)
γ^{GR}	0.151***	0.210***	-0.305***	0.018	-0.160**	0.015
	(0.027)	(0.028)	(0.056)	(0.060)	(0.066)	(0.036)
$\gamma^{COV} - \gamma^{GR}$	-0.57***	-0.18***	0.86***	-0.95***	-1.58***	0.40***
	(0.05)	(0.04)	(0.10)	(0.14)	(0.22)	(0.10)
Dynamic ($j = 3$)						
$\Sigma_{s=0}^{3}\gamma_s$	-0.91***	-0.06	-1.30***	-2.32***	-3.89***	-0.56***
	(0.07)	(0.06)	(0.12)	(0.15)	(0.18)	(0.10)
$\Sigma_{s=0}^{3}\gamma_s^{COV}$	-0.48***	0.10***	0.57***	-1.18***	-2.21***	0.46***
	(0.05)	(0.03)	(0.10)	(0.13)	(0.21)	(0.11)
$\Sigma_{s=0}^{3}\gamma_s^{GR}$	0.18***	0.26***	-0.32***	0.05	-0.19***	0.02
	(0.03)	(0.03)	(0.06)	(0.06)	(0.07)	(0.04)
$\Sigma_{s=0}^{3}\gamma_s^{COV} - \Sigma_{s=0}^{3}\gamma_s^{GR}$	-0.66***	-0.16***	0.89***	-1.23***	-2.02***	0.43***
	(0.06)	(0.04)	(0.11)	(0.14)	(0.21)	(0.11)
Dynamic ($j = 9$)						
$\Sigma_{s=0}^{9}\gamma_s$	-1.24***	-0.26***	-1.38***	-2.25***	-4.32***	-0.79***
	(0.06)	(0.07)	(0.13)	(0.12)	(0.15)	(0.10)
$\Sigma_{s=0}^{9}\gamma_s^{COV}$	-0.55***	0.25***	0.57***	-1.49***	-2.96***	0.44***
	(0.05)	(0.05)	(0.11)	(0.10)	(0.12)	(0.08)
$\Sigma_{s=0}^{9}\gamma_s^{GR}$	0.25***	0.37***	-0.35***	0.13**	-0.20***	0.06
	(0.03)	(0.03)	(0.07)	(0.06)	(0.07)	(0.05)
$\Sigma_{s=0}^{9}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.80***	-0.12**	0.92***	-1.62***	-2.77***	0.38***
	(0.06)	(0.06)	(0.12)	(0.11)	(0.13)	(0.09)
Dynamic ($j = 12$)						
$\Sigma_{s=0}^{12}\gamma_s$	-1.38***	-0.39***	-1.42***	-2.24***	-4.40***	-0.85***
	(0.06)	(0.07)	(0.14)	(0.13)	(0.16)	(0.11)
$\Sigma_{s=0}^{12}\gamma_s^{COV}$	-0.55***	0.33***	0.61***	-1.62***	-3.04***	0.47***
	(0.05)	(0.06)	(0.12)	(0.11)	(0.13)	(0.09)
$\Sigma_{s=0}^{12}\gamma_s^{GR}$	0.29***	0.43***	-0.37***	0.18***	-0.19**	0.09*
	(0.03)	(0.03)	(0.07)	(0.06)	(0.08)	(0.05)
$\Sigma_{s=0}^{12}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.84***	-0.10*	0.98***	-1.80***	-2.85***	0.39***
	(0.06)	(0.06)	(0.13)	(0.12)	(0.15)	(0.10)
Observations	13,768	12,900	13,734	13,800	13,800	12,894

* p<0.10, ** p<0.05, *** p<0.010

Notes: Regression coefficients are elasticities, with robust standard errors. Business cycle measured by employment per population. Total effect of business cycle in Great Recession and Covid-19 is found by summing non-recessionary coefficients with respective marginal effects of recessionary coefficients. All specifications control for state demographics, state fixed effects, month fixed effects, and state-by-month linear trends.

Table A.5: Sensitivity of Business-Ccyle Estimates to Alternative Dating of Great Recession

