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ABSTRACT

We analyze the effect of California's $20 fast food minimum wage, which was enacted in September 2023 and went into effect in April 2024, on employment in the fast food sector. In unadjusted data from the Quarterly Census of Employment and Wages, we find that employment in California's fast food sector declined by 2.7 percent relative to employment in the fast food sector elsewhere in the United States from September 2023 through September 2024. Adjusting for pre-AB 1228 trends increases this differential decline to 3.2 percent, while netting out the equivalent employment changes in non-minimum-wage-intensive industries further increases the decline. Our median estimate translates into a loss of 18,000 jobs in California's fast food sector relative to the counterfactual.

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1 Introduction

In September 2023, through Assembly Bill 1228, California legislated a minimum wage increase to $20 per hour for fast food workers employed at chains with more than sixty locations nationwide.[1] Because the entirety of this increase went into effect on April 1, 2024, six months after AB 1228's passage, this is one of the largest one-time minimum wage increases in United States history and one of the few focused on a single industry in recent decades.

We analyze the effects of AB 1228 on employment in the fast food sector using the Quarterly Census of Employment and Wages (U.S. Bureau of Labor Statistics, 2025). In unadjusted data, we find that employment in California's fast food sector declined by 2.7 percent relative to employment in the fast food sector elsewhere in the United States from September 2023 through September 2024. Adjusting for pre-AB 1228 trends increases this differential decline to 3.2 percent. Netting out the equivalent detrended employment change in California's non-minimum-wage-intensive industries relative to the rest of the United States increases the differential decline further to 3.6 percent. Our median estimate translates into a loss of 18,000 jobs that would have otherwise existed in the absence of the policy. Difference-in-differences event study analyses also show declines in employment after the legislation's enactment and subsequent implementation.

A number of factors will tend to lead our estimates to understate the likely impact of a $4 increase in the sector-wide minimum wage. First, not all restaurants in the limited-service sector were subject to AB 1228, which applied to chains with at least sixty establishments nationwide; as such, the higher wage did not bind on all employees in this sector. Further, a number of municipalities in the state have imposed higher minimum wages than the state level, including some of the largest cities like Los Angeles ($17.24 in July 2024), San Francisco ($18.67 in July 2024), San Jose ($17.55 in January 2024), and San Diego ($16.85 in January 2024). These policies limit the extent to which AB 1228 raised the effective minimum wage. In addition, twenty-eight other states increased their minimum wages after the passage of AB 1228, including a number in excess of $1 per hour. To the extent that those policies reduce employment, including these states in a nationwide control group attenuates estimates of AB 1228's effects on employment. Indeed, we find modestly larger differential declines in California's fast food employment when we exclude states that increased their minimum

[1] The law in question also established a Fast Food Council within its Department of Industrial Relations, which was "charged with developing minimum fast food restaurant employment standards, including, as appropriate, standards on wages, working conditions, and training, as are reasonably necessary or appropriate to protect and ensure the welfare, including the physical well-being and security, of fast food workers" (California State Legislature, 2023) The full text of the law is available at https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240AB1228. We use the term "fast food" to encompass the limited-service restaurant sector.

wage rates from the sample. While estimates that utilize the entirety of the United States as the control group are our baseline, such estimates should be viewed as placing a lower bound on the effects of California's $20 minimum wage on its fast food sector. We view the inclusion of all states as the preferred approach in this case because it is transparent, conservative, and limits the scope for researchers to endogenously select a control group that yields a result consistent with their priors.

We also examine the possibility of spillovers to California's full-service restaurant sector, which was subject to the state's general minimum wage increase of 50 cents in January 2024 (to $16 per hour) but whose employers are often in competition with fast food restaurants for staff. Full-service restaurants also exhibited employment declines in California relative to the rest of the United States. Relative to the evidence for the fast food sector, the declines we observe for full-service restaurant are smaller in magnitude.

There is increasing evidence that minimum wage increases have nonlinear effects, with large increases having qualitatively different impacts than relatively small minimum wage increases (Clemens and Strain, 2021; Clemens et al., 2025; Meer and Tajali, 2025). This difference is predicted by many models of the labor market, including those that emphasize firm bargaining power (Berger et al., 2025), capital and production technology adjustment frictions (Hurst et al., 2022), and non-wage adjustment margins (Clemens, 2021). California's policy experiment provides an opportunity to examine the effects of an unusually large increase and its focus on a single sector also allows us to hone in on a particular industry within a given state.

Because of its relative novelty, this policy has already attracted some analysis. Reich and Sosinskiy (2024) assess AB 1228's effects on fast-food wages and prices, and use preliminary CES data to examine employment, finding no adverse impact. However, CES data are subject to sampling error and revisions – indeed, revised CES data after the initial publication of their report is more strongly suggestive of negative effects.[2] Sovich and Hamdi (2025) analyze the effects of AB 1228 using anonamyzed payroll data from Equifax, which covers 5,000 large employers across the United States. Their analysis focuses on relatively large establishments[3] and finds evidence of offsetting declines in turnover and hiring that net to modest if any impact on employment. We add to these existing analyses by examining industry-wide employment using comprehensive data from the Quarterly Census of Employment and

[2]In a 2025 brief for the Institute for Research on Labor and Employment, Reich again reports no adverse effects using QCEW data. However, details regarding the econometric approach in the report are scant (Reich, 2025).

[3]For their establishment-level analysis, Sovich and Hamdi (2025) report analyzing "1,097 establishments (23 distinct firms) in [their] fast-food establishment sample. Prior to treatment, the median fast-food establishment has 67 employees." These establishments thus appear quite large relative to food service industry-wide averages.

Wages and by analyzing these comprehensive data as transparently as possible.

The remainder of this paper proceeds as follows. We discuss our data and our methodology in Sections 2 and 3. We present results in Section 4 and conclude in Section 5.

2 Data

We use monthly employment data from the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) from September 2021 (two years prior to AB 1228's enactment) through December of 2024. The data thus cover two calendar years preceding the passage of AB 1228 and extend through the most recently available data at the time this paper was written. Our post-treatment data include the two quarters between AB 1228's September 2023 passage and April 2024 implementation, as well as three quarters following the $20 fast food minimum wage's implementation. The data provide state-level employment counts by industry for privately-owned establishments. We focus on three sectors: fast food (NAICS 722513), full-service restaurants (722511), and a constructed non-minimum-wage-intensive category defined as total private employment excluding food services and retail (NAICS 44-45 and 72). Data are reshaped from quarterly to monthly using reported employment for each of the three months in each quarter. We convert wage data to first-quarter 2024 real dollars using the non-seasonally-adjusted Consumer Price Index; wage data from the QCEW are only available quarterly.

For initial time series tabulations, we construct a "Rest of U.S." series by subtracting California from national totals. For regression analyses we use state-level aggregates. In addition to unadjusted data, we also analyze data that are indexed relative to September 2023 (i.e., the month AB 1228 was passed) and that are detrended and seasonally adjusted. We remove state-specific pre-trends by separately detrending each geography-by-industry series by calculating the compound monthly growth rate over the 24 months prior to the policy change and subtracting the resulting counterfactual trend from the observed series.[4] We then adjust additionally for seasonality by regressing detrended employment on month-of-year fixed effects using data from September 2021 to September 2023, separately for California and the Rest of U.S.[5] This choice reflects the clear differences in seasonality that appear in the unadjusted figures we present and discuss below. We obtain detrended and

[4]Crucially, the trends themselves are estimated using pre-treatment data only so that they cannot be influenced by dynamic treatment effects. An expanding body of research recognizes that mistakenly allowing geography-specific trends to be influenced by dynamic treatment effects would result in bias (Meer and West, 2016).

[5]We proceed in this order because removing the trend first ensures that the seasonal adjustment captures true cyclical fluctuations rather than the growth trends states experienced as employment recovered from its early-pandemic lows.

seasonally adjusted series through December 2024 by netting out the resulting seasonal adjustment factors.

As a first look at the data and the relevance of these adjustments, we present comparisons of fast food employment in California and the rest of the U.S. in Figure 1, keeping in mind that many of those states had minimum wage increases themselves. We begin with levels of employment (1a), then index both series to 100 in September 2023 (1b).[6] We also show the series detrended as described above (1c) and both detrended and adjusted for seasonality (1d).

A relative decline in fast food employment in California following the passage of AB 1224 is evident in the unadjusted levels of employment, in the indexed employment series, in the detrended series, and in the detrended and seasonally adjusted series. In Figures 1b, 1c, and 1d, for which each series has been indexed relative to September 2023, the magnitude of the relative decline through late 2024 is readily observed from the graphs as being on the order of 2 to 4 percent. In panel 1a, the y-axis ranges were chosen such that the top of the range is just under 14 percent higher than the bottom of the range for both the CA and Rest of U.S. series, such that similar movements in the level of each series correspond with an equivalent percent change. Here too, a difference on the order of 2-3 percent is visually apparent in the figure. The key implication of this set of figures is that indexing, detrending, and seasonally adjusting the data make the series more visually comparable but do not substantively alter the relative movements that underlie our regression estimates.

For comparison, Figure A1 shows the same set of figures for non-minimum-wage-intensive industries. Here, we see that California performed worse than the Rest of the U.S. for a two-month period at the onset of 2023, but was otherwise on a similar trend. These non-minimum-wage intensive series constitute the within-state control series that will be netted out by our triple-difference estimators.

