More Than Just Numbers: Assessing the Real Impact of Minimum Wage Increases on Childcare Labor Markets

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Dedication

This thesis is dedicated to all childcare workers,

whose unwavering efforts and dedication

bring joy, care, and learning

to the lives of children every single day.

Abstract

This paper investigates the causal effects of minimum wage changes on the childcare labor market, a sector often characterized by low wages. Leveraging a difference-in-differences approach, I estimated treatment effects using two-way fixed effects and Callaway and Sant'Anna estimators. This research analyzes the causal impact of minimum wage law changes on earnings, employment, and turnover within childcare centers. The results underline a statistically significant 3% increase in the logarithm of earnings, indicating a strong causal relationship between minimum wage increase and earnings. However, the impacts on employment and turnover, while negative, are not statistically significant. These findings provide an insightful understanding of the labor dynamics in the childcare industry and suggest a potential model of perfect competition with search frictions and mobility costs. The pre-trend assumption in each case is validated by a dynamic model, strengthening the causal inference from the results. By dissecting the intricate causal relationship between wages and childcare quality, this research contributes to the broader discourse on minimum wage policies. It invites a reevaluation of wage structures in sectors like childcare, where the quality of service is directly linked to labor conditions.

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1 Introduction

There are growing concerns among parents and policymakers that increasing wages in the childcare labor market may reduce access to childcare services. Despite these concerns, raising wages' impact on the childcare labor supply remains unclear, as there is no consensus on the effects of implementing minimum wage policies within the industry. This raises the question of whether we are at odds with the childcare labor market policy.

Minimum wage laws aim to improve the financial well-being of the lowest-paid workers by setting a floor wage for each worker. Raising the minimum wage can also increase wages for workers who earn slightly above the minimum wage, even when these laws are only binding for workers whose wages would have been lower without them (David, Manning, and Smith, 2016).

The effects of minimum wage increases on employment, earnings, and turnover rates can vary depending on the nature of the market. In competitive markets, wages above the equilibrium level can create job separations. In contrast, in imperfectly competitive markets, the outcomes depend on the prevailing conditions in both the output and input markets.

The childcare sector presents a unique opportunity to study the impact of minimum wage laws, characterized by low average earnings for childcare workers and high labor intensity. For instance, childcare worker-to-children ratios are fixed by law in every state.

Increases in the minimum wage may influence both the supply and quality of childcare services available to parents. Recent research, for example, has examined the relationship between low wages for childcare workers and high turnover and stress levels among these caregivers (Moon and Burbank, 2004).

As a result, this study aims to investigate the effects of an increase in the minimum wage rate on turnover rates, earnings, and employment levels in the childcare sector.

In recent years, the childcare sector has posed several challenges for policymakers. Firstly, a growing demand for non-parental care has been driven by societal and economic factors. Secondly, this surge in demand for childcare has been accompanied by a rising trend in the cost of providing such services. Lastly, the quality of childcare services varies significantly across providers, further complicating policy decisions (Herbst, 2022).

According to Farfan-Portet, Lorant, and Petrella (2011), government intervention to reduce childcare costs can take subsidies (or tax deductions) to parents who use formal childcare or direct subsidies to service childcare providers. Although both types of subsidies aim to ensure access to childcare, parents' choices might not only be constrained by the cost of childcare but also on the availability of childcare places. It is interesting to note that the lack of direct funding for childcare has led to using alternative resources associated with other policies, such as active labor market policies. This tendency to finance employment in the childcare sector neither encourages

the development of a high-quality childcare infrastructure nor does it recognize the importance of the technical and/or relational skills needed to provide quality childcare services unless training programs are included and staff is adequately compensated (Farfan-Portet, Lorant, and Petrella, 2011).

The growth in the childcare sector has not been accompanied by corresponding improvements in labor conditions or increased wages for childcare workers (Gramlich, Flanagan, and Wachter, 1976). According to the (BLS) US Bureau of Labor Statistics (n.d.), childcare labor markets are characterized by low-paying jobs and minimal worker entry requirements.

A basic labor supply model demonstrates that a wage increase results in a higher equilibrium quantity in labor supply. It can be argued that a higher equilibrium labor supply may increase the likelihood of childcare providers finding higher-quality workers (Ermisch, 1989).

Minimum wage policies provide a suitable framework for examining the effects of wage changes on workers' outcomes, particularly in the childcare sector (Gramlich, Flanagan, and Wachter, 1976). Since minimum wage regulations primarily impact low-wage earners, a change in the minimum wage could potentially affect a significant portion of the worker population that might be candidates for the childcare industry (Gramlich, Flanagan, and Wachter, 1976).

However, some researchers argue that minimum wage laws can negatively affect the employment levels of low-wage workers, which leads to complex implications for labor market outcomes (Goldfarb, 1974). By 1975,

the federal minimum wage covered 90% of the workforce (Brown, 1999), emphasizing the importance of studying minimum wage policies in labor economics.

Studying minimum wages presents challenges to researchers and can lead to seemingly contradictory effects on labor outcomes. In more recent studies, authors like Card and Krueger (2015) emphasize the difficulty of generating valid counterfactuals for studying the effects of minimum wage on labor market outcomes. They also highlight the endogeneity issue associated with federal minimum wage increases and aggregate labor market conditions. These authors belong to a new wave of economists using more credible identification strategies to estimate the effects of minimum wage on labor market outcomes.

As a result, studies examined regional variations and local changes to minimum wage. The focus of these studies was primarily on employment levels, as seen in the works of Card (1992b) and Card (1992a). This new wave of research contributed to advancements in measuring minimum wage changes and modeling minimum wage policies.

Despite these advancements, most research on minimum wage presents contradictory conclusions, leading to a lack of consensus on the effects of minimum wage laws (Lemos, Rigobon, and Lang, 2004). One approach to addressing these contradictions is to analyze minimum wage policies within specific market structures. Recent studies suggest that minimum wage effects are specific to market structures and require different models to under-

stand the mechanisms and effects (Flinn, 2006). Additionally, understanding the product market is crucial for comprehending labor market outcomes.

In a competitive labor market, a minimum wage higher than the competitive equilibrium wage should have a less severe impact on employment within inelastic product markets. Employers can partially offset the increased wage bill cost through price hikes passed onto customers. Employers must compensate for higher minimum wages in more elastic product markets with greater job separations.