	(1) SNAP	(2) Medicaid	(3) TANF	(4) UI	(5) UI (Total)	(6) SSI
Baseline GR (Jan 2008 - Nov 2010)						
$\Sigma_{s=0}^{6}\gamma_s$	-1.06***	-0.15**	-1.34***	-2.31***	-4.19***	-0.66***
	(0.07)	(0.06)	(0.13)	(0.15)	(0.18)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{COV}$	-0.55***	0.18***	0.57***	-1.34***	-2.61***	0.46***
	(0.05)	(0.04)	(0.11)	(0.14)	(0.21)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{GR}$	0.21***	0.31***	-0.33***	0.08	-0.21***	0.03
	(0.03)	(0.03)	(0.06)	(0.06)	(0.07)	(0.04)
$\Sigma_{s=0}^{6}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.76***	-0.13***	0.90***	-1.42***	-2.40***	0.42***
	(0.06)	(0.04)	(0.12)	(0.14)	(0.22)	(0.12)
Alt GR 1 (Jan 2008 - June 2009)						
$\Sigma_{s=0}^{6}\gamma_s$	-0.97***	0.00	-1.43***	-2.26***	-4.27***	-0.64***
	(0.06)	(0.06)	(0.13)	(0.15)	(0.17)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{COV}$	-0.59***	0.12***	0.60***	-1.37***	-2.59***	0.45***
	(0.05)	(0.04)	(0.11)	(0.14)	(0.21)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{GR}$	0.00	0.06	-0.41***	-0.27***	-0.28***	0.02
	(0.04)	(0.04)	(0.09)	(0.09)	(0.10)	(0.05)
$\Sigma_{s=0}^{6}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.59***	0.07	1.01***	-1.10***	-2.31***	0.44***
	(0.07)	(0.06)	(0.14)	(0.16)	(0.23)	(0.12)
Alt Gr 2 (Jan 2008 - Dec 2013)						
$\Sigma_{s=0}^{6}\gamma_s$	-1.26***	-0.34***	-1.19***	-2.32***	-3.95***	-0.73***
	(0.07)	(0.06)	(0.14)	(0.15)	(0.18)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{COV}$	-0.41***	0.29***	0.47***	-1.32***	-2.75***	0.50***
	(0.05)	(0.04)	(0.11)	(0.14)	(0.22)	(0.11)
$\Sigma_{s=0}^{6}\gamma_s^{GR}$	0.40***	0.49***	-0.38***	0.08	-0.43***	0.11***
	(0.02)	(0.02)	(0.04)	(0.05)	(0.06)	(0.03)
$\Sigma_{s=0}^{6}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.81***	-0.20***	0.84***	-1.39***	-2.31***	0.39***
	(0.06)	(0.04)	(0.11)	(0.14)	(0.21)	(0.11)
Observations	13,618	12,750	13,586	13,650	13,650	12,894

* p<0.10, ** p<0.05, *** p<0.010

Notes: Regression coefficients are elasticities, with robust standard errors. Business cycle is measured by employment per population. Total effect of business cycle in Great Recession and Covid-19 is found by summing non-recessionary coefficients with respective marginal effects of recessionary coefficients. All specifications control for state demographics, state fixed effects, month fixed effects, and state-by-month linear trends.

Table A.6: The Effect of Cross-Program Caseload Interactions on Business-Cycle Estimates

	(1) SNAP	(2) Medicaid	(3) TANF	(4) UI (Total)	(5) SSI
LNSSI_6	0.085***	0.000	0.203***	-0.001	
	(0.009)	(0.008)	(0.018)	(0.028)	
LNUI2_6	0.074***	-0.015***	0.080***		0.053***
	(0.005)	(0.004)	(0.010)		(0.010)
LNTANF_6	0.109***	0.004		0.080***	0.060***
	(0.005)	(0.006)		(0.013)	(0.008)
LNMedChipTot_6	0.231***		0.009	-0.083***	-0.038**
	(0.010)		(0.025)	(0.025)	(0.017)
GR=1 × LNSSI_6	-0.006	0.000	-0.147***	0.025	
	(0.010)	(0.011)	(0.021)	(0.018)	
GR=1 × LNUI2_6	-0.007	-0.045***	-0.057***		0.007
	(0.005)	(0.006)	(0.011)		(0.008)
GR=1 × LNTANF_6	0.016***	-0.015***		-0.039***	-0.001
	(0.004)	(0.004)		(0.009)	(0.006)
GR=1 × LNMedChipTot_6	-0.029***		0.018	-0.124***	0.057***
	(0.008)		(0.020)	(0.019)	(0.015)
COVID=1 × LNSSI_6	-0.036**	0.045***	-0.149***	-0.054	
	(0.015)	(0.011)	(0.024)	(0.042)	
COVID=1 × LNUI2_6	-0.019***	-0.019***	-0.042***		-0.153***
	(0.008)	(0.005)	(0.013)		(0.019)
COVID=1 × LNTANF_6	0.001	-0.009**		-0.059**	0.041***
	(0.006)	(0.004)		(0.025)	(0.015)
COVID=1 × LNMedChipTot_6	0.049**		-0.062*	0.143*	-0.096**
	(0.021)		(0.032)	(0.077)	(0.049)
LNSNAP_6		0.273***	0.511***	0.199***	0.114***
		(0.012)	(0.024)	(0.030)	(0.018)
GR=1 × LNSNAP_6		0.022*	0.101***	-0.026	-0.073***
		(0.012)	(0.021)	(0.019)	(0.014)
COVID=1 × LNSNAP_6		-0.058***	0.049*	0.309***	-0.094***
		(0.010)	(0.027)	(0.065)	(0.034)
$\Sigma_{s=0}^{6}\gamma_s$	-0.61***	-0.28***	-0.04	-3.86***	-0.43***
	(0.07)	(0.06)	(0.13)	(0.20)	(0.12)
$\Sigma_{s=0}^{6}\gamma_s^{COV}$	-0.35***	0.16***	0.38***	-1.12***	-0.40***
	(0.07)	(0.05)	(0.13)	(0.29)	(0.15)
$\Sigma_{s=0}^{6}\gamma_s^{GR}$	0.20***	0.25***	-0.72***	-0.71***	-0.03
	(0.05)	(0.04)	(0.10)	(0.11)	(0.06)
$\Sigma_{s=0}^{6}\gamma_s^{COV} - \Sigma_{s=0}^{6}\gamma_s^{GR}$	-0.55***	-0.10	1.10***	-0.41	-0.37**
	(0.08)	(0.06)	(0.16)	(0.29)	(0.15)
Observations	11,240	11,394	11,276	11,148	11,462