3 Methods

Our formal econometric analyses include a combination of basic difference-in-differences style estimates and event studies. For our difference-in-differences estimators, we focus on 12-

[5]We are careful to estimate seasonal effects using pre-treatment data only. Additionally, the unadjusted figures we present and discuss below illustrate why it is relevant in this historical episode to detrend prior to estimating seasonal adjustment factors; seasonal adjustment would otherwise track the substantial employment growth associated with post-pandemic employment recoveries.

[6]Subscripts are such that regions are indexed by j, industries by i, and time by t. Indexed employment in region $j \in$ {CA, Rest of US} in industry $i \in$ {Fast Food, Full Service, Non-MW Intensive}, at time t is thus Indexed $\text{Emp}_{\text{i,j,t}} = \frac{\text{Emp}_{\text{i,j,t}}}{\text{Emp}_{\text{i,j,Sept 2023}}}$.

month changes in employment from September 2023 to September 2024. The key benefit of this emphasis is to avoid the need to adjust for seasonality, which is a non-trivial source of variance due in part to the COVID-19 pandemic's influence on seasonal employment patterns. Our simplest estimator compares California to the rest of the United States over this time horizon and is thus:

$$\begin{aligned}\beta_{\text{DD}} = &[\text{Indexed Emp}_{\text{Fast Food, CA, Sept 2024}} - \text{Indexed Emp}_{\text{Fast Food, Rest of US, Sept 2024}}] \\ &- [\text{Indexed Emp}_{\text{Fast Food, CA, Sept 2023}} - \text{Indexed Emp}_{\text{Fast Food, Rest of US, Sept 2023}}] \end{aligned} \tag{1}$$

As extensions to our simplest estimator, we augment Equation 1 along two dimensions. First, we net out pre-treatment trend growth from September 2021 to September 2023 using the methods described in the previous section to generate a set of de-trended difference-in-differences style estimators. Second, we use non-minimum-wage-intensive industries as a within-state control group to construct a triple-difference estimator. The triple-difference estimator can be written as:

$$\begin{aligned}\beta_{\text{DDD}} = &\Big[[\text{Indexed Emp}_{\text{Fast Food, CA, Sept 2024}} - \text{Indexed Emp}_{\text{Fast Food, Rest of US, Sept 2024}}] \\ &- [\text{Indexed Emp}_{\text{Fast Food, CA, Sept 2023}} - \text{Indexed Emp}_{\text{Fast Food, Rest of US, Sept 2023}}]\Big] \\ &- \Big[[\text{Indexed Emp}_{\text{Non-MW Intensive, CA, Sept 2024}} - \text{Indexed Emp}_{\text{Non-MW Intensive, Rest of US, Sept 2024}}] \\ &- [\text{Indexed Emp}_{\text{Non-MW Intensive, CA, Sept 2023}} - \text{Indexed Emp}_{\text{Non-MW Intensive, Rest of US, Sept 2023}}]\Big] \end{aligned} \tag{2}$$

In addition to the estimators described by Equations 1 and 2, we estimate a standard set of event study regressions at the state level. The event study regressions have the benefit of presenting the full time paths of employment changes in California's fast food sector relative to various comparison groups. The difference-in-differences event study is described by:

$$\text{Indexed Emp}_{\text{s,t}} = \phi_s + \phi_t + \sum_{t \neq \text{Sept 2023}} \rho_t \text{CA}_s \times \text{Time}_t + \epsilon_{s,t}, \tag{3}$$

where states are indexed by s and months are indexed by t, with ϕ_s and ϕ_t being the corresponding sets of state and time fixed effects. Within the summation, September 2023 is the omitted time period such that the ρ_t track differential changes in California relative to the rest of the United States from September 2023 to period t.

The basic triple-difference style equation, which adds an index for industry i, is:

$$\text{Indexed Emp}_{\text{i,s,t}} = \phi_s \times \phi_i + \phi_s \times \phi_t + \phi_i \times \phi_t + \sum_{t \neq \text{Sept 2023}} \rho_t \text{CA}_s \times \text{Time}_t \times \text{Fast Food}_i + \epsilon_{i,s,t}. \quad (4)$$

Equation 4 includes state by industry, state by time, and industry by time fixed effects. In this specification, the ρ_t track differential changes in California's fast food sector relative to the fast food sector in the rest of the United States net of the equivalent changes that occurred in California's non minimum wage intensive industries relative to those same industries in other states.

Identifying the causal effect of AB 1228 requires that employment in California's fast food sector would have moved along a trend parallel to that of the relevant counterfactual in the absence of AB 1228. We test the plausibility of this assumption in two ways. First, we compare the simple and detrended estimates we obtain from equations 1 and 2. If these estimates are similar, this provides evidence that our estimates are not sensitive controlling for pre-AB 1228 trends. Second, the estimates of ρ_t in Equations 3 and 4 for periods prior to September 2023 provide direct evidence on whether California's fast food sector was on divergent trends relative to our counterfactual in the months leading up to AB 1228's enactment.

Because AB 1228 was only enacted in California, only one state is exposed to treatment. Consequently, standard cluster-robust standard errors will tend to produce insufficiently conservative inference. We rely instead on placebo inference, in which we assign treatment status to each of the states in our control group (at the same time as the enactment of AB 1228) and assess where our actual point estimates sit within the distribution of placebo point estimates. Because we are testing the hypothesis that AB 1228 had a negative effect on employment, we focus on the fraction of states for which the placebo treatment effect takes a more negative value than the effect we estimate for California. For our difference-in-difference and triple-difference estimates, which have the benefit of summarizing the relevant estimates in a single parameter, we present tabular listings of the sets of states with placebo treatment effects that are more negative than the California estimate. For the event study estimators, we present the time paths of each state's placebo treatment effects (and California's estimates) in "spaghetti plots," as has become standard in the synthetic control literature. These methods are likely to yield overly conservative estimates since California is the nation's most populous state and consists of a relatively large number of geographically dispersed labor markets, and is thus likely to exhibit less variance than the typical "placebo" state used within the inference exercise.

Our sample for estimating these event study regressions uses state-level data. In specifications that use detrended data, each state's growth rate is calculated separately over the 24 months prior to September 2023 to produce the counterfactual trend for that state.[7] For triple-difference estimates, the detrending exercise is conducted at the state-by-industry level.

While our main text figures present estimates using detrended and seasonally adjusted data, our appendix figures present estimates illustrating how our estimates are impacted by detrending and seasonally adjusting. Reassuringly, the effects of these adjustments are as one would expect based on the time series presented earlier in Figure 1. Because we detrend and seasonally adjust the data prior to estimation, Equations 3 and 4 are estimated as shown, with fixed effects and no additional controls, on the detrended and seasonally adjusted data.

4 Results

We begin by demonstrating that AB 1228 had a meaningful effect on wages in the fast food industry in California. Figure 2a shows indexed, detrended, and seasonally adjusted average wages for the California and Rest of U.S. fast food sectors. The QCEW wage data are available at the quarterly level only. Wages track each other closely until the quarter after which AB 1228 takes effect. This is seen explicitly in the event study in Figure 2b, which shows that the wage increase in California is an outlier relative to the distribution of placebo estimates associated with other states.[8]

Having established that AB 1228 increased wages substantially in California's fast food sector, we next turn to the basic difference-in-differences and triple difference estimates described by Equations 1 and 2 for employment. The full set of cell entries that underlie these estimates are presented in Table 1.

The first three rows of Table 1's Column 5 illustrate that relative to September 2023, fast food employment in California had declined by 2.64 percent, whereas employment in non-minimum-wage-intensive industries had increased by 0.58 percent. This contrasts with the rest of the United States, where fast food restaurant employment had increased marginally while employment in all non-minimum-wage-intensive industries had risen by 1 percent. Our

[7] This is equivalent to the procedure used earlier to generate the detrended time series presented in Figure 1, but here the trends are estimated separately for each state rather than for the "Rest of U.S." as a whole. Detrending and seasonally adjusting using only pre-treatment data helps avoid bias from post-treatment influence on trend estimates (Meer and West, 2016); adjustment using pre-treatment data is in the spirit of the imputation difference-in-differences estimators developed by separately by Gardner et al. (2024) and by Borusyak et al. (2024).

[8] The other visible outlier in the figure is the District of Columbia, which is among the jurisdictions that also enacted a minimum wage increase during our sample.

estimate of Equation 1, which compares California's fast food employment growth with fast food employment growth elsewhere in the United States, is -2.74 percent, reflecting that California's fast food employment contracted by 2.64 percent while fast food employment elsewhere increased by 0.10 percent. We also compare California to a set of states that did not change their minimum wage after September 2023. These states had slightly higher increases in fast food employment – possibly reflecting the impact of higher minimum wages on low-wage sectors in states that implemented increases. This leads to a larger estimate of -3.14 percent for Equation 1. This suggests that estimates that rely on the full set of states as controls may produce a lower bound on the effect of AB 1228.

A basic difference-in-differences estimate is subject to standard identification threats. One potential threat is the possibility that fast food employment in California and the rest of the United States may have diverged from September 2023 to September 2024 because they were already trending differentially. We check for this by comparing the trends in these variables from September 2021 to September 2023. The relevant cell entries in Column 4 reveal that fast food employment in California had, in fact, grown slightly more than fast food employment in the rest of the United States prior to AB 1228's enactment. Consequently, if the associated pre-treatment trends are extrapolated to produce a detrended estimate, we obtain a difference-in-differences estimate of -3.2 percent (-3.5 percent when California is only compared with states that enacted no minimum wage increases).