In contrast, imperfect labor markets, such as monopsonies and oligopsonies, are more prevalent and harder to predict. Employers in these markets have more bargaining power to set wages and employment levels. Even in perfect labor markets, search frictions, and mobility costs can grant employers greater bargaining power. Furthermore, outside options are crucial for understanding the impact of minimum wage increases. Labor markets with higher wages from outside options might face recruitment and retention challenges due to relatively low wages in the inside option. Service quality suffers due to the costs incurred from turnovers. Conversely, labor markets with similar wage rates as outside options could experience the opposite effect (Propper and Van Reenen, 2010).

In a groundbreaking research paper that examined the impact of minimum wage and introduced innovative identification techniques, county data from across state borders were analyzed in Card and Krueger (1993). The researchers utilized data from low-paying jobs to investigate the employment

consequences following a minimum wage increase in a given state. Nearly two decades later, Dube, Lester, and Reich (2010) employed a similar methodology but extended it to encompass the entire nation. Subsequently, in Dube, Lester, and Reich (2016), the authors delved into the influence of minimum wages on employment flows and labor market dynamics. Inspired by Dube, Lester, and Reich (2010) and Callaway and Sant'Anna (2021), I replicate this experiment using data from childcare labor markets.

While there is extensive literature on the effects of minimum wage changes in low-wage labor markets, studies specifically addressing the impact on childcare labor markets remain limited. This paper aims to bridge the knowledge gap by investigating the consequences of minimum wage increases on the childcare labor market. To do so, it examines alterations in the log of average earnings, employment levels, the log of employment, and turnover rates among childcare workers.

A difference-in-differences design with staggered treatment adoption is employed in this study, along with two distinct estimators: a two-way fixed effects approach to estimate the overall effects of minimum wage changes; and the estimator proposed in Callaway and Sant'Anna (2021) to account for dynamic heterogeneous effects. The analysis relies on quarterly county data from the Quarterly Workforce Indicators (QWI), which, despite being based on administrative records from social security and unemployment insurance, covers approximately 95% of private-sector jobs. Due to the exclusion of self-employed individuals from the sample, this study primarily focuses on workers in childcare centers.

This study examines the period between 2001-Q1 and 2007-Q2 when the federal minimum wage remained unchanged at 5.15 per hour, as shown in Figure 1. The stable federal minimum wage compares childcare labor markets in states that raised their minimum wages above the federal level and those that did not. The analysis considers a binary case, wherein a state that increased its minimum wage at least once during the study period is deemed treated.

Although the data used is not recent, the methods employed in this study offer robust quasi-experimental evidence regarding the impact of minimum wages on the childcare market. Furthermore, the study demonstrates methodologies that can be applied to more contemporary state wage variations. By comprehending the effects of minimum wage changes on average earnings, employment, and turnover rates, policymakers can design more effective incentives to promote stable and competitive wages for childcare workers, ultimately improving service quality (Propper and Van Reenen, 2010). The overarching policy objective of enhancing childcare wages is to reduce staff turnover, increase service quality, and expand and secure more accessible childcare options.

I evaluate the difference-in-differences coefficient of minimum wage changes on labor outcomes, finding significant effects on the log of earnings, with an increase of approximately 3%. In contrast, the overall effects on employment and turnover are not statistically significant, with a reduction of about 6.5 percentage points in childcare jobs and a 0.3 percentage point decrease in turnover, both of which are empirically small. The dynamic models indi-

cate that parallel pre-trends are maintained in each case.

The structure of this article is as follows: Section 2 outlines the methodology and the equations employed to identify both the overall effects and the dynamic heterogeneous effects of minimum wage changes. Section 3 introduces the data and delineates the distinctions between states that altered their minimum wage rates and those that did not. Section 4 presents the primary findings and offers a discussion of the results. Lastly, Section 5 concludes the article and proposes directions for future research on this subject.

2 Methodology

This study aims to ascertain the impact of a minimum wage increase on worker turnover, earnings, and employment within the childcare sector, specifically in childcare centers. The study covers the period from 2001-Q1 to 2007-Q2, during which the federal minimum wage remained constant at $5.15 per hour before rising to $5.85 in 2007-Q3. In this interval, 14 states altered their minimum wage laws while 15 did not, providing a basis for comparison. The remaining states had minimum wage laws consistently above the federal minimum wage, which were subject to dynamic changes.

Given the constant federal minimum wage in the study period, it is feasible to compare states that increased their minimum wage rates above the federal level using a binary treatment approach. This approach mitigates endogeneity issues arising from changes in the federal minimum wage due

to overall labor market conditions (Card, 1992a). The comparison was conducted between states that adhered to the federal minimum wage rate and those that raised their minimum wage laws at least once.

I used a two-way fixed-effects estimator to gauge the overall effect and the Callaway and Sant'Anna (2021) estimator to examine the dynamic trajectories for minimum wage increases. I also employed the unconditional parallel trends assumption of the difference-in-differences approach to estimate the impact of minimum wage increases.

The identification strategy hinges on two assumptions. First, without any changes in the minimum wage rate laws, states that altered their laws would have adhered to the federal minimum wage rate. Second, once a state is treated, it remains treated for the duration of the study. Therefore, only the first change during the study period is considered for states with programmed minimum wage rate changes.

The two estimators are presented in equations 1 through 4. The two-way fixed-effect estimator is outlined in equation 1:

$$y_{i,t} = \alpha_i + \theta_t + \beta X_{it} + \varepsilon_{it} \tag{1}$$

The Callaway and Sant'anna estimator is used to capture the dynamic effects of a minimum wage increase on treated states, as shown in equations 2 to 4:

$$ATT(g,t) = E[Y_t(g) - Y_t(0)|G_g = 1] \tag{2}$$

$$ATT(t) = \sum_{g}^{G} ATT(g,t) \tag{3}$$

$$y_{i,t} = Y_{i,t}(0) + \sum_{t}^{T}\sum_{g}^{G}(Y_{i,t}(g) - Y_{i,t}(0)) * G_{i,g} \tag{4}$$

$$y_{i,t} = Y_{i,t}(0) + \sum_{t}^{T} ATT(t) \tag{5}$$

In specifications 1, 4, and 5, y_{it} could represent various measures such as worker turnover rates, annualized real earnings, log of earnings, the level of employment normalized by 10,000 people, or the log of the level of employment. β in specification 1 represents the

3   Data

To investigate the impact of minimum wage changes on the childcare labor market in the United States, I utilize the Quarterly Workforce Indicators (QWI) dataset. The QWI provides local labor market statistics on employee-employer relationships, including all jobs covered by unemployment insur-

ance from partner states, except for Massachusetts. The dataset covers all private-sector jobs, excluding agriculture, federal employees, military, postal workers, and self-employed individuals. Consequently, self-employed childcare workers and family providers are omitted, and the study focuses on childcare workers in centers.