* p<0.10, ** p<0.05, *** p<0.010

Notes: The 6 subscript refers to a 6-month lagged average. Regression coefficients are elasticities, with robust standard errors. Business cycle is measured by employment per population. Total effect of business cycle in Great Recession and Covid-19 is found by summing non-recessionary coefficients with respective marginal effects of recessionary coefficients. All specifications control for state demographics, state fixed effects, month fixed effects, and state-by-month linear trends.

Table A.7: The Effect of Covid-19 Policies on Caseloads (with EPOP Interaction)

	(1) SNAP	(2) Medicaid	(3) TANF	(4) UI	(5) UI (Total)	(6) SSI
Binary						
COVID Policy Index	0.066	0.053	0.371***	0.328**	0.271	0.277**
	(0.074)	(0.039)	(0.101)	(0.160)	(0.206)	(0.122)
$\Sigma_{s=0}^{6} HI * \gamma_s^{COV}$	0.01***	-0.01***	-0.01**	-0.01	0.05***	-0.04***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
$\Sigma_{s=0}^{6} \gamma_s$	-1.00***	-0.18***	-1.35***	-2.32***	-3.94***	-0.81***
	(0.07)	(0.06)	(0.13)	(0.15)	(0.18)	(0.11)
$\Sigma_{s=0}^{6} \gamma_s^{COV}$	-0.49***	0.17***	0.62***	-1.30***	-2.39***	0.40***
	(0.05)	(0.04)	(0.12)	(0.14)	(0.21)	(0.11)
$\Sigma_{s=0}^{6} \gamma_s^{GR}$	0.20***	0.32***	-0.34***	0.08	-0.25***	0.05
	(0.03)	(0.03)	(0.06)	(0.06)	(0.07)	(0.04)
$\Sigma_{s=0}^{6} \gamma_s^{COV} - \Sigma_{s=0}^{6} \gamma_s^{GR}$	-0.70***	-0.15***	0.96***	-1.39***	-2.15***	0.35***
	(0.06)	(0.05)	(0.13)	(0.15)	(0.22)	(0.12)
Index						
COVID Policy Index	0.530***	0.300***	-0.060	0.621	-0.927*	0.802***
	(0.188)	(0.114)	(0.236)	(0.441)	(0.506)	(0.285)
$\Sigma_{s=0}^{6} Index * \gamma_s^{COV}$	-0.09	-0.11***	0.09	-0.14	0.57***	-0.31***
	(0.06)	(0.03)	(0.08)	(0.12)	(0.15)	(0.09)
$\Sigma_{s=0}^{6} \gamma_s$	-1.05***	-0.17***	-1.30***	-2.32***	-3.99***	-0.74***
	(0.07)	(0.06)	(0.13)	(0.15)	(0.18)	(0.11)
$\Sigma_{s=0}^{6} \gamma_s^{COV}$	-0.47***	0.21***	0.58***	-1.25***	-2.66***	0.54***
	(0.06)	(0.04)	(0.11)	(0.15)	(0.22)	(0.12)
$\Sigma_{s=0}^{6} \gamma_s^{GR}$	0.21***	0.31***	-0.34***	0.08	-0.23***	0.04
	(0.03)	(0.03)	(0.06)	(0.06)	(0.07)	(0.04)
$\Sigma_{s=0}^{6} \gamma_s^{COV} - \Sigma_{s=0}^{6} \gamma_s^{GR}$	-0.68***	-0.10**	0.93***	-1.34***	-2.43***	0.49***
	(0.06)	(0.05)	(0.12)	(0.16)	(0.23)	(0.12)
Observations	13,618	12,750	13,650	13,650	13,650	12,894

* p<0.10, ** p<0.05, *** p<0.010

Notes: Robust standard errors. Business cycle is measured by employment per population. Total effect of business cycle in Great Recession and Covid-19 is found by summing non-recessionary coefficients with respective marginal effects of recessionary coefficients. "Binary" specification interacts an indicator whether the state has stringent Covid-19 policies with the business cycle; "Index" specification interacts the continuous index of stste Covid-19 policies with the business cycle. All specifications control for state demographics, state fixed effects, month fixed effects, and state-by-month linear trends.