A second threat is the possibility that California's overall labor market may have been impacted by shocks that affected it differently relative to the rest of the country after the implementation of its fast food minimum wage.[9] We investigate the possibility of this sort of shock through Equation 2, which incorporates a comparison of employment changes in non-minimum-wage-intensive industries (private employment excluding NAICS 44-45 and 72) in California relative to the rest of the United States. Because employment in non-minimum-wage-intensive industries grew fairly similarly in California relative to the rest of the United States, our estimate of Equation 2 is similar to that of Equation 1, at -2.3 percent. The detrended version of Equation 2 comes in larger, at -3.6 percent, reflecting that California's non-minimum-wage-intensive employment was on a slower growth trend than the rest of the United States prior to the implementation of its fast food minimum wage. Once again, the estimates using non-changing states as a comparison is larger in absolute value, with a simple triple-difference estimate of -2.6 percent and a detrended triple-difference estimate of

[9] A related concern is that the Fast Food Council enacted policies separate from the legislated minimum wage increase that reduced employment specifically in the fast food sector, which we spuriously attribute to the minimum wage. However, the progress of the Council has been slow and, as of March 2025, had yet to even vote on any policies and hoped "soon to establish rules on how to conduct future votes" (Kuang, 2025). Nevertheless, we cannot preclude that the mere existence of the Council has a chilling effect on employment.

-3.9 percent.

In summary, Table 1 presents eight difference-in-difference and triple-difference style estimates of Equations 1 and 2 in the final four rows of columns 5 and 6, corresponding to simple differences and detrended differences, and for estimation using all states as controls versus using only states that enacted no minimum wage increase as controls. The estimates range from -2.28 to -3.93 percent, with a median of just under -3.2 percent.

As discussed in Section 3, we assess the statistical strength of our estimates using placebo inference methods. For each of the eight specifications summarized in the previous paragraph, Appendix Table A1 lists the states for which the placebo estimate is more negative than the estimate for California. In the simple difference-in-differences specification (regardless of control group) and in the detrended difference-in-differences specification when focusing on control states that enacted no minimum wage increase, the estimate for California is the most negative among the set, implying strongly statistically significant effects. In two of the remaining specifications – the triple-difference estimates using non-increasing states as a control and the detrended difference-in-differences using all states – we calculate p-values less than 0.05, as only one or two states have more extreme negative values than California. For the remaining three specifications, all of which are triple-difference models, the California point estimate is statistically significant at the 0.1 level.

The two specifications with the highest p-values, namely the detrended triple-difference specifications, are also the specifications with the largest point estimates. This indicates the additional imprecision arises from the variance introduced by the detrending and triple-difference procedures when applied to states within the control group.

We next present estimates from our event study specifications. Figure 3 presents estimates of Equations 3 and 4 with outcomes that are indexed, detrended, and seasonally adjusted prior to estimation.[10] Figures 3a and 3b present estimates of Equation 3's difference-in-differences style model, while Figures 3c and 3d present estimates of Equation 4's triple-difference style model. In Figures 3a and 3c the placebo estimates are drawn from all states while in Figures 3b and 3d the placebo estimates are only drawn from states that enacted no minimum wage increases during our sample.

The estimates of Equations 3 and 4 in Figure 3 align with what one would expect on the basis of the time series figures presented earlier and with the more basic difference-in-differences estimates presented in Table 1. This set of figures show that, prior to the enactment of AB 1228, California closely tracks other states (adjusting for seasonality and pre-existing trends). After AB 1228's enactment, however, there is a regular and accumulating decline in employment, with endline estimates implying declines of roughly 4 percent

[10]Figure A3 shows the event studies graphs with only indexing and only indexing and detrending.

by months 12-15 following enactment, which correspond with September through December 2024.[11] Note that the decline in employment begins after enactment in September 2023 and continues after the law's implementation in April 2024. This suggests an anticipatory response by fast food employers, as Figure 2 showed that wages responded to the law's implementation in the second quarter of 2024.

Figure A8 shows the effect on wages in full-service restaurants, which were not directly impacted by AB 1228 but which may be affected through labor and product market competition. Somewhat surprisingly, there was no relative increase in wages observed in this industry in the QCEW. Table A2 presents estimates of the relationship between AB 1228's enactment and employment in the full-service restaurant sector, following Equations 1 and 2 and including the full set of estimates presented in Table 1 for the fast food sector. The estimates for the full-service sector range from -1.55 to -2.75 with a median of -2.12. The estimates are thus of the same sign but smaller in magnitude than the declines in fast food employment. Table A3 shows that, relative to the estimates for fast food, more states experienced more extreme declines in full-service restaurant employment than did California. Whereas all 8 of the estimates of Equations 1 and 2 generate p-values less than 0.10 for the fast food sector, the same is true for only 4 of the 8 specifications for full-service employment. Figures A2, A5, and A6 present time series and event study estimates for the full service sector that mirror Figures 1, A3, and A4 for the fast food sector. The pattern for full-service restaurants is similar to that seen for fast food restaurants, though post-AB 1228 employment trends are somewhat more difficult to distinguish from pre-AB 1228 trends for full-service restaurants than for fast food restaurants. At present, we can only speculate as to the economic forces behind these changes. It is possible that AB 1228 has led full-service restaurants to have more difficulty attracting workers, or that those employers anticipate future minimum wage increases in their sector as well.

[11] Table A1 shows that the detrended triple-difference specifications have the highest p-values, which is reflected in the sets of placebo treatment estimates. An important difference between the event study estimates and the estimates presented in Table 1 is that prior to event study estimation we have smoothed out seasonal patterns using the procedure described in Section 3. Seasonal adjustment is unnecessary for estimation of Equations 1 and 2 due to the exclusive focus on 12-month changes. While the seasonal adjustment procedure has no impact on our point estimates, as can be seen in Figure 1's transparent presentation of the effects of our detrending and seasonal adjustment procedures, it inflates p-values by resulting in more extreme values among some of the control states. This is, perhaps, unsurprising given the substantial variation in individual states' employment growth trajectories during the recovery from the pandemic. That our detrending and seasonal adjustment procedures have modest impacts on the endline point estimates is further illustrated across the panels of Figures A3 and A4. Figure A7 shows that there was no divergence between California and other states' employment in non-minimum-wage-intensive industries after AB 1228's enactment, although pre-enactment employment exhibits differential shifts in California.

5 Conclusion

We examine the impact of California Assembly Bill 1228, whose primary effect to date has been an increase in the minimum wage of fast food workers to $20 per hour. We document that AB 1228 increased wages substantially, with a roughly 8 percent increase in California's fast food sector relative to the fast food sector elsewhere in the country. With respect to employment, we first show that California's fast food employment was on a similar path as the rest of the United States prior to AB 1228's enactment. Following AB 1228's enactment, employment in the fast food sector in California fell substantially, with estimates ranging from 2.3 to 3.9 percent across specifications, even as employment in other sectors of the California economy tracked national trends.

Combining the wage and employment effects we estimate, the implied own-wage employment elasticities range from -0.29 to -0.49. These elasticity estimates exceed the median own-wage elasticity in the literature as summarized by (Dube, 2019). Because CA's statewide fast food minimum wage rose by 25% (i.e., from $16 to $20), the implied elasticities of fast food employment with respect to the minimum wage range from -0.09 to -0.16.[12] These are lower bounds on the effect of a sector-wide minimum wage increase of 25 percent, however, for two reasons. First, several large jurisdictions within California had minimum wages in excess of $16 at the time of AB 1228's implementation. Second, many limited-service restaurants were not affected by AB 1228 due to its focus on large chains. Put differently, the effective increase in California's statewide fast food minimum wage was smaller than the statutory increase and only part of the sector was affected, indicating that the implied elasticities on affected restaurants was larger.

We highlight several directions for future research on the effects of AB 1228. First, as with any major policy change, it will be interesting to track AB 1228's medium- and long-run effects. Second, it may be fruitful to utilize California's plethora of sub-state minimum wages as additional sources of variation in AB 1228's bite. Additional sources of data can be deployed to examine other margins of response, like compliance (Clemens and Strain, 2022; Stansbury, 2025), hours of work (Jardim et al., 2022), prices (Leung, 2021; Renkin et al., 2022; Aaronson, 2001; Reich and Sosinskiy, 2024; Link, 2024), establishment closures (Aaronson et al., 2018), labor-labor substitution (Clemens et al., 2021), search effort by workers (Adams et al., 2018), non-wage benefits (Dworsky et al., 2022; Meiselbach and Abraham, 2023; Clemens et al., 2018), work effort (Obenauer and Nienburg, 1915; Coviello et al., 2022), distributional impacts (Drucker et al., 2021; MaCurdy, 2015), and other aspects

[12] These are within the ranges emphasized in recent literature reviews that report elasticities with respect to the minimum wage itself (Neumark and Shirley, 2022; Wolfson and Belman, 2019).

of the production function (Hirsch et al., 2015). Finally, the interplay between California's fast food and full-service restaurant sectors warrants further examination. Future work may make progress in understanding the implications of sector-specific regulation for sectors that compete in closely related labor and product markets.