QWI values may be missing for various reasons, such as unavailability for specific categories and quarters, failure to meet Census Bureau publication standards, or suppression due to confidentiality concerns when fewer than three workers or establishments are available for a particular aggregate measure. To address this, I have assigned minimum employment records to counties with zero employment values, affecting 1% of the data or 509 values. This ensures these counties are included in the sample and only applies to the count of jobs variable.

The sample encompasses states that either maintained their minimum wage rate at the federal level or changed their minimum wage laws between 2001-Q1 and 2007-Q2. A total of 29 states were included in the study, with 14 increasing their minimum wage laws above federal minimum wages and 15 not altering their minimum wage laws. Table 1 presents the list of states and their corresponding rollout dates, while figure 1 depicts a line plot of the minimum wage time series for the federal government and treated states.

States that increased their minimum wages above the federal level after 2001-Q1 are considered treated units, with the first increase counting as the start of the treatment. Conversely, states following the federal minimum are

considered comparison units. This creates a valid counterfactual, given that the federal minimum wage did not change due to aggregate labor market conditions between 2001-Q1 and 2007-Q2. Workers receive the highest rate in the context of multiple minimum wage laws at different administrative levels.

This study's treatment occurs at the state level, while outcome variables are determined at the county level. Each observation represents a county during a specific quarter between 2001-Q1 and 2007-Q2.

Figure 2 displays the visualization of missing proportions for outcome variables. The turnover rate has the highest proportion of missing data at 47%, followed by employment at 27% and earnings at 1%. To address this, I employed the k-nearest-neighbors (knn) algorithm for imputing missing values, thereby avoiding the exclusion of counties from the sample.

Table 2 highlights the differences between states that did not change their minimum wage laws and those that did. Two main features are apparent: first, there are no practical differences between treated and untreated states regarding turnover rates and earnings; second, significant differences exist between treated and untreated states in employment normalized by population. Treated states have a larger population, while untreated states exhibit higher-variance data for employment. The right skewness of earnings data indicates a higher number of people with low earnings, so the log of employment has also been included. This transformation corrects the skewness and results in smaller means and standard deviations between treated and

untreated states.

Table 1: Sample states and the time they changed their minimum wage rate laws

	State	Quarter of minimum wage change
1	Colorado	2007-Q1
2	Florida	2005-Q2
3	Georgia	No change during 2001-Q1 and 2007-Q2
4	Idaho	No change during 2001-Q1 and 2007-Q2
5	Illinois	2004-Q1
6	Indiana	No change during 2001-Q1 and 2007-Q2
7	Iowa	2007-Q2
8	Kansas	No change during 2001-Q1 and 2007-Q2
9	Louisiana	No change during 2001-Q1 and 2007-Q2
10	Maryland	2007-Q1
11	Michigan	2006-Q4
12	Minnesota	2005-Q3
13	Missouri	2007-Q1
14	Montana	2007-Q1
15	Nebraska	No change during 2001-Q1 and 2007-Q2
16	Nevada	2006-Q4
17	New Mexico	No change during 2001-Q1 and 2007-Q2
18	North Carolina	2007-Q1
19	North Dakota	No change during 2001-Q1 and 2007-Q2
20	Ohio	2007-Q1
21	Oklahoma	No change during 2001-Q1 and 2007-Q2
22	South Carolina	No change during 2001-Q1 and 2007-Q2
23	South Dakota	No change during 2001-Q1 and 2007-Q2
24	Tennessee	No change during 2001-Q1 and 2007-Q2
25	Texas	No change during 2001-Q1 and 2007-Q2
26	Utah	No change during 2001-Q1 and 2007-Q2
27	Virginia	No change during 2001-Q1 and 2007-Q2
28	West Virginia	2006-Q3
29	Wisconsin	2005-Q2

Table 2: Differences between states that changed their minimum wage laws vs. states that did not change their minimum wage laws.

Variable	Never Treated	Treated
Turnover Rate	0.157	0.155
	(0.070)	(0.067)
Employment / 10,000	138.546	60.781
	(720.223)	(247.760)
Log Employment	4.220	4.337
	(1.502)	(1.483)
Real Earnings	14,453.68	14,717.10
	(5,275.586)	(5,031.755)
Log Earnings	9.498	9.527
	(0.447)	(0.414)

4   Results

This section of the paper presents two types of results. Initially, I estimated the overall effects utilizing the Two-Way Fixed Effects estimator (TWFE) and the estimator suggested by Callaway and Sant'Anna (2021). I then introduce the dynamic effects estimated through the Callaway and Sant'Anna (CS) estimator. Both sets of results focus on the same outcome variables. The discussion concludes with a synthesis of the dynamic effects and their connection to the overall effects.

4.1   Overall Effects

Table 3 provides the TWFE and the Callaway and Sant'Anna difference-in-differences results, demonstrating the impact of increased state minimum

wage rates on four variables: Employment, Log of employment, Turnover Rate, and Log of Earnings. The first column shows the Two-Way Fixed Effects estimates and the second column presents the Callaway and Sant'Anna estimates.

Table 3's first column (TWFE) illustrates that states which raised their minimum wage rates during the study period saw an approximate reduction of 19 jobs per 10,000 people, a figure statistically significant at 5%. However, this figure does not correspond in absolute terms to the value in the second column (CS). The CS estimate indicates an increase of eight jobs per 10,000 people. However, this estimate is not statistically significant. Despite this, the lesser quantity of observations indicates that the estimate is less precise and could present a compositional effect, which might explain the change in sign.

