The Effects of China's Minimum Wage: Who Thrives and Who Struggles Among Rural Migrant Workers?

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Abstract: This paper utilizes long-period data and dynamic Difference-in-Differences (DID) models to explore the multifaceted impacts of minimum wage (MW) policies, focusing on both their implementation and subsequent updates. Regarding MW policy implementation, we identify a positive correlation between enactment and the influx of rural migrant workers, underscoring the policy's role in shaping labor market dynamics. Analyzing the effects of MW standard updates, we observe a temporal pattern: initial suppression of employment opportunities for migrant workers followed by an expansion phase. Additionally, there is a positive elasticity between MW standard updates and migrant workers' wages, intensifying over time. Over the long term, as MW standards rise, there is a notable shift in work locations towards county borders. Scrutinizing heterogeneous effects, we find significant negative impacts on lower-wage workers and dynamic effects among higher-wage workers. MW updates lead to substantial wage increases for lower-wage workers initially, with lagged positive effects observed for higher-wage workers. Based on our findings, we propose policy suggestions. While MW policy implementation enhances migrant work opportunities, careful consideration of its impact on rural migrant workers' welfare is crucial. Continuation of MW policies is recommended, accompanied by a nuanced understanding of their effects on labor market dynamics and welfare implications for different segments of the workforce. In conclusion, our study provides valuable insights into the impacts of MW policies, informing policymakers on the intricate dynamics of labor markets and the welfare implications of MW standards.

Keywords: China's Minimum Wage Policies, Rural Migrant Workers, Labor Market

1. Introduction

The impact of the Minimum Wage (MW) on employment remains a topic of ongoing debate. Empirical studies conducted in diverse contexts yield mixed results, ranging from negative (Gindling & Terrell, 2009) to positive (Giuliano, 2013), and even null employment elasticities (Giuliano, 2013). These divergent outcomes are often attributed to variations in labor market structures (Soundararajan, 2019). The theoretical framework suggests negative employment effects in competitive markets, but posits positive effects for a reasonably low MW in monopolistic markets (Stigler, 1946). Furthermore, the theory anticipates distinct effects based on factors such as the relative level of the MW to the market clearing wage, the structure and number of minimum wages (Terrell & Almeida, 2008) and the degree of enforcement (Soundararajan, 2019).

However, there is a consensus that discussions on the impact of MW primarily focus on the lower end of the initial wage distribution (Terrell & Almeida, 2008). Notably, in China, rural migrant workers form a significant subgroup, contributing to over one-third of the labor force in 2022, and their numbers continue to increase (National Bureau of Statistics of China, 2022). These workers typically possess less human capital, marked by limited education, skills, and work experience. Consequently, their access to occupations with better economic returns and prestige is constrained (Huang et al., 2010; Zhang & Wu, 2017).

The impact of MW on this group presents a particular puzzle. On one hand, their wages tend to hover around the minimum wage level, making them highly susceptible to the MW

policies. The introduction or update of MW may lead to either a substantial increase in wages or job loss (Alaniz et al., 2011). On the other hand, their tendency to work in informal sectors makes them less likely to be covered by minimum wage legislation (Gindling & Terrell, 2004), potentially rendering the MW ineffective for this subgroup.

In 1993, China introduced a MW policy, urging provincial governments to establish their own standards[1]. However, enforcement was insufficient. Subsequently, in 2004, the country issued comprehensive MW Regulations, ensuring nationwide implementation. Thus, the introduction of this policy in China followed a staggered process, with provinces adopting standards in different years. Furthermore, under the MW policy, the standards in every province undergoes adjustments every one or two years.

To the best of our knowledge, research on the impact of China's MW policy, particularly concerning rural migrant labor, is limited (Ren et al., 2021). Besides, the available studies yield inconclusive results. Moreover, most prior research simply employed aggregate-level data to assess MW effects in China (Fang et al., 2021; Fang & Lin, 2015), overlooking individual diversity. Furthermore, the literature rarely differentiates between the imposition of a MW policy and its updating. This is primarily due to the unavailability of pre-period data before the policy introduction, posing challenges in establishing a benchmark for measuring the policy's effects.