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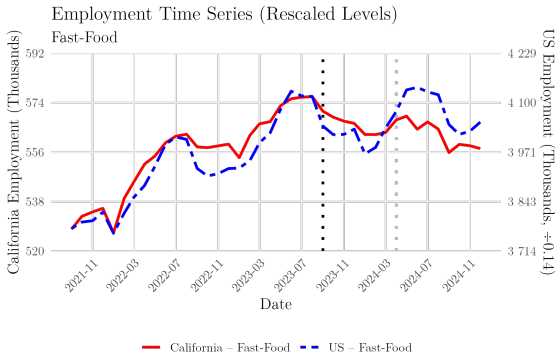
Tables and Figures



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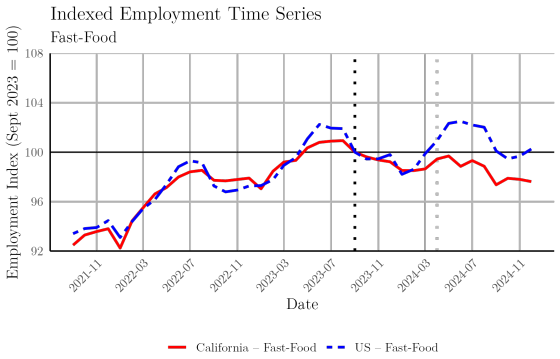

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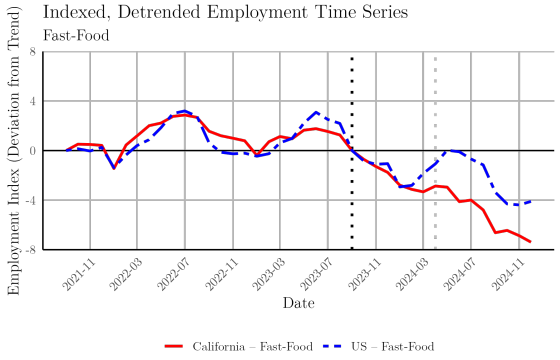

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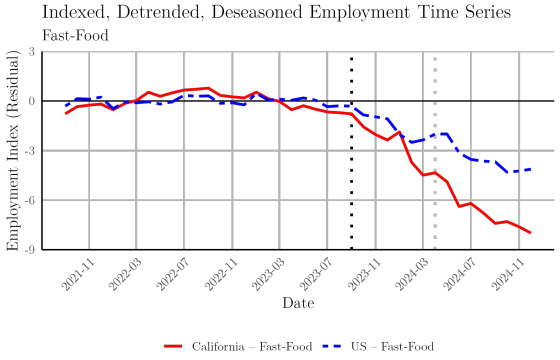
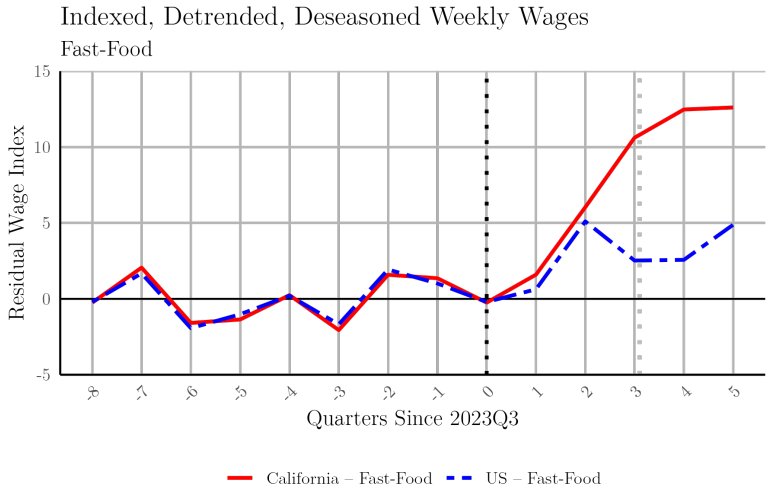
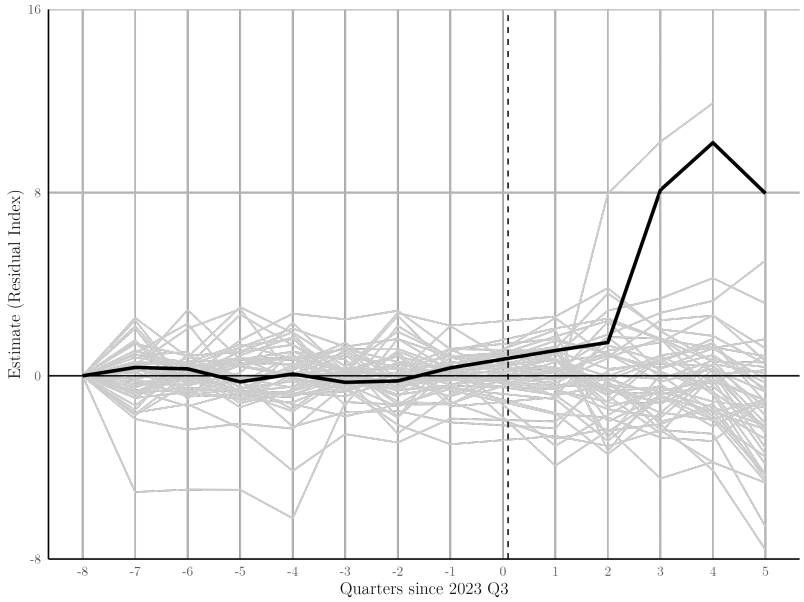


(d) Indexed, detrended, and deseasoned

Figure 1: **Fast-food employment trends in California versus the Rest of the United States (September 2021–December 2024).** This figure illustrates monthly fast-food employment in California and the Rest of the U.S. around the enactment of AB 1228 in September 2023, using QCEW data for NAICS 722513. Panel (a) displays raw employment levels in each region. Panel (b) indexes both series to 100 at September 2023 to emphasize relative changes following AB 1228's enactment. Panel (c) presents the series after removing the compound monthly growth trend calculated over the 24 months prior to September 2023. Panel (d) adjusts the detrended series for seasonal effects using month-of-year fixed effects, which are also estimated using data over the 24 months prior to September 2023.



(a) Indexed, Detrended, Deseasoned Wages: Fast Food



(b) Difference-in-Difference (DD) for all states

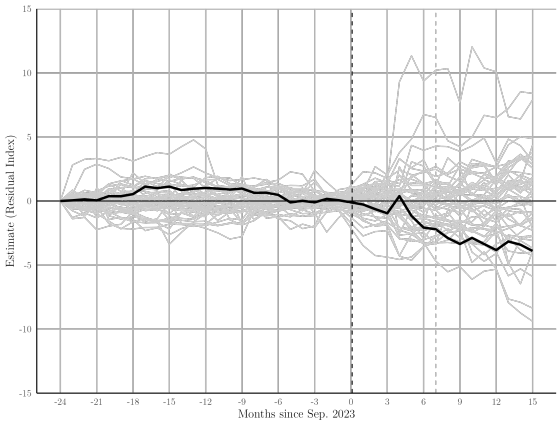
Figure 2: **Fast-food employment wages in California versus the Rest of the United States (September 2021–December 2024).** This figure shows the (real) average weekly wage index for fast food (NAICS 722513) using QCEW data. Panel (a) shows time series data after removing the compound quarterly growth trend from September 2021–September 2023, and after adjusting for seasonality by subtracting quarter-of-year fixed-effects estimated on September 2021–September 2023 data. It compares California to the Rest of the United States. Panel (b) shows event study estimates for California alongside placebo treatment effects, both estimated as described in Section 3. California's treatment effect estimates are displayed by the solid black line and the placebo treatment effect estimates for other states are shown in lighter gray lines. We have omitted the Q4 2024 (i.e., period 5 relative to Q3 2023) data point associated with the District of Columbia (the one outlier that takes higher values than California at event times 3 and 4) for visualization purposes. The District of Columbia is the only jurisdiction for which the placebo estimates exceed the California estimate.

Table 1: Indexed Employment Outcomes and Difference-in-Differences Estimates

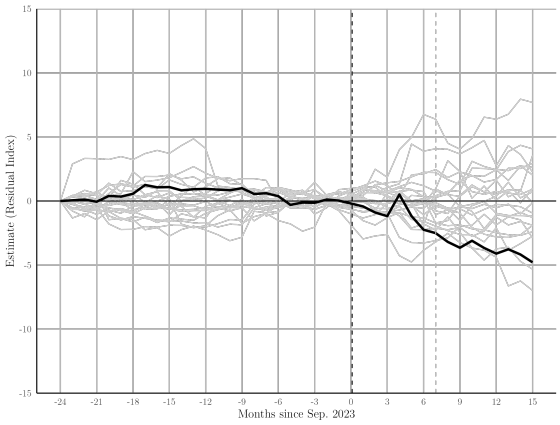
		(1)	(2)	(3)	(4)	(5)	(6)
Panel A							
State	**Industry**	**Sept. 2021**	**Sept. 2023**	**Sept. 2024**	**Change from 21–23 (annual)**	**Change from 23–24**	**Detrended (23–24) − (21–23)**
CA	Fast Food (FF)	92.48	100.00	97.36	3.76	–2.64	–6.40
CA	Higher Wage Ind. (HWD)	95.03	100.00	100.58	2.49	0.58	–1.91
Rest of US	Fast Food (FF)	93.41	100.00	100.10	3.30	0.10	–3.20
Rest of US	Higher Wage Ind. (HWD)	93.37	100.00	101.04	3.31	1.04	–2.27
Non-Increasers	Fast Food (FF)	93.18	100.00	100.50	3.41	0.50	–2.91
Non-Increasers	Higher Wage Ind. (HWD)	93.01	100.00	101.16	3.49	1.16	–2.33
Panel B							
Comparison					**Pre-Trend DD or DDD**	**Simple DD or DDD**	**Detrended DD or DDD**
HWD	CA minus Rest of US				–0.82	–0.46	0.36
	CA minus Non-Increasers				–1.00	–0.58	–1.16
FF	CA minus Rest of US				0.46	–2.74***	–3.20**
	CA minus Non-Increasers				0.35	–3.14***	–3.49***
FF and HWD (DDD)	CA minus Rest of US				0.47	–2.28*	–3.57*
	CA minus Non-Increasers				0.35	–2.57**	–3.93*