In table 3 Log employment indicates a reduction in the number of jobs ranging from 2.4% to 6.5% following a positive change in the minimum wage rate. However, these estimates are not statistically significant. In this table, both point estimates (TWFE and CS) agree on the sign and exhibit similar uncertainty but differ significantly in magnitude. Therefore, assuming a true effect is present, it will likely be negative or null.

The impact of an increase in the minimum wage rate on the turnover rate ranges from around -0.4 to -0.3 percentage points for both estimators in presented in table 3 in row Turnover rate. Furthermore, these estimates demonstrate very similar precision. However, the change is not empirically

significant since the mean values are very alike across treated and never treated states in the pre-treatment period. Even though the TWFE estimate is statistically significant, the preferred specification CS shows no significance.

Additionally, earnings for childcare workers increased between 2.26% and 3% in real terms, and this increase is statistically significant at 5% for both estimators in table 3. The effect calculated from the CS estimator is lower than the 3% effect obtained with the TWFE estimator. The similarity between the two coefficients could indicate a true effect of minimum wage increases on earnings.

To provide further context to the employment numbers, a decrease of 19 jobs per 10,000 people represents a third of the mean values of the treated states and a seventh of the never treated states. An increase of 8 jobs per 10,000 people represents a 13% of the mean values of the treated states and a 23% of the untreated states. The TWFE estimate is twice as large as the CS estimate in absolute terms for treated states. The TWFE estimate is empirically sizable and statistically significant, but it is biased downward compared to the positive CS estimate in table **??**. This bias is because the TWFE produces a common trend for the different treated state groups, and given the heterogeneity of treatment groups, and it generates bias when comparing to the comparison group, which might not be true in this case.

A 3% increase in real earnings, as shown in Table 3, signifies an annual increase of approximately $\$440$ in real dollars. While this figure is statisti-

	TWFE	CS
Employment Per 10,000	-19.435**	8.193
	(8.844)	(14.972)
R^2	0.467	N/A
Log employment	-0.029	-0.065
	(0.032)	(0.033)
R^2	0.762	N/A
Turnover rate	-0.004**	-0.0003
	(0.002)	(0.003)
R^2	0.262	N/A
Log earnings	0.030***	0.026
	(0.010)	(0.009)
R^2	0.707	N/A

Note:	*p$<$0.1; **p$<$0.05; ***p$<$0.01

Table 3: Two-way fixed effects and Callaway and Sant'Anna analysis of county/quarter minimum wage data on various outcomes

cally significant, it becomes even more meaningful when juxtaposed with the average shift in minimum wage laws across the treated states. Compared with the 2007 minimum wage level of 5.15, we discern an average minimum wage rise of 3.08 percent. This outcome underscores that the average earnings have surged commensurately with the average increase in the minimum wage rate.

4.2   Dynamic Effects

The dynamic effects are estimated through the Callaway and Sant'Anna (CS) estimator, and the results are depicted in Figures 3, 4, 5, and 6. They

present the treatment effect for each period relative to the untreated outcome.

Figure 3 shows a mostly stable trend in the employment rate for three years before and after the minimum wage increase, with a small but statistically insignificant increase in the treatment year. This suggests that the treatment might have immediate effects on employment', but these effects do not persist over time.

In Figure 4, the dynamic treatment effect on the log of employment shows a slight decrease at the treatment year and a gradual decline over the following three years, although these effects are statistically insignificant. This indicates that the log of employment is not substantially affected by the minimum wage increase in the traditional view, where wider confidence intervals are taken as a lack of strong evidence for a particular direction of effects.

Figure 5 shows a slight decrease in the turnover rate in the treatment year, followed by an increase in the following years. However, these changes are not statistically significant, suggesting that the minimum wage increase does not significantly affect the turnover rates in a dynamic sense.

Lastly, Figure 6 illustrates a significant increase in the log of earnings in the treatment year, which persists over the following three years. This suggests that the minimum wage increase has a lasting positive effect on the earnings of childcare workers. Nevertheless, I should point out that these dynamic effects have wide standard errors rendering the treatment effects less evident. However, the pattern in the dynamic effects' shape is clear compared

to the pre-treatment years.

4.3   Synthesis of the Findings

The results suggest that minimum wage increases can lead to reduced employment and turnover rates and increased earnings for childcare workers. However, the effects on employment and turnover rates are not statistically significant.

The dynamic effects provide additional insights into the timing and persistence of these effects. The employment rate seems to increase slightly in the treatment year but returns to the baseline in the following years. The log of employment shows a gradual decline, although this effect is not statistically significant. The turnover rate decreases in the treatment year but increases in the following years, while the log of earnings significantly increases in the treatment year and remains high in the following years.

In summary, the findings suggest that minimum wage increases might have immediate but not lasting effects on employment and turnover rates. In contrast, they have a lasting positive effect on the earnings of childcare workers. This implies that the benefits of increased wages for childcare workers might outweigh the potential costs of reduced employment opportunities. However, further research is needed to confirm these findings and to explore the potential mechanisms behind them.

5   Conclusions and final remarks

5.1   Summary

In this study, we examined the impact of changes in minimum wage laws on real earnings, turnover, and employment levels in the context of childcare workers, with the broader aim of reducing barriers to access to childcare. While traditional literature on childcare focuses on parents' labor force participation, it often overlooks the labor market conditions of childcare workers. Interestingly, the data analysis suggests a full pass-through effect in the earnings of childcare workers following a change in the minimum wage. This finding underscores the potential benefits of increasing the minimum wage rate for childcare workers and the overall quality of childcare services.

My analysis reveals that a 3% rise in the minimum wage leads to a statistically significant annual increase of $440 in real earnings, a reduction in turnover, and a modest decrease in employment levels. This rise is consistent with the observed average change in the minimum wage rate of 3.08% when compared to the 2007 minimum wage level of 5.15.

However, the increase in the minimum wage was also found to be associated with a slight decrease in employment. The magnitude of this effect is relatively small when estimated using the Callaway and Sant'Anna estimator, representing approximately a tenth of the pre-treatment values compared to a third when estimated using the TWFE approach.