We aim to evaluate the impact of the MW on Chinese rural migrant workers' employment using a comprehensive twenty-year panel dataset (1995–2015) provided by the Rural Fixed

[1] The factors considered in setting minimum wage levels include local living costs, the consumer price index, social insurance (e.g. pensions and healthcare insurance), the housing provident fund, the average wage level, the level of economic development, and the employment situation in the local labor market. In general, there are two minimum wage standards: a minimum monthly wage and a minimum hourly wage. The minimum monthly wage applies to full-time employees, whereas the minimum hourly wage applies to part-time workers.

Observation Point[2] of the Ministry of Agriculture in China. This dataset ensures a robust representation across both time and geographical locations. From 1995 to 2002, the database covers household information, including the number of migrant workers within households. From 2003 to 2015, it encompasses individual information, such as wages and migration status.

Leveraging the varied introduction years of minimum wage (MW) across regions and our extensive dataset, our initial analysis concentrates on assessing the impact of MW introduction on employment, specifically the number of household migrant workers[3]. To achieve this, we employ staggered difference-in-differences estimators, following the approach outlined by Callaway and Sant'Anna (2021).

In addition to this, we delve into the effects of subsequent MW updates on both employment and wages of migrant workers, utilizing the dynamic DID model proposed by de Chaisemartin and D'Haultfœuille (2024). Our analysis extends to estimating the impact of an elevated MW standard on the likelihood of migration for work, migrant workers' earnings, and the locations of migrant works.

Furthermore, we explore heterogeneity within distinct groups, considering rural migrant workers' wages.

Our investigation into minimum wage (MW) policies and their subsequent updates reveals multifaceted dynamics. Initially, MW policy implementation shows a positive correlation with the influx of rural migrant workers. However, our analysis of MW standard updates uncovers a nuanced temporal pattern: while initial increases suppress employment opportunities for

[2] The Rural Fixed Observation Point Survey System monitors farmers' income, rural labor transfer and employment, and collects sales price information from major agricultural producers (Gustafsson et al., 2014).

[3] To determine the number of migrant workers within a household from 2003 to 2021, we calculate it by summing the individuals identified as migrant workers in the individual data.

migrant workers, a subsequent expansion phase emerges. Moreover, MW standard updates exhibit a positive elasticity with migrant workers' wages, intensifying over time, leading to a shift towards more local employment in the long term. Notably, our examination of heterogeneous effects indicates a significant negative impact on lower-wage workers, contrasting with dynamic effects among higher-wage workers, including initial decreases followed by increases in migrant work. Lower-wage workers experience substantial wage increases initially, with a lagged positive effect observed among higher-wage workers, underscoring the need for careful consideration of MW policies' impact on rural migrant workers' welfare.

2. Minimum Wages in China

In 1993, China introduced its first national minimum wage regulations, which were subsequently incorporated into the country's updated Labor Law in July 1994. This legislation mandated that all employers pay wages meeting or exceeding the local minimum wage. To determine these local minimum wage standards, provincial, autonomous-region, and municipal governments were instructed to adhere to five guiding principles. These principles encompassed considerations such as the lowest living expenses of workers, average number of dependents they support, local average wages, labor productivity, local employment levels, and regional economic development. This framework afforded significant flexibility to provinces and cities in setting their respective minimum wages.

By December 1994, 7 out of 31 provinces had established their own minimum wage standards. By the end of 1995, this number had risen to 24, with differing implementation dates

across regions. For instance, 3 provinces and municipalities had implemented the minimum wage by the end of 1994, increasing to 20 by the end of 1995, 22 by the end of 1996, 27 by the end of 1997, 29 by the end of 1999, 30 by the end of 2002, 31 by the end of 2003, and finally reaching full coverage with 32 regions by the end of 2004.

In February 2004, more stringent regulations were enacted, marking a pivotal moment for minimum wage standards in China. Notably, these standards were now set and adjusted through collaborative efforts between local governments, trade unions, and enterprise confederations within each province. Furthermore, the updated regulations mandated that local governments revise minimum wage standards at least once every two years, while also increasing penalties for violations from 20 to 100% of the owed wages to 100–500% of the owed wages.