$p < .1^{*}; p < .05^{**}; p < .01^{***}$

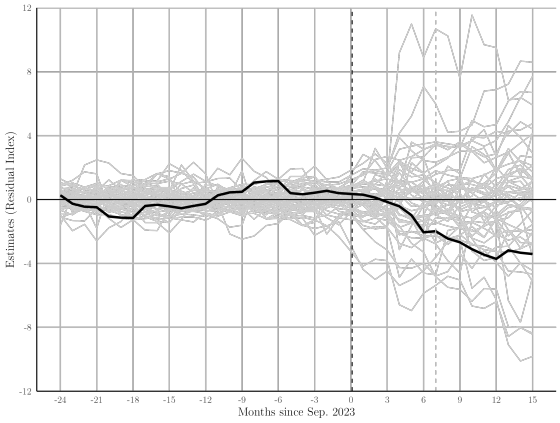
Note: Using data from the QCEW, this table presents the full set of cell entries that underlie estimates of equations 1 and 2 as presented in section 3. "Change from 21–23 (annual)" = $(\text{Index}_{2023} - \text{Index}_{2021})/2$. The "Detrended" column = (col 5) - (col 4), and analogously for the DD and DDD estimates in Panel B. September 2023 is 100 for every industry in every state by the mechanics of the index construction. This table shows the results of the simple difference-in-difference exercises described in Equations 1 and 2. Significance levels are calculated using the placebo method described in Section 3. The sets of placebo treatment states with estimates more negative than the California estimate are shown in Table A1.



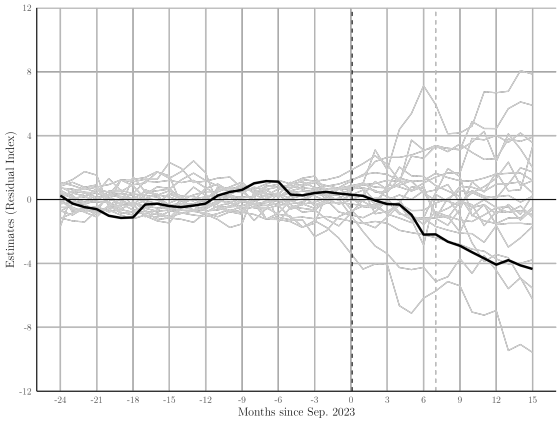
(a) DD, For all states



(b) DD, For non-increasers and California



(c) Triple Differences (DDD), For all states



(d) DDD, For non-increasers and California

Figure 3: **Fast-food employment in California (black line) versus the Rest of the United States (September 2021–December 2024).** This figure shows the detrended and seasonally adjusted event study estimates for fast food (NAICS 722513) in California (solid black line) and other ("placebo treatment") states (gray lines). Panel (a) shows the DD estimates of (Equation 3) from the placebo exercise described in Section 3 where every state (except CA) is in the control group (50 control states). Panel (b) shows the same exercise as described in Panel (a), except the control state pool is the "non-increaser" state group that did not change their minimum wage in the study period (22 control states). Panel (c) shows the triple-difference (Equation 4) version of Panel (a). Panel (d) shows the triple-difference (Equation 4) version of Panel (b).

A Additional Tables and Figures

Table A1: Fast-food Placebo Estimates by Estimation Type

Estimation Type	**CA Estimate**	p**-value**	**States More Negative than CA**	**# Placebo States**
DD (All states)	−2.74	0	—	50
DD (Non-increasers)	−3.14	0	—	22
DDD (All states)	−2.28	0.06	Alaska, Delaware, Idaho	50
DDD (Non-increasers)	−2.57	0.0455	Idaho	22
Detrended DD (All states)	−3.20	0.04	Delaware, District of Columbia	50
Detrended DD (Non-increasers)	−3.49	0	—	22
Detrended DDD (All states)	−3.57	0.06	Delaware, District of Columbia, Louisiana	50
Detrended DDD (Non-increasers)	−3.93	0.0909	Idaho, Louisiana	22

Notes: The estimation type listed in the first column refers to the estimates in Table 1. The coefficient in the second column is the California estimate in Table 1. The p-values are constructed by dividing the number of states with placebo estimates more negative than CA by the number of placebo states. A full description of this exercise is in Section 3.

Table A2: Indexed Employment Outcomes and Difference-in-Differences Estimates (Full Service)

		(1)	(2)	(3)	(4)	(5)	(6)
Panel A							
State	**Industry**	**Sept. 2021**	**Sept. 2023**	**Sept. 2024**	**Change from 21–23 (annual)**	**Change from 23–24**	**Detrended (23–24) − (21–23)**
CA	Full Service (FS)	91.52	100.00	98.05	4.24	–1.95	–6.19
CA	Higher Wage Ind. (HWD)	95.03	100.00	100.58	2.49	0.58	–1.91
Rest of US	Full Service (FS)	91.27	100.00	100.06	4.37	0.06	–4.31
Rest of US	Higher Wage Ind. (HWD)	93.37	100.00	101.04	3.32	1.04	–2.28
Non-Increasers	Full Service (FS)	91.71	100.00	100.27	4.15	0.27	–3.88
Non-Increasers	Higher Wage Ind. (HWD)	93.01	100.00	101.16	3.50	1.16	–2.34

Panel B				
Comparison		**Pre-Trend DD or DDD**	**Simple DD or DDD**	**Detrended DD or DDD**
HWD	CA minus Rest of US	–0.82	–0.46	0.37
	CA minus Non-Increasers	–1.00	–0.58	0.43
FS	CA minus Rest of US	–0.13	–2.01*	–1.88
	CA minus Non-Increasers	0.09	–2.22**	–2.31***
FS and HWD (DDD)	CA minus Rest of US	0.69	–1.55	–2.24
	CA minus Non-Increasers	1.09	–1.65	–2.75**

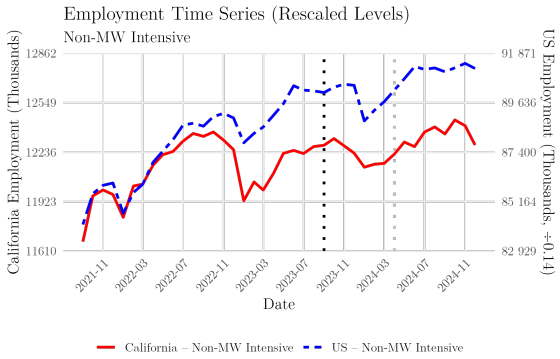
$p < .1^{*}; p < .05^{**}; p < .01^{***}$

Note: Using data from the QCEW, this table presents the full set of cell entries that underlie estimates of equations 1 and 2 as presented in section 3. "Change from 21–23 (annual)" = $(\text{Index}_{2023} - \text{Index}_{2021})/2$. The "Detrended" column = (col 5) - (col 4), and analogously for the DD and DDD estimates in Panel B. September 2023 is 100 for every industry in every state by the mechanics of the index construction. This table shows the results of the simple difference-in-difference exercises described in Equations 1 and 2. Significance levels are calculated using the placebo method described in Section 3. The sets of placebo treatment states with estimates more negative than the California estimate are shown in Table A3.

Table A3: Full-service Placebo Estimates by Estimation Type

Estimation Type	**CA Estimate**	***p*-value**	**States More Negative than CA**	**# Placebo States**
DD (All states)	-2.01	0.06	Arizona, Missouri, Wyoming	50
DD (Non-increasers)	-2.22	0.045	Wyoming	22
DDD (All states)	-1.55	0.14	Arizona, Idaho, Missouri, New Mexico, Rhode Island, West Virginia, Wyoming	50
DDD (Non-increasers)	-1.65	0.136	Idaho, West Virginia, Wyoming	22
Detrended DD (All states)	-1.90	0.10	Arizona, District of Columbia, Louisiana, New York, Rhode Island	50
Detrended DD (Non-increasers)	-2.31	0.00	-	22
Detrended DDD (All states)	-2.27	0.10	Arizona, District of Columbia, Louisiana, New York, Rhode Island	50
Detrended DDD (Non-increasers)	-2.75	0.045	Louisiana	22

Notes: The estimation type listed in the first column refers to the estimates in Table A2. The coefficient in the second column is the California estimate in Table A2. The p-values are constructed by dividing the number of states with placebo estimates more negative than CA by the number of placebo states. A full description of this exercise is in Section 3.