It should be noted that the reduction in employment levels is a contentious

issue. The data does not allow me to determine whether this decrease is due to an increase in the number of hours worked per employee, a shift from part-time to full-time employment, or an increase in separations. Further research is needed to clarify these aspects and fully understand the implications of changes in minimum wage laws on employment dynamics and the accessibility and quality of childcare services.

5.2   Implications for Policy and Practice

The findings of this study have several implications for policy and practice in the childcare sector. As the demand for non-parental childcare continues to grow, policymakers must carefully consider the potential effects of minimum wage increases on childcare workers, providers, and families.

1. Supporting childcare workers: The results suggest that minimum wage increases can lead to higher earnings for childcare workers, which may improve their financial well-being and job satisfaction. This, in turn, could help attract and retain qualified staff in the childcare sector, improving the overall quality of care.

2. Monitoring employment effects: While the study did not find statistically significant negative effects on employment in the short term, policymakers should monitor the long-term effects of minimum wage increases on employment opportunities in the childcare sector. This is particularly important in areas with low population density or high unemployment, where childcare providers may be more sensitive to wage changes.

3. Balancing affordability and quality of care: The potential pass-through of wage increases to childcare prices may impact families' ability to afford quality childcare. Policymakers should consider strategies to mitigate the potential negative consequences of higher childcare costs, such as expanding subsidies or tax credits for low-income families.

4. Further research on market structures: This study highlights the importance of understanding the labor market structure in the childcare sector. The effects of minimum wage increases may differ depending on the degree of competition and price elasticity. Future research could explore these factors' variations across different regions or provider types to inform targeted policy interventions.

5.3   Limitations and Future Research Directions

While this study provides valuable insights into the effects of minimum wage increases on the childcare sector, several limitations should be considered when interpreting the findings.

1. Data limitations: The study relies on aggregate data, which may mask important heterogeneity in the effects of minimum wage increases across different subpopulations or provider types. Future research could benefit from the use of individual-level or provider-level data to better understand the distribution of the effects.

2. Causal inference: The study uses a difference-in-differences approach to estimate the causal effects of minimum wage increases, which relies on the

assumption of parallel trends between treated and untreated groups. While the dynamic effects analysis provides some evidence supporting this assumption, it is important to consider alternative methods, such as synthetic control or regression discontinuity designs, to strengthen causal inference.

3. Mechanisms: This study does not directly examine the mechanisms through which minimum wage increases may affect the childcare sector, such as changes in provider costs, demand for services, or worker productivity. Future research could investigate these mechanisms to provide a more comprehensive understanding of the consequences of minimum wage increases for childcare workers, providers, and families.

By addressing these limitations and building on the findings of this study, future research can further contribute to our understanding of the complex relationship between minimum wage policies and the childcare sector, ultimately informing evidence-based policies to support the well-being of childcare workers and the families they serve.

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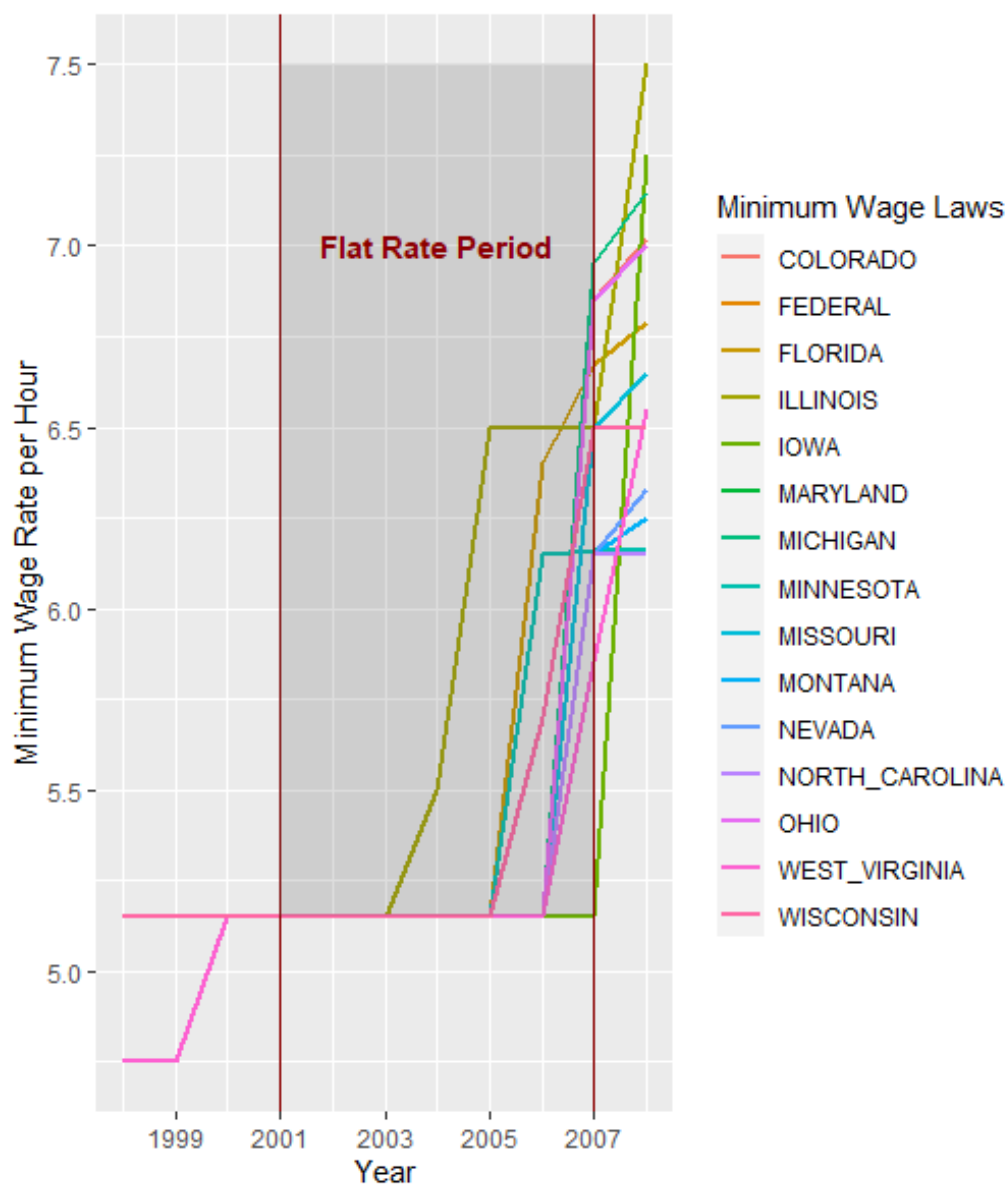US Bureau of Labor Statistics (n.d.). *Childcare workers: Occupational outlook handbook*. Available at `http://www.bls.gov/ooh/personal-care-and-service/childcare-workers.htm#tab-1` (2022/11/30).