3. Data

Our data comprises two primary sources: minimum wage records spanning 1994 to 2023 at the county level, and a comprehensive twenty-year panel dataset (1995–2015) from the Rural Fixed Observation Point (RFOP) [4] under the Ministry of Agriculture in China. Established in 1986 and ongoing, the RFOP annually surveys 23,000 rural households and 375 villages across 368 counties in 32 provinces, autonomous regions, and municipalities (Gao et al., 2022). The RFOP survey employed a rigorous multistage cluster population probability sampling technique, delineated into three key strata (He & Wang, 2017). Initially, every province autonomous region, and municipality was categorized by geographic features into plain, hilly, and mountainous areas. Subsequently, counties were stratified by per capita income, grouping

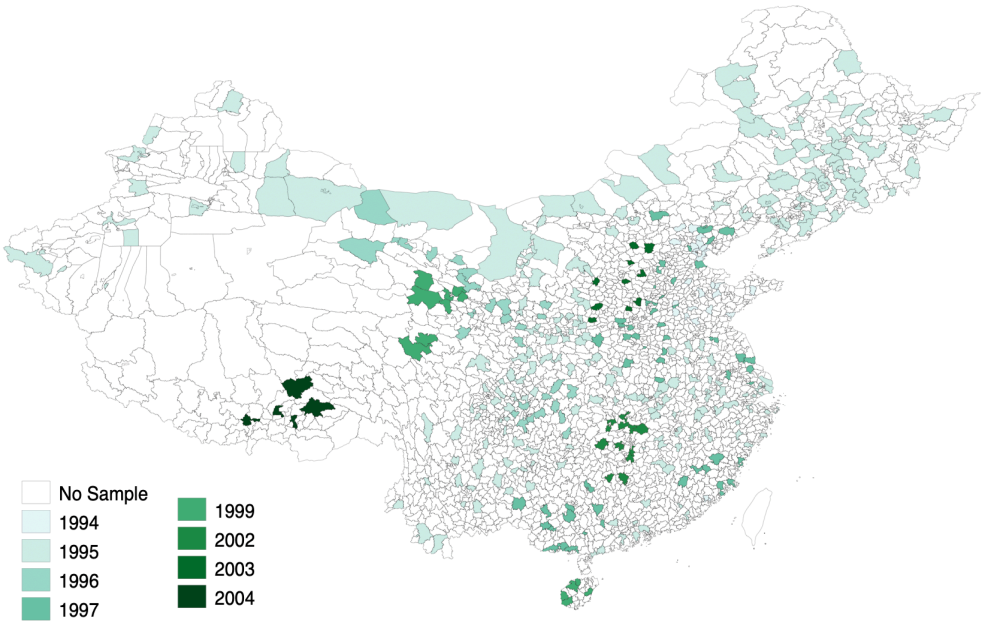
[4] The Rural Fixed Observation Point Survey System monitors farmers' income, rural labor transfer and employment, and collects sales price information from major agricultural producers (Gustafsson et al., 2014).

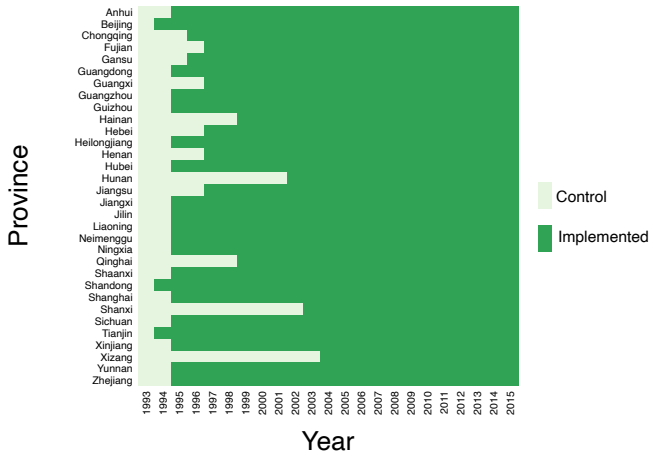
them into low, middle, and high-income categories. Representative counties were then selected based on income levels. Finally, villages were stratified based on their characteristics, with one representative village chosen from each county. Within these villages, a random sample of a few dozen households was selected. Overall, the RFOP sample represents 13.5 percent of China's roughly 2,600 counties, with the number of surveyed households per village ranging from 50 to over 100, dependent on village size.