B Data Appendix

Below we provide details on the data sources and cleaning of caseload and covariates used in our analysis.

B.1 SNAP

Monthly, state-level SNAP caseload data is provided by the United States Department of Agriculture.[23] State-level caseload data occasionally have large spikes due to short-term disaster relief provided by the program. Because these caseloads are unrelated to the business cycle but can have a large weight for estimation, we smooth the SNAP data by removing non-Covid months in which a state caseload spike is greater than six times a standard deviation of the state-level variation in monthly caseloads.

B.2 UI

Data on Unemployment Insurance claims between 1999 and 2022 are provided by the Department of Labor.[24]. This data is available weekly (aggregated to monthly) by state. Regular UI claims are provided throughout the period and we include both initial and continuing claims. Data in total UI programs, including the Temporary Extended Unemployment Compensation program (April 2003 through March 2005), the Emergency Unemployment Compensation and Extended Benefits programs (July 2008 through December 2013), and the Pandemic Unemployment Assistance, Pandemic Unemployment Compensation, and Pandemic Emergency Unemployment Compensation programs (March 2020 through August 2021) are available during their respective periods.

B.3 TANF

Monthly state-level TANF caseloads data is provided by the Administration of Children and Families.[25] We linearly interpolate over any missing values, which affect only a handful of

[23] `https://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap`
[24] Claims data are available here: `https://oui.doleta.gov/unemploy/claims.asp`
[25] `https://www.acf.hhs.gov/ofa/programs/tanf/data-reports`

observations.

B.4 Medicaid

Monthly state-level Medicaid and Children's Health Insurance Program (CHIP) caseload data comes from two sources. First, from January 1999 through September 2012 data comes from the Medicaid Statistical Information System tables, which were reported as part of an annual report by the Center for Medicare and Medicaid Services. For the years 2009-2012, caseload data is missing for three states: Massachusetts, Utah, and Wisconsin. Beginning in October 2013 and through 2022, Medicaid caseload data is provided by the Kaiser Family Foundation. Due to changes in data sources and the missing data between September 2012 and October 2013, we include indicators in the Medicaid regressions for each data period. Unlike SNAP and TANF data, we do not exclude months with large spikes in caseloads since this is often related to expansions of Medicaid coverage over this period, which is a policy response we do not wish to exclude from the analysis.

B.5 SSI

Data on SSI applications from from the Social Security Administration Monthly Workload Data files and are available beginning in October 2000. This dataset provides monthly state-level SSI application data, however applications are tallied on a weekly basis. Because the number of weeks counted each month varies, applications are adjusted for the number of reported weeks within the month. Similar to other data we exclude large non-Covid spikes in applications greater than 6 standard deviations of the application variation. This adjustment only affects 6 observations. Applications not assigned to a state, such as from a military base or online, are excluded.

B.6 Labor Force

To measure the changes in the labor force and business cycle we primarily rely on the employment-population ratio. We obtain monthly state-level EPOP data, along with Unemployment Rate (UR), and Labor Force Participation (LFP) data from the Bureau of Labor Statistics.

B.7 Demographics

To account for state-level demographic changes that may affect social safety net caseloads, we include the following variables taken from the annual Current Population Survey Annual Social and Economic Supplement: share of households that are adults, adults in poverty, seniors, seniors in poverty, Black, Hispanic, below the poverty line, and below 200 percent of the poverty line. These variables are all linearly interpolated across months within years.

B.8 Seasonal Adjustment

To account for seasonal trends in the business cycle and caseloads, we adjust our caseload and business cycle variables (Y_{it}) using the following equation:

$$\ln \hat{Y}_{it} = \ln Y_{it} - \ln \bar{Y}_{im} - \ln \bar{Y}_{i}$$

where $\ln \bar{Y}_{im}$ is the mean of Y for state i and month m for all t prior to January 2020, and $\ln \bar{Y}_{i}$ is the mean of Y for all months prior to January 2020. We exclude 2020 from our seasonal adjustment factors so as not to allow the pandemic shocks to distort the measured seasonality.