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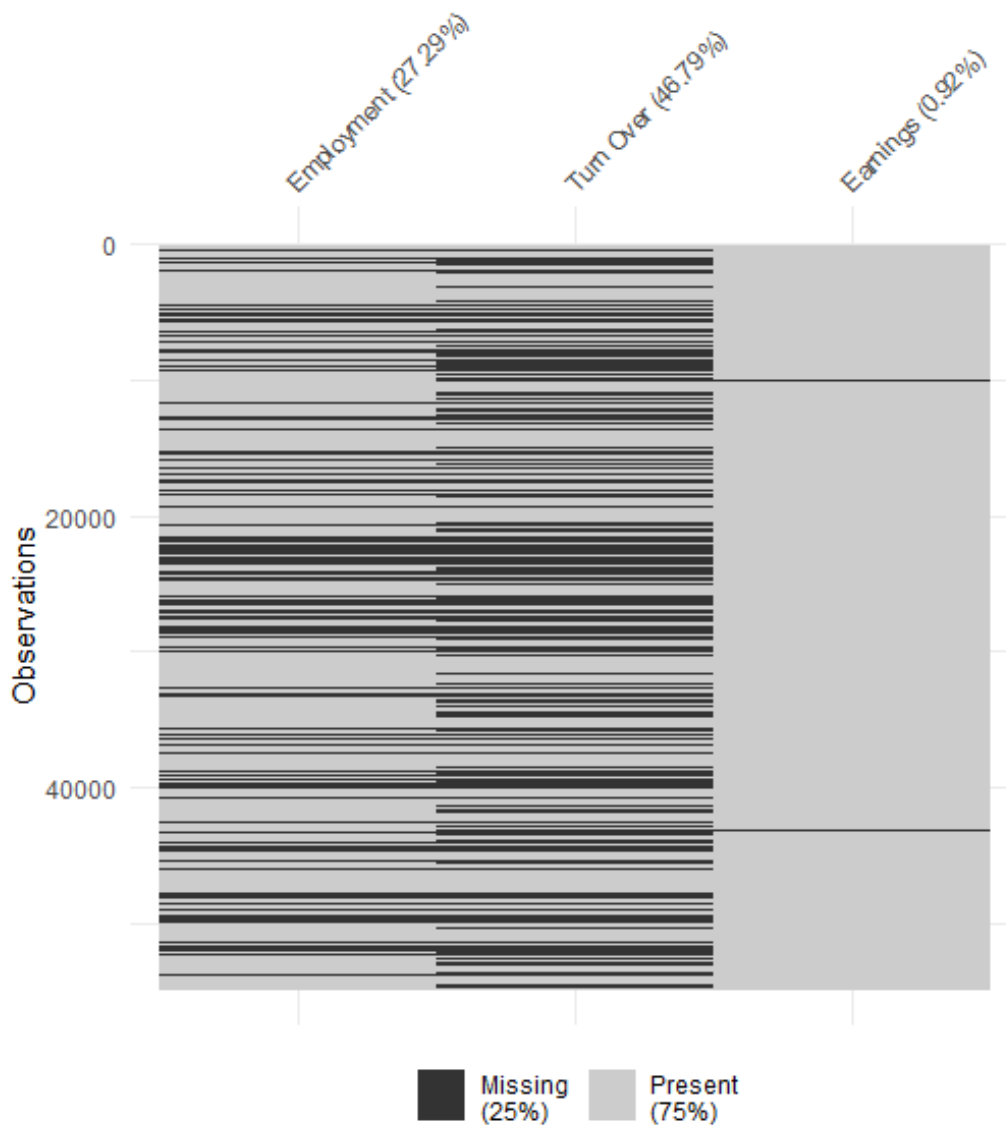
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