The RFOP dataset offers a comprehensive collection of household and individual data spanning a significant period. Pre-2003 records encompass detailed household-level information, including labor and migrant worker numbers. Post-2003, the survey expanded to include a questionnaire covering demographic details, employment status, income, expenditures, and other relevant data for family members. Of particular relevance to our study on rural migrant workers, the dataset includes information on their wages, location, and duration of migration. These features align with our study's requirements and offer a robust statistical foundation for variable selection. Through an agreement, we acquired access to RFOP data covering 375 villages across 368 counties and 32 provinces from 1995 to 2015.

Figure 1 depicts the implementation year of the minimum wage across our 368 sample counties in China, spanning from 1994, when certain provinces initiated the policy, to 2004, when it was uniformly adopted nationwide. **Figure 2** illustrates the disparities in implementation years among provinces. Subsequent to the initial implementation, provinces revised their minimum wage standards at varying intervals and by differing increments. **Figure 3** showcases the implementation and update years across provinces from 1994 to 2015, with updates occurring between 4 and 19 times during this period. Notably, some provinces, such

as Beijing, Tianjin, and Shanghai, updated their standards frequently, while others, like Xizang and Hubei, did so less often. Certain years witnessed widespread updates, while others saw minimal activity, such as 2009 when only two provinces revised their standards. **Figure 4** presents the average increase in minimum wage standards (adjusted for inflation) across sample counties within each province, while **Figure 5** breaks down these averages by province. Overall, there is a discernible upward trend in the magnitude of minimum wage increases. However, the frequency and extent of these increases vary significantly among provinces.





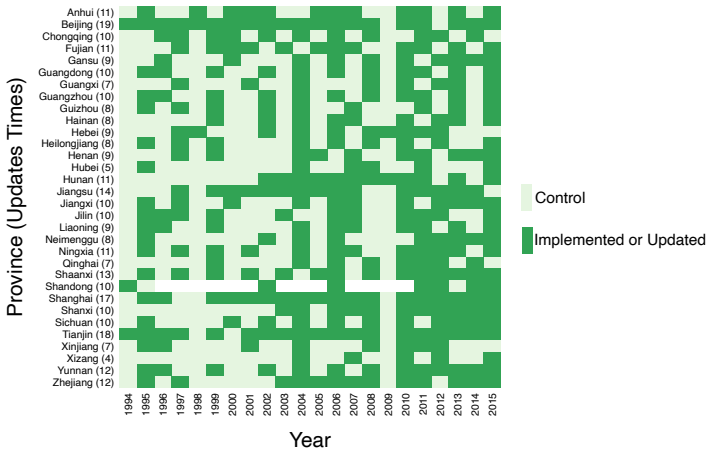


Figure 1: Implementation Year of Minimum Wage in Sample Counties (1994-2004)

Figure 2: Disparities in Minimum Wage Implementation Years Among Provinces

Figure 3: Implementation and Update Years of Minimum Wage Across Provinces (1994-2015)