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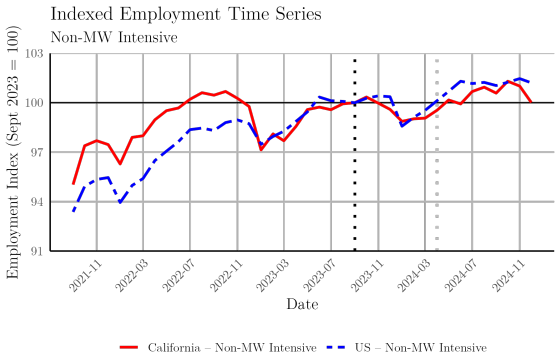

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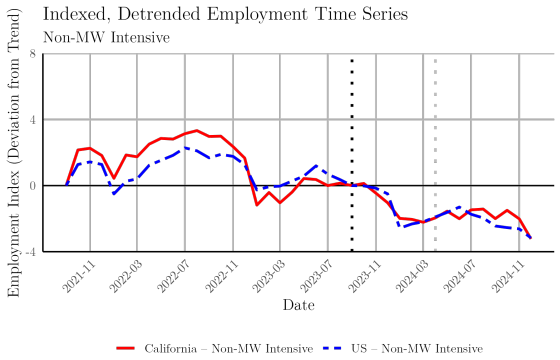
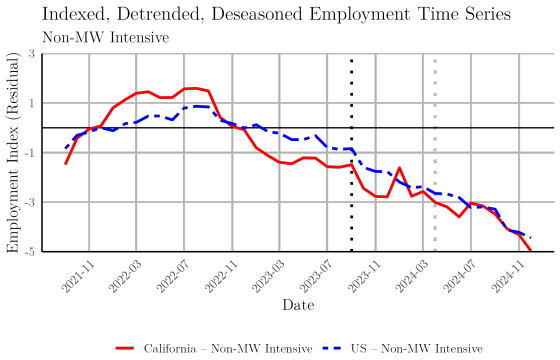
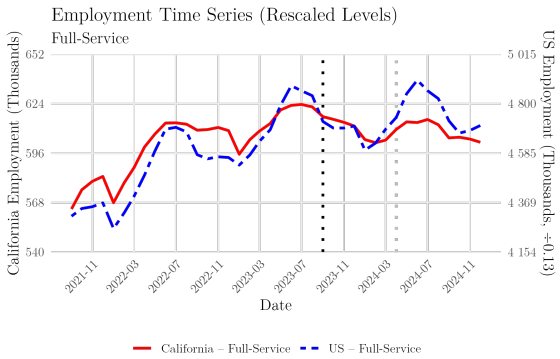


(c) Indexed and detrended

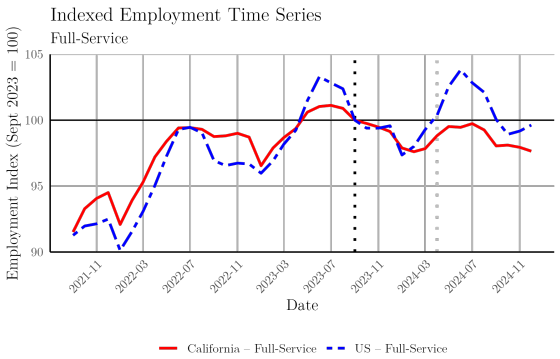


(d) Indexed, detrended, and deseasoned

Figure A1: **Non-minimum-wage-intensive industries employment trends in California versus the Rest of the United States (September 2021–December 2024)** This figure illustrates monthly employment for non-minimum-wage-intensive industries, defined as total private employment excluding food services (NAICS 72) and retail trade (NAICS 44–45) in California and the Rest of the U.S. around the enactment of AB 1228 in September 2023, using QCEW data. Panel (a) displays raw employment levels in each region. Panel (b) indexes both series to 100 at September 2023 to emphasize relative changes following AB 1228's enactment. Panel (c) presents the series after removing the compound monthly growth trend calculated over the 24 months prior to September 2023. Panel (d) adjusts the detrended series for seasonal effects using month-of-year fixed effects, which are also estimated using data over the 24 months prior to September 2023.



(a) Monthly levels



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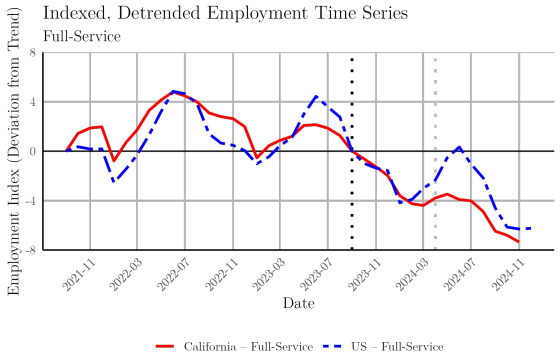
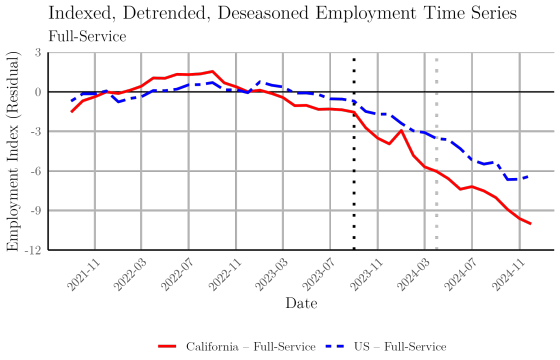
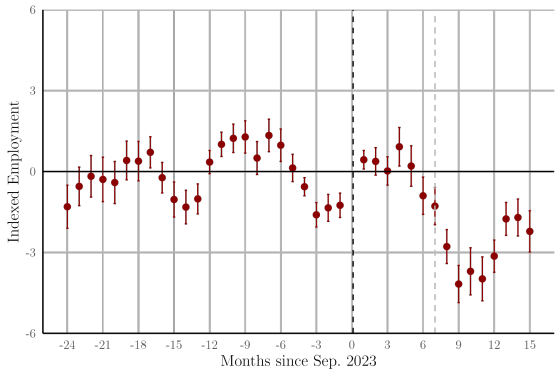


(c) Indexed and detrended

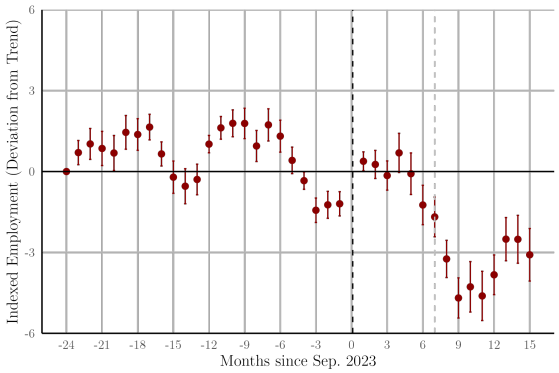


(d) Indexed, detrended, and deseasoned

Figure A2: **Full-service restaurant employment trends in California versus the Rest of the United States (September 2021 – December 2024).** This figure illustrates monthly full-service restaurant employment (NAICS 722511) in California and the Rest of the U.S. around the enactment of AB 1228 in September 2023, using QCEW data for NAICS 722511. Panel (a) displays raw employment levels in each region. Panel (b) indexes both series to 100 at September 2023 to emphasize relative changes following AB 1228's enactment. Panel (c) presents the series after removing the compound monthly growth trend calculated over the 24 months prior to September 2023. Panel (d) adjusts the detrended series for seasonal effects using month-of-year fixed effects, which are also estimated using data over the 24 months prior to September 2023.



(a) Indexed



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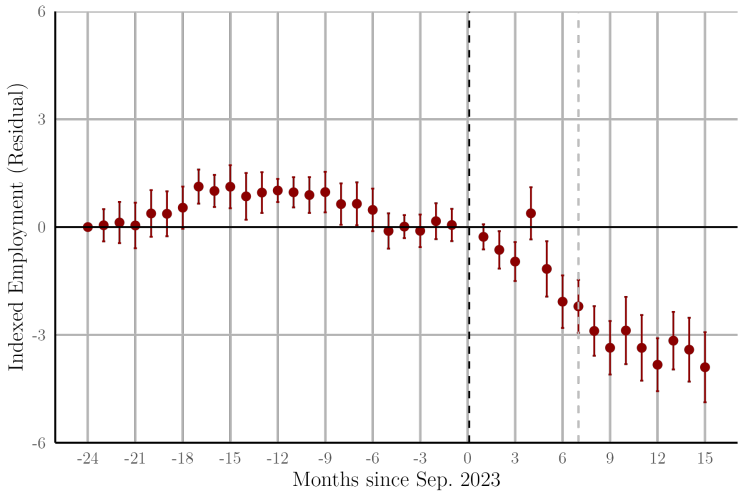


(c) Indexed, detrended, and deseasoned

Figure A3: **Limited-service restaurant employment event-study estimates in California versus all other states (September 2021–December 2024).** This figure shows coefficient estimates from event-study regressions of indexed limited-service restaurant employment (NAICS 722513) for California relative to all other states, using QCEW data. All series are indexed to 100 at September 2023. Estimates are obtained from Equation 3. Panel (a) shows coefficient estimates on observations consisting of the raw indexed outcomes (no detrending or seasonal adjustment). Panel (b) shows coefficients after detrending each geography-by-industry series by removing the compound monthly growth trend over September 2021–September 2023. Panel (c) adjusts the detrended series for seasonality by subtracting month-of-year fixed-effects estimated on September 2021–September 2023 data. In all panels, the zero event-time point corresponds to September 2023 (the AB 1228 announcement). Confidence intervals are constructed using cluster robust standard errors which, for reasons discussed in the main text, are insufficiently conservative in this setting and thus do not underlie the inference procedures we describe and utilize in the main text.