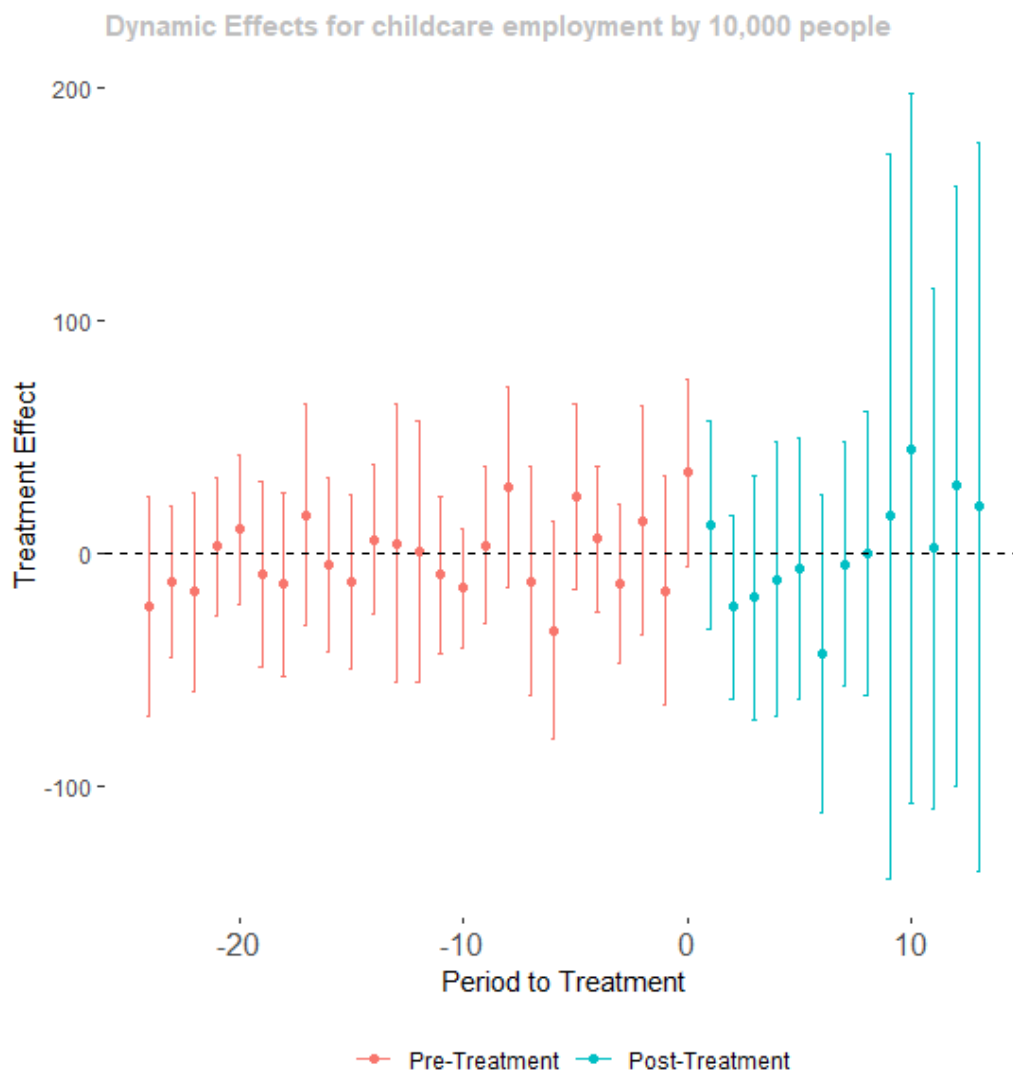
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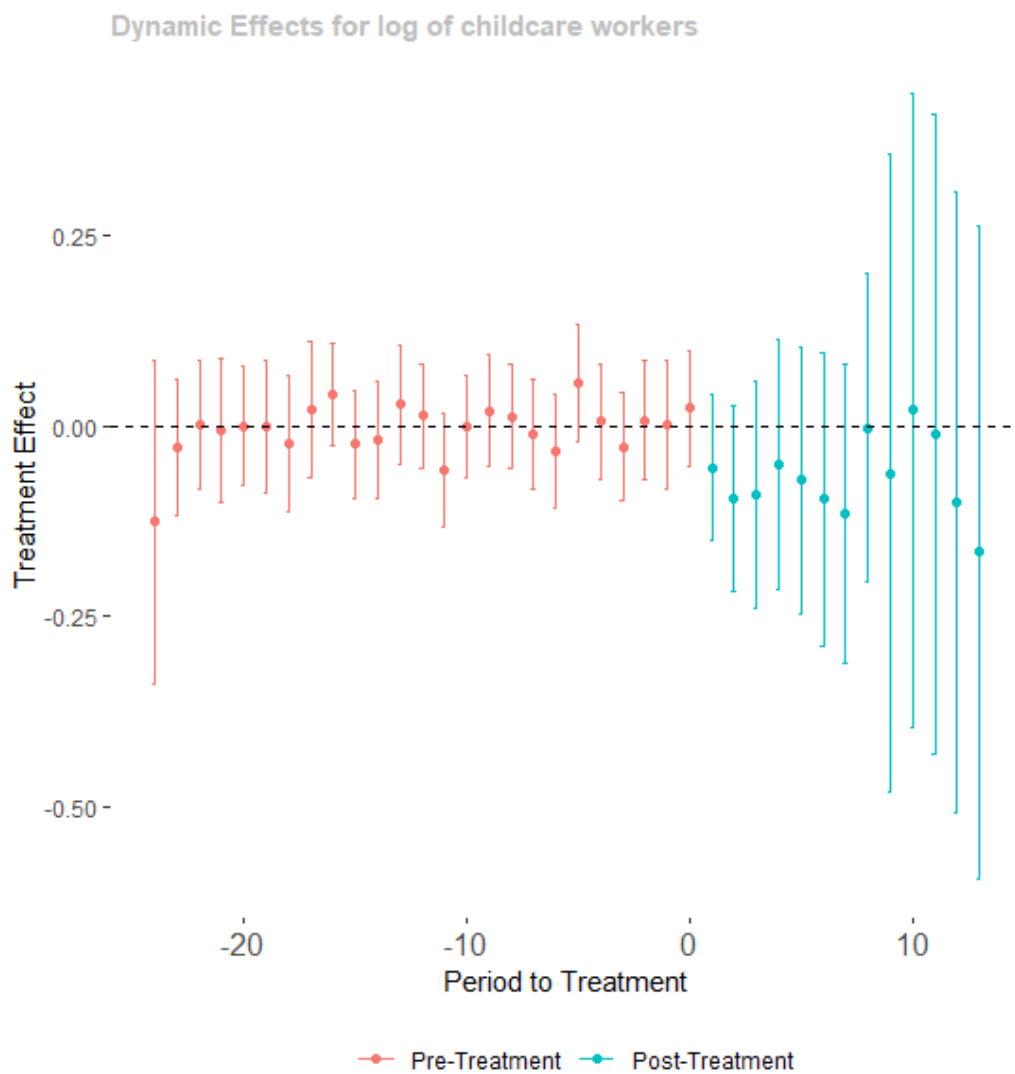
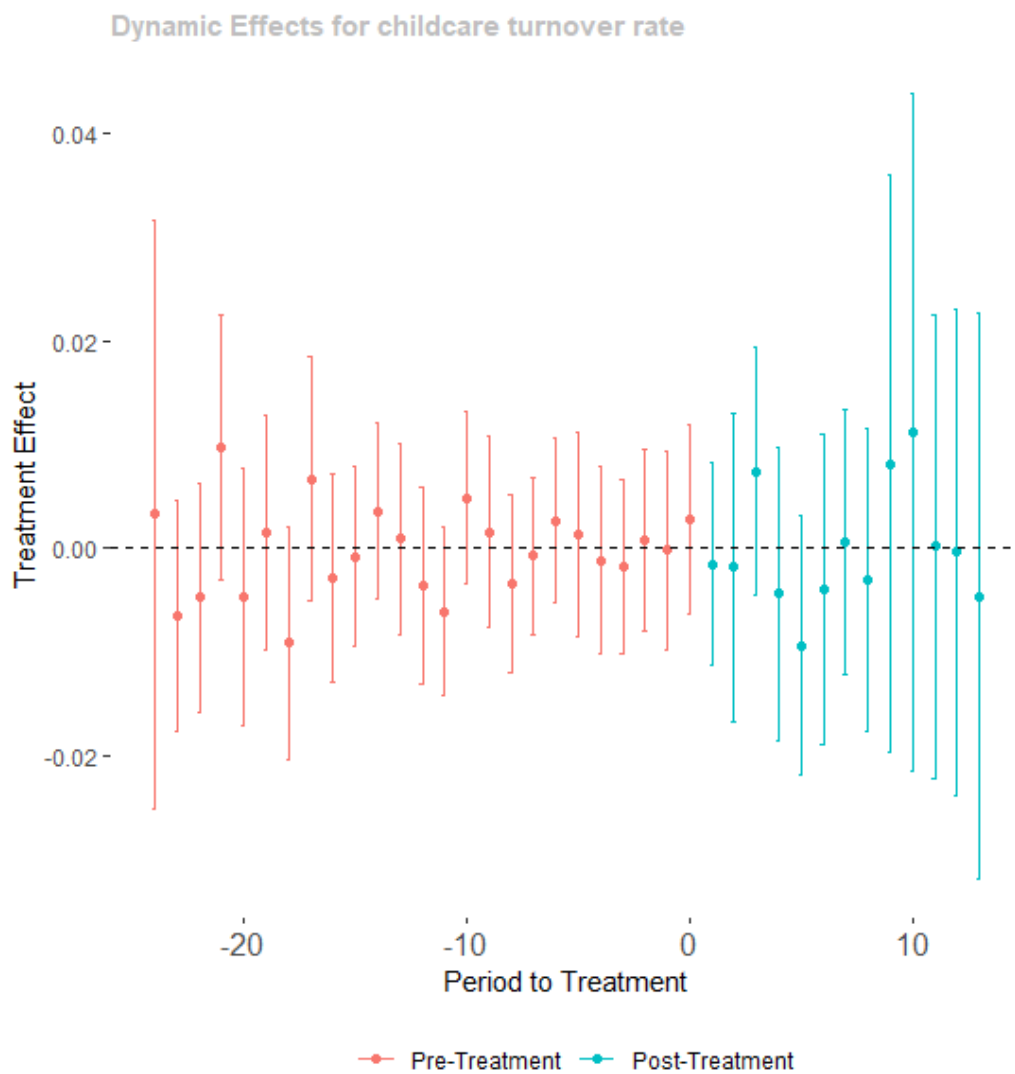