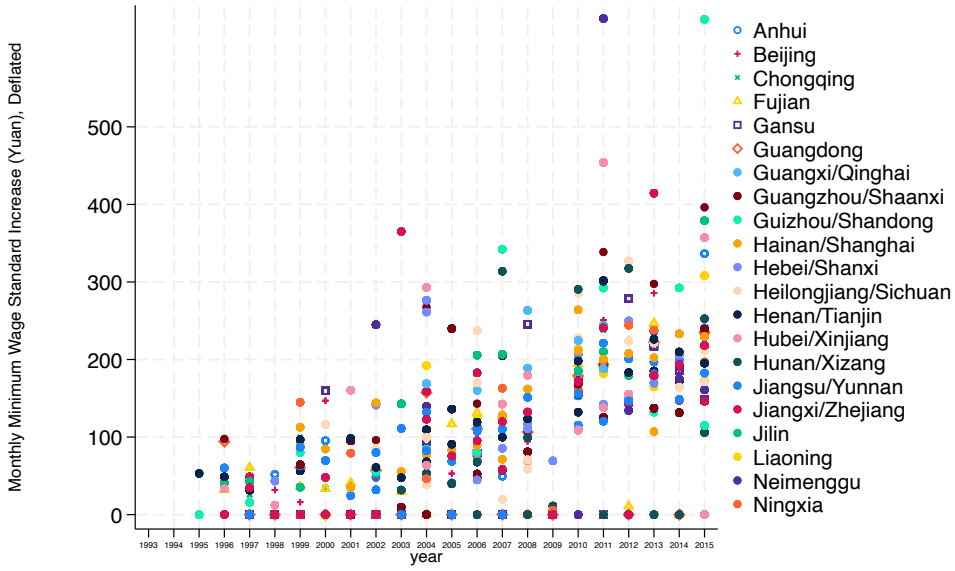


Figure 4: Average Increase in Minimum Wage Standards Across Sample Counties by Province