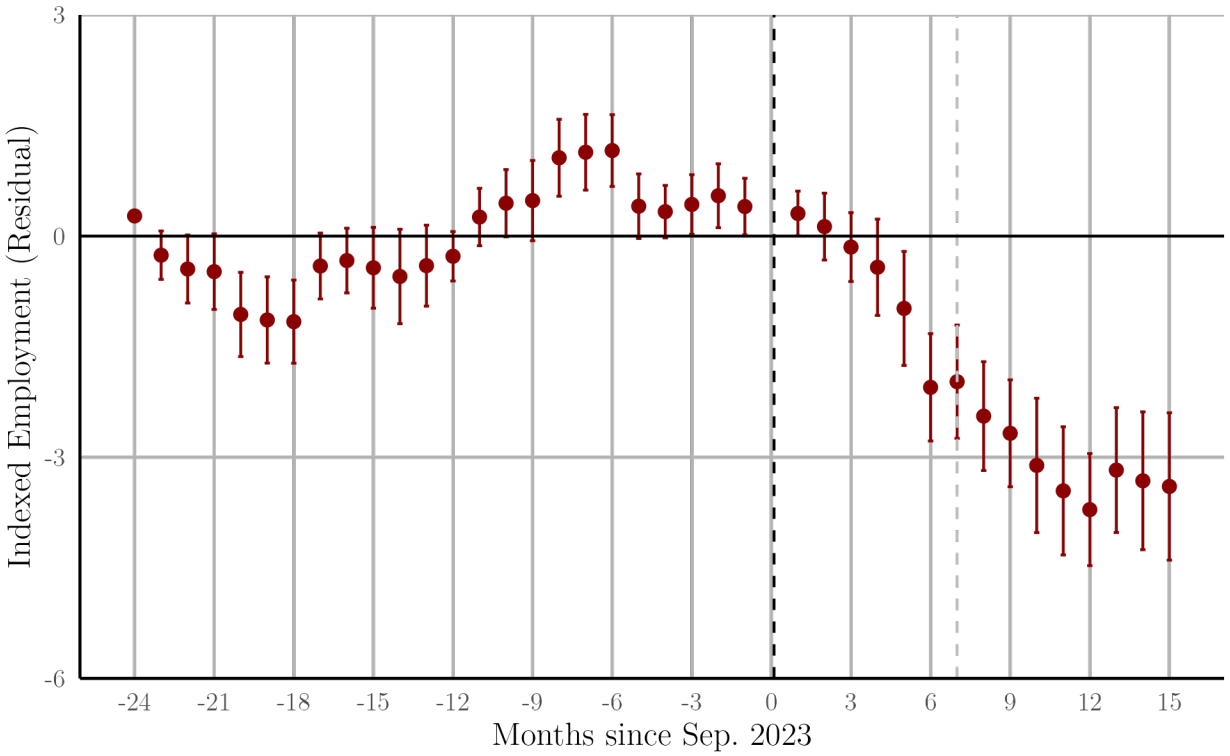
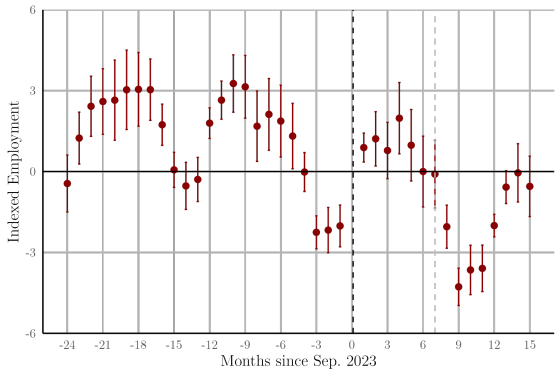
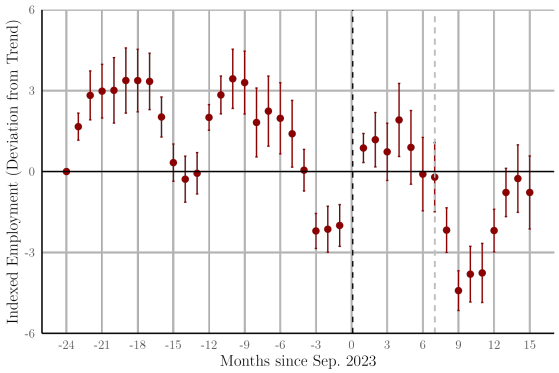


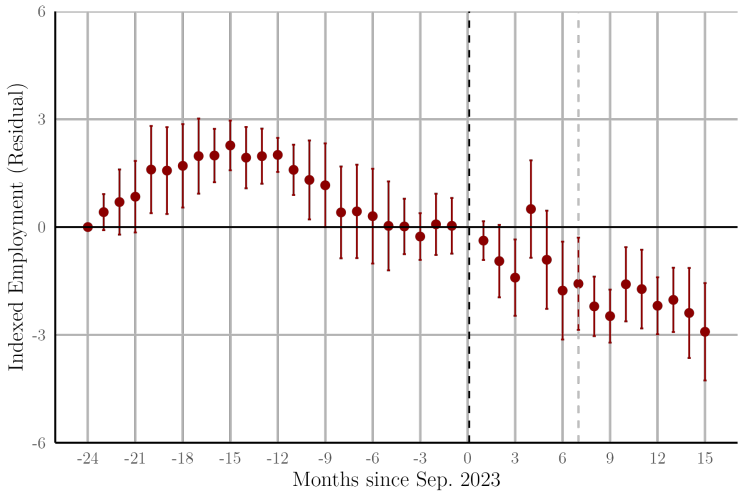
Figure A4: **Limited-service restaurant triple-difference event-study estimates in California versus all other states and non-full-service industries (September 2021–December 2024).** This figure presents coefficient estimates from a triple-difference event-study regression of indexed limited-service restaurant employment (NAICS 722513) for California relative to all other states and relative to non-minimum-wage-intensive industries, using QCEW data. All series are indexed to 100 at September 2023, and estimates are obtained from Equation 4. We first detrend each geography-industry series by removing the 24-month compound-monthly growth trend over September 2021 – September 2023. Then, we adjust the detrended series for seasonality by subtracting month-of-year fixed-effects estimated on September 2021 – September 2023 data. The zero event-time point corresponds to September 2023 (the AB 1228 announcement). Confidence intervals are constructed using cluster robust standard errors which, for reasons discussed in the main text, are insufficiently conservative in this setting and thus do not underlie the inference procedures we describe and utilize in the main text.



(a) Indexed



(b) Indexed and detrended



(c) Indexed, detrended, and deseasoned

Figure A5: **Full-service restaurant employment event-study estimates in California versus all other states (September 2021–December 2024).** This figure shows coefficient estimates from event-study regressions of indexed full-service restaurant employment (NAICS 722511) for California relative to all other states, using QCEW data. All series are indexed to 100 at September 2023. Estimates are obtained from Equation 3. Panel (a) shows coefficient estimates on observations consisting of the raw indexed outcomes (no detrending or seasonal adjustment). Panel (b) shows coefficients after detrending each geography-by-industry series by removing the compound monthly growth trend over September 2021–September 2023. Panel (c) adjusts the detrended series for seasonality by subtracting month-of-year fixed-effects estimated on September 2021–September 2023 data. In all panels, the zero event-time point corresponds to September 2023 (the AB 1228 announcement). Confidence intervals are constructed using cluster robust standard errors which, for reasons discussed in the main text, are insufficiently conservative in this setting and thus do not underlie the inference procedures we describe and utilize in the main text.