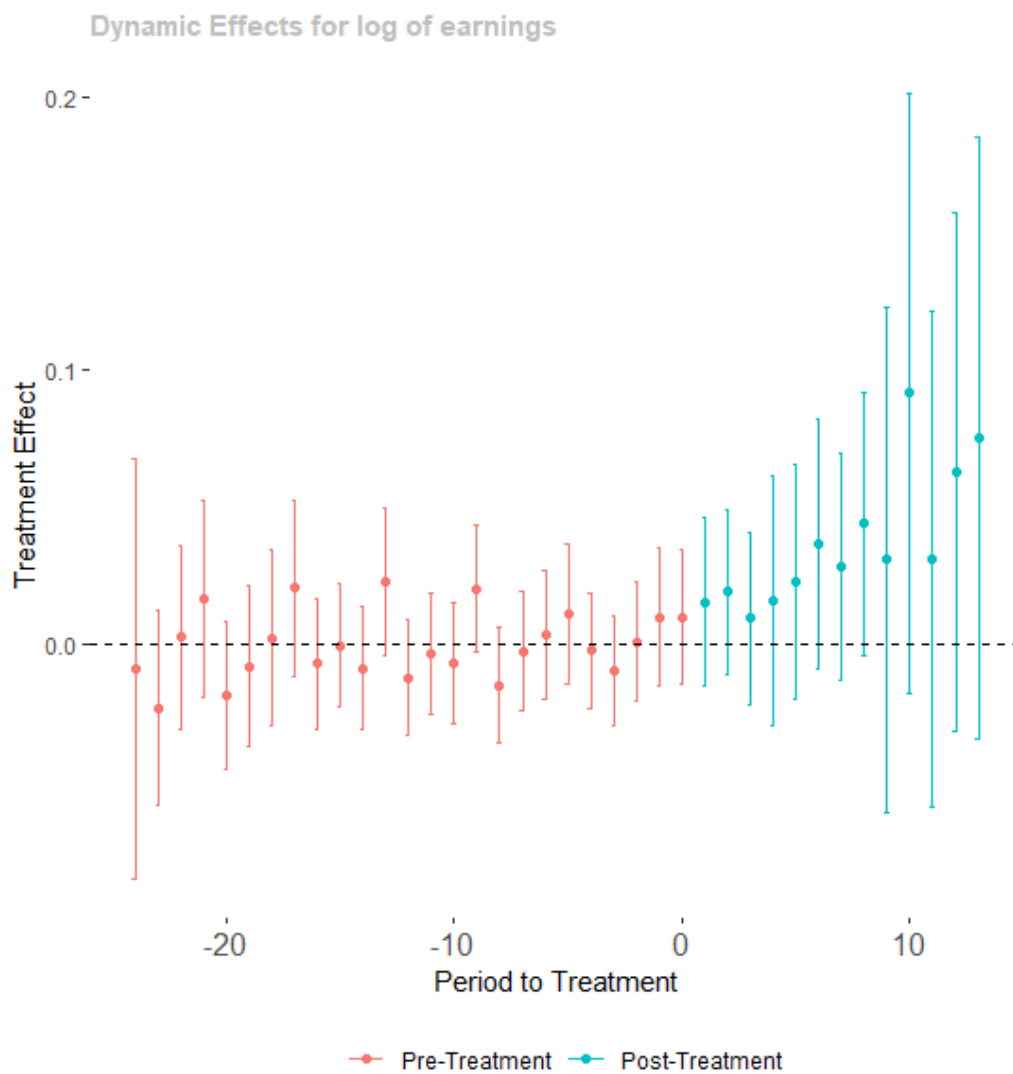Figure 4: Dynamic effects for log of childcare jobs

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