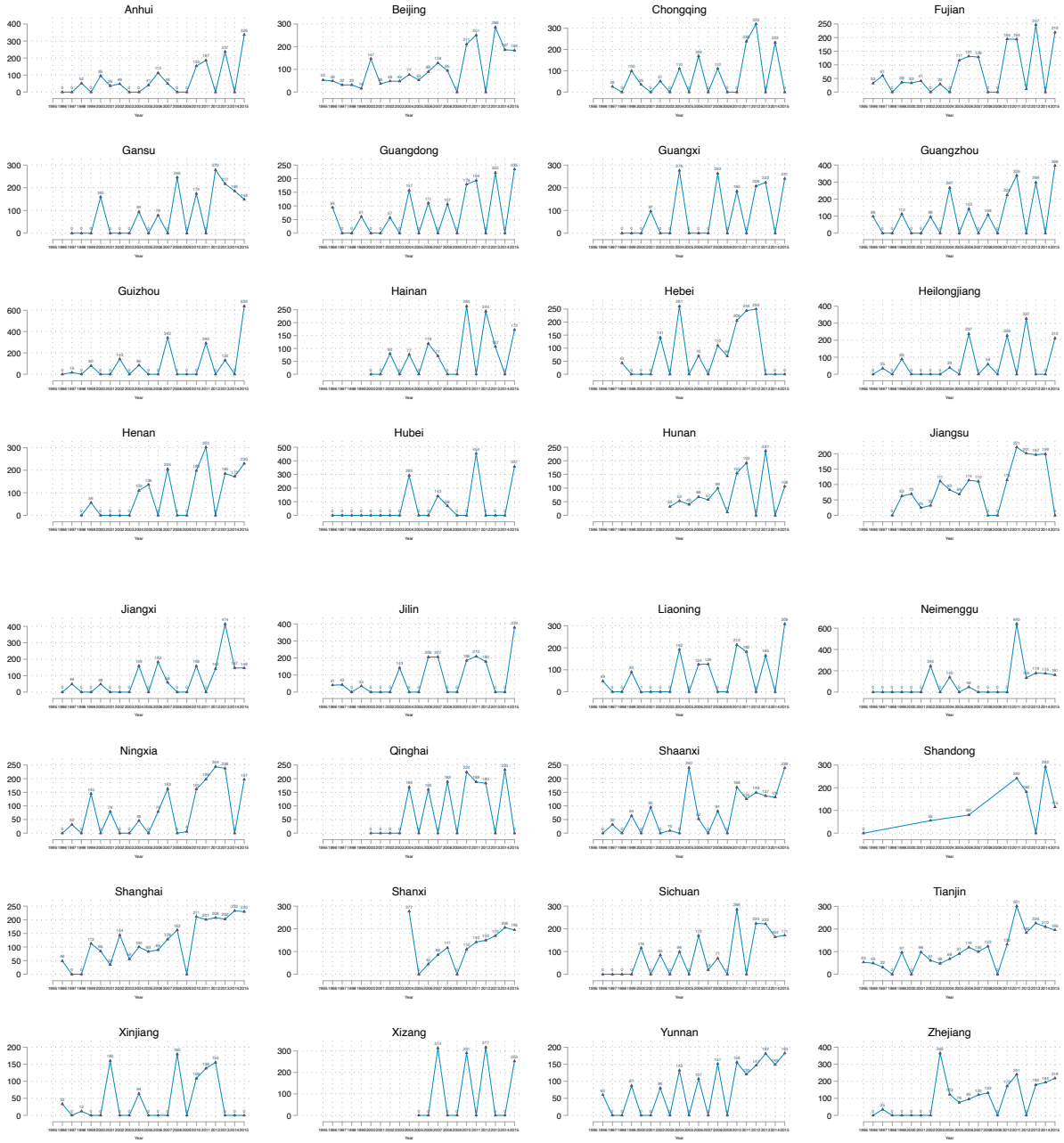


Figure 5: Average Increase in Minimum Wage Standards Across Sample Counties by Province

Table 1 presents household-level information spanning from 1995 to 2002. During this period, there was a decline in the number of permanent residents in households alongside an increase in the household workforce, although the number of migrant workers decreased. The primary labor force's age demographic shifted towards older ages, from 18-50 to over 51. Additionally, there was an improvement in the educational attainment of the primary labor force, progressing from below elementary and elementary school levels to junior high school and above. The predominant types of Household Employment Diversity were Pure Agriculture (approximately 40%) and Primary Agriculture with Secondary Other Business (around 38%), both of which experienced a decrease, particularly the latter, which decreased from 39.4% to 36%. Conversely, other employment types witnessed an increase.

Table 2 presents individual-level information spanning from 2003 to 2015. It indicates a rising average age of household members, increasing from approximately 36 to 40 years. The proportion of rural individuals engaged as family-operated laborers, both in agriculture and non-agriculture sectors, is declining, while there is a corresponding increase in the number of individuals engaged as employed laborers. Additionally, the percentage of migrant workers fluctuates between 22% and 24%. **Table 3** provides insights into rural migrant workers, revealing an increase in their average age from 32 to 37 years. Approximately 65% of migrant workers are male, and 35% are female. Their deflated (to 2022) monthly wage has risen from 801 yuan to 2405 yuan, with an increase in migrant workdays from 240 to 254. The share of migrant workers employed within the county is decreasing, while those working within the

province but outside the county are increasing. Furthermore, there is a slight uptick in the percentage of migrant workers employed outside their home province, rising from 32% to 34%.

Table 1: Description of Household-Level Information (1995-2002)

	1995-1996 (N = 35345)	1997-1998 (N = 36011)	1999-2000 (N = 36349)	2001-2002 (N = 37090)
Household permanent residents count				
Mean (SD)	4.37 (1.60)	4.28 (1.60)	4.21 (1.61)	4.13 (1.59)
Household workforce count				
Mean (SD)	2.51 (1.11)	2.50 (1.10)	2.50 (1.10)	2.53 (1.12)
Rural migrant worker count				
Mean (SD)	0.24 (0.59)	0.22 (0.56)	0.21 (0.54)	0.21 (0.54)
Primary labor force age				
Under 30 years old	3288 (9.4%)	3145 (8.8%)	2919 (8.1%)	2783 (7.6%)
Between 31 and 40 years old	10969 (31.2%)	10929 (30.6%)	10298 (28.6%)	8779 (24.0%)
Between 41 and 50 years old	11934 (34.0%)	11909 (33.3%)	12091 (33.5%)	11712 (32.0%)
Between 51 and 60 years old	5971 (17.0%)	6046 (16.9%)	6748 (18.7%)	8271 (22.6%)
Above 61 years old	2983 (8.5%)	3738 (10.5%)	3991 (11.1%)	5033 (13.8%)
Primary labor force education level				
Illiterate or semi-literate	3426 (10.0%)	3142 (9.2%)	3051 (8.7%)	2781 (7.8%)
Elementary school level	14737 (42.9%)	14431 (42.1%)	14478 (41.2%)	14263 (39.8%)
Junior high school level	12959 (37.7%)	13405 (39.1%)	14180 (40.4%)	15119 (42.2%)
High school and above level	3223 (9.4%)	3294 (9.6%)	3428 (9.8%)	3635 (10.2%)
Household Employment Diversity				
Pure agriculture	13821 (40.3%)	13648 (39.9%)	13691 (39.0%)	14103 (39.4%)
Primary agriculture, secondary	13491 (39.4%)	13207 (38.6%)	13174 (37.5%)	12902 (36.0%)
other business				