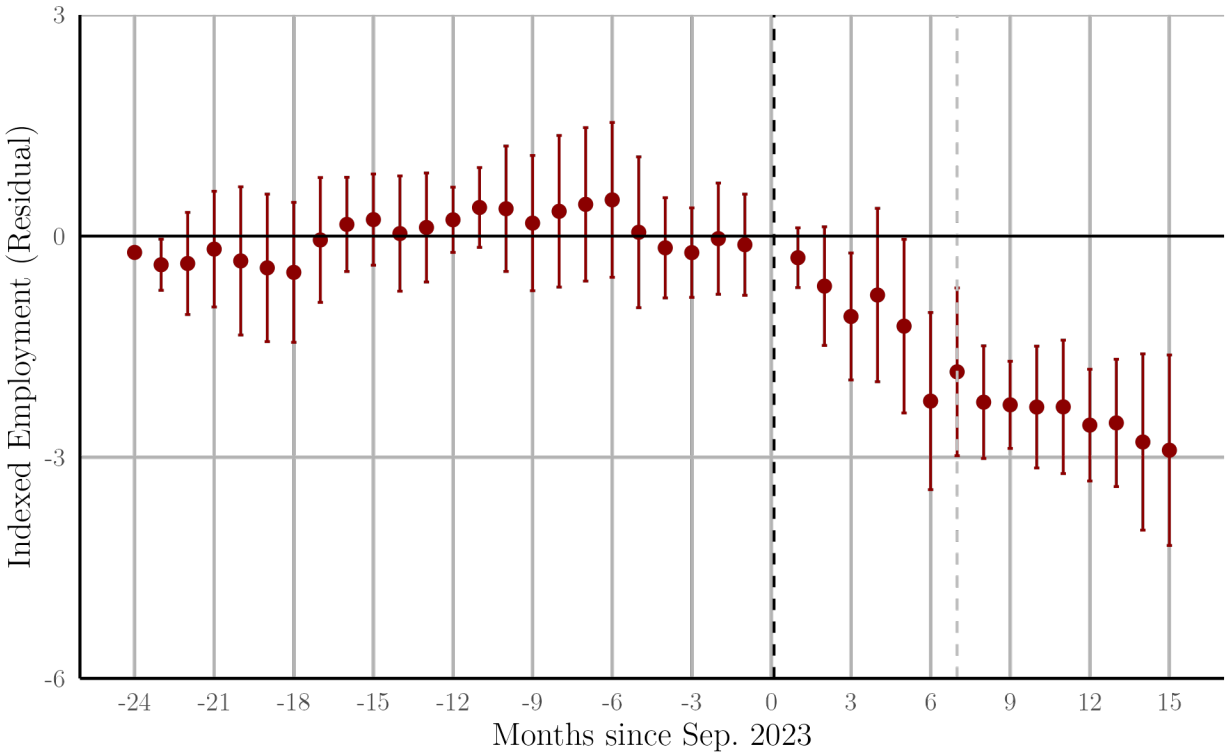
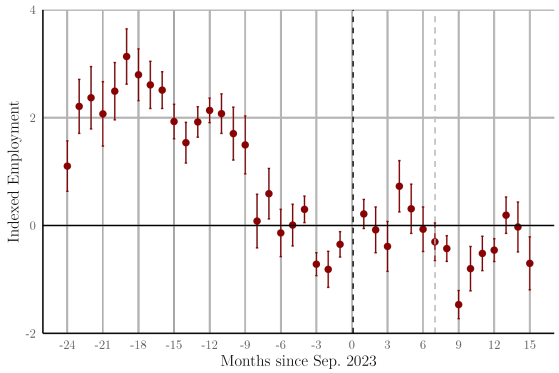
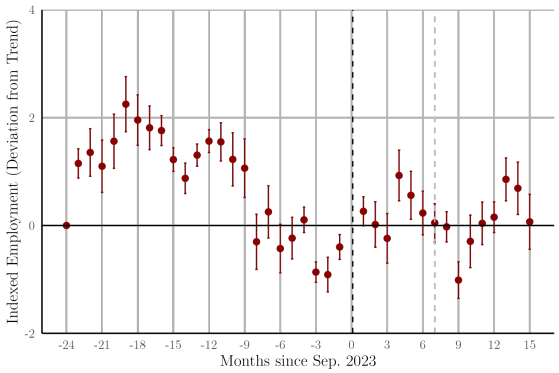


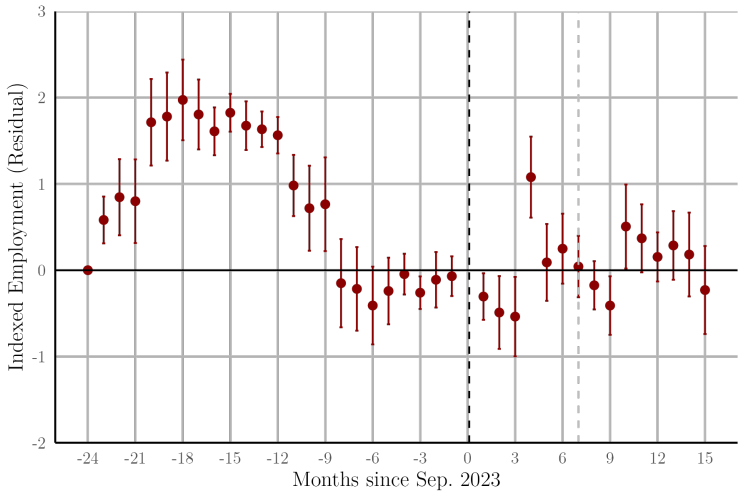
Figure A6: **Full-service restaurant triple-difference event-study estimates in California versus all other states and non-full-service industries (September 2021–December 2024).** This figure presents coefficient estimates from a triple-difference event-study regression of indexed full-service restaurant employment (NAICS 722511) for California relative to all other states and relative to non-minimum-wage-intensive industries, using QCEW data. All series are indexed to 100 at September 2023, and estimates are obtained from Equation 4. We first detrend each geography-industry series by removing the 24-month compound-monthly growth trend over September 2021 – September 2023. Then, we adjust the detrended series for seasonality by subtracting month-of-year fixed-effects estimated on September 2021 – September 2023 data. The zero event-time point corresponds to September 2023 (the AB 1228 announcement). Confidence intervals are constructed using cluster robust standard errors which, for reasons discussed in the main text, are insufficiently conservative in this setting and thus do not underlie the inference procedures we describe and utilize in the main text.



(a) Indexed

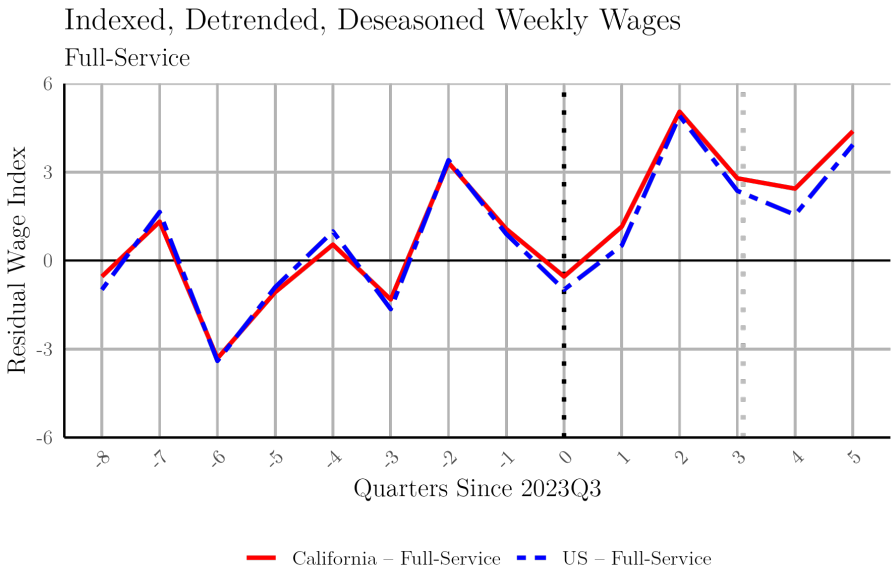


(b) Indexed and detrended

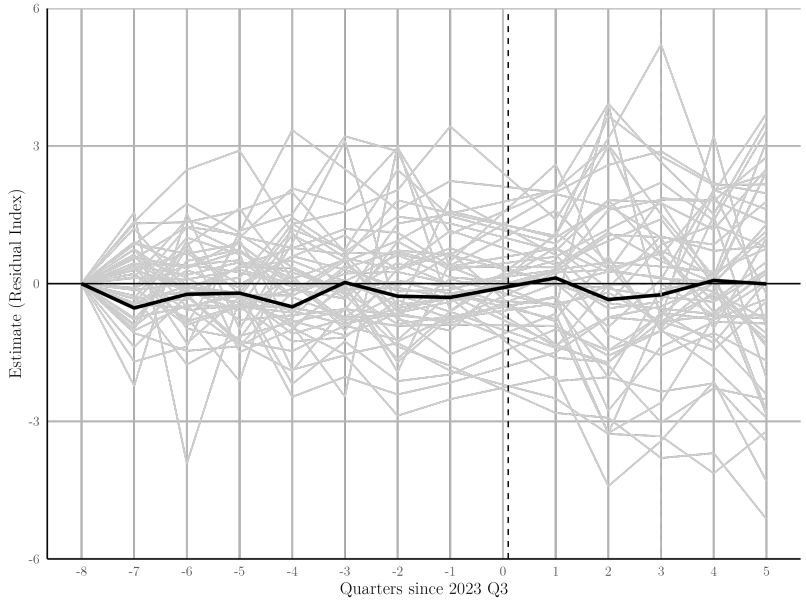


(c) Indexed, detrended, and deseasoned

Figure A7: **Non-minimum-wage-intensive industries employment event-study estimates in California versus all other states (September 2021–December 2024).** This figure shows coefficient estimates from event-study regressions of indexed employment in non-minimum-wage-intensive industries (defined as total private employment excluding NAICS 44–45 and 72) for California relative to all other states, using QCEW data. All series are indexed to 100 at September 2023. Estimates are obtained from Equation 3. Panel (a) estimates on observations consisting of the raw indexed outcomes (no detrending or seasonal adjustment). Panel (b) shows coefficients after detrending each geography-by-industry series by removing the compound monthly growth trend over September 2021–September 2023. Panel (c) adjusts the detrended series for seasonality by subtracting month-of-year fixed-effect fits estimated on September 2021–September 2023 data. In all panels, the zero event-time point corresponds to September 2023 (the AB 1228 announcement). Confidence intervals are constructed using cluster robust standard errors which, for reasons discussed in the main text, are insufficiently conservative in this setting and thus do not underlie the inference procedures we describe and utilize in the main text.



(a) Indexed, Detrended, Deseasoned Wages: Full Service



(b) DD, For all states

Figure A8: **Full-service employment wages in California versus the Rest of the United States (September 2021–December 2024).** This figure shows the (real) average weekly wage index for full-service restaurants (NAICS 722511) for California and all other states, using QCEW data. Panel (a) shows time series data after removing the compound quarterly growth trend from September 2021–September 2023, and after adjusting for seasonality by subtracting quarter-of-year fixed-effects estimated on September 2021–September 2023 data. Panel (b) shows event study estimates for California alongside placebo treatment effects, both estimated as described in Section 3. California's treatment effect estimates are displayed by the solid black line and the placebo treatment effect estimates for the 22 states without minimum wage increases are shown in lighter gray lines.