	1995-1996	1997-1998	1999-2000	2001-2002
	(N = 35345)	(N = 36011)	(N = 36349)	(N = 37090)
Primary non-agriculture, secondary agriculture	5042 (14.7%)	5372 (15.7%)	5749 (16.4%)	5577 (15.6%)
Pure non-agriculture	1413 (4.1%)	1468 (4.3%)	1782 (5.1%)	2329 (6.5%)
Other	495 (1.4%)	528 (1.5%)	752 (2.1%)	887 (2.5%)

Table 2: Description of Individual-Level Information (2003-2015)

	2003-2004	2005-2007	2008-2010	2011-2013	2014-2015
	(N = 114843)	(N = 204160)	(N = 233192)	(N = 233573)	(N = 148259)
Age					
Mean (SD)	35.88 (19.37)	36.69 (19.58)	37.85 (20.00)	39.02 (20.47)	40.15 (21.01)
Gender					
Female	53298	91808	97821	103018	68707
	(47.9%)	(47.9%)	(47.9%)	(47.9%)	(47.9%)
Male	57902	99890	106286	112094	74622
	(52.1%)	(52.1%)	(52.1%)	(52.1%)	(52.1%)
Occupation					
Family-operated agricultural laborer	45680	78021	78047	78418	49260
	(53.6%)	(53.1%)	(51.7%)	(50.8%)	(48.8%)
Family-operated non-agricultural laborer	8152 (9.6%)	14031 (9.6%)	14675 (9.7%)	14024 (9.1%)	8742 (8.7%)
Employed laborer	15637	29485	36694	40258	27387
	(18.3%)	(20.1%)	(24.3%)	(26.1%)	(27.1%)
Individual/partnered business operator	1962 (2.3%)	3286 (2.2%)	2704 (1.8%)	2470 (1.6%)	1627 (1.6%)
Private enterprise operator	881 (1.0%)	1472 (1.0%)	1368 (0.9%)	1583 (1.0%)	1096 (1.1%)
Rural and state cadres	1257 (1.5%)	2065 (1.4%)	1885 (1.2%)	1800 (1.2%)	1133 (1.1%)
Education, technology, medical, health, and cultural arts worker	1017 (1.2%)	1673 (1.1%)	1480 (1.0%)	1457 (0.9%)	1006 (1.0%)
Other	10715	16888	14134 (9.4%)	14225 (9.2%)	10794
	(12.6%)	(11.5%)			(10.7%)

Deflated Monthly Wage					
Mean (SD)	801.11	965.09	1294.93	1934.54	2405.70
	(489.03)	(558.25)	(724.17)	(1002.77)	(1142.71)
Migrant workers					
0	80226	151839	182259	181594	111776
	(76.4%)	(75.9%)	(78.6%)	(78.6%)	(77.5%)
1	24839	48186	49571	49419	32396
	(23.6%)	(24.1%)	(21.4%)	(21.4%)	(22.5%)

Table 3: Description of Rural Migrant Workers Information

	2003-2004 (N = 24839)	2005-2007 (N = 48186)	2008-2010 (N = 49571)	2011-2013 (N = 49419)	2014-2015 (N = 32396)
Age					
Mean (SD)	32.37 (11.98)	33.72 (12.27)	34.52 (12.21)	35.95 (12.28)	37.35 (12.32)
Gender					
Female	8458 (34.1%)	16704 (34.7%)	17379 (35.1%)	17214 (34.8%)	11214 (34.6%)
Male	16376 (65.9%)	31462 (65.3%)	32166 (64.9%)	32181 (65.2%)	21158 (65.4%)
Occupation -					
Family-operated agricultural laborer	5221 (21.5%)	10928 (23.3%)	9385 (19.6%)	8625 (18.2%)	5625 (18.3%)
Family-operated non-agricultural laborer	2486 (10.2%)	4598 (9.8%)	4926 (10.3%)	4801 (10.2%)	2836 (9.2%)
Employed laborer	12417 (51.2%)	24459 (52.1%)	27590 (57.7%)	27890 (59.0%)	18003 (58.4%)
Individual/partnered business operator	795 (3.3%)	1401 (3.0%)	1205 (2.5%)	1040 (2.2%)	642 (2.1%)
Private enterprise operator	366 (1.5%)	681 (1.5%)	674 (1.4%)	810 (1.7%)	536 (1.7%)
Rural and state cadres	194 (0.8%)	389 (0.8%)	350 (0.7%)	273 (0.6%)	177 (0.6%)
Education, technology, medical, health, and cultural arts worker	274 (1.1%)	485 (1.0%)	401 (0.8%)	441 (0.9%)	313 (1.0%)
Other	2501 (10.3%)	4022 (8.6%)	3297 (6.9%)	3395 (7.2%)	2676 (8.7%)
Deflated Monthly Wage					
Mean (SD)	801.11 (489.03)	965.09 (558.25)	1294.93	1934.54	2405.70

	2003-2004 (N = 24839)	2005-2007 (N = 48186)	2008-2010 (N = 49571)	2011-2013 (N = 49419)	2014-2015 (N = 32396)
			(724.17)	(1002.77)	(1142.71)
Number of migrant workdays					
Mean (SD)	240.02 (96.49)	247.06 (94.07)	252.96 (88.94)	256.84 (84.83)	254.51 (84.33)
Employment Location -					
Outside County but	5324 (21.4%)	10023 (20.8%)	12570 (25.4%)	13294 (26.9%)	8851 (27.3%)
Within Province					
Outside Township but	9881 (39.8%)	18466 (38.3%)	16102 (32.5%)	14958 (30.3%)	9421 (29.1%)
Within County					
Outside Province	8024 (32.3%)	15467 (32.1%)	16843 (34.0%)	16885 (34.2%)	10983 (33.9%)
Overseas	233 (0.9%)	439 (0.9%)	731 (1.5%)	450 (0.9%)	304 (0.9%)

4. Empirical Application

Utilizing our dataset, we examine the impact of minimum wage through two lenses: the implementation of minimum wage policies and the regular updates to minimum wage standards. We posit that these factors may yield distinct effects; while the former signifies the transition from absence to presence, the latter represents routine adjustments to standards.

4.1.The Effects of the Implement of Minimum Wage Policies

We employ difference-in-differences (DID) methodologies to estimate the impact of minimum wage (MW) policy implementation. Since Ashenfelter (1978) introduced DID in economics, it has gained popularity among researchers for its clarity, intuitive results, and straightforward application in causal inference and policy assessment. However, recent studies have highlighted potential estimation biases in the traditional two-way fixed-effect model, particularly in staggered DID designs, due to processing heterogeneity. Specifically, earlier treated samples may inadvertently act as control groups for later treated samples (Goodman-Bacon, 2021), leading to cross-contamination and biased regression results (Sun & Abraham, 2021). To address this issue, existing literature offers three main solutions. The first involves calculating and weighting the group-period average treatment effect on treated (ATT) to avoid using treated individuals as improper control groups (Callaway & Sant'Anna, 2021; de Chaisemartin & D'Haultfœuille, 2020; Sun & Abraham, 2021). The second entails

employing interpolation methods to derive reasonable counterfactual outcomes from control group samples (Borusyak et al., 2024). Lastly, stacked regression selects suitable control groups for each treatment group, stacking datasets based on relative event times and conducting regression estimates (Cengiz et al., 2019). Given the multi-phase implementation of China's MW policies, this paper adopts a standard staggered DID approach. To mitigate reliance on subjective adjustments and unclear statistics from alternative estimators, we employ the Heterogeneity-Robust estimator of ATT proposed by Callaway and Sant'Anna (2021).

Specifically, the method developed by Callaway and Sant'Anna (2021), commonly known as CSDID, enhances the estimation of ATT under the conditional assumptions of Parallel Trends Assumption (PTA) and No Anticipation (NA). This is particularly applicable when units are quasi-randomly assigned treatment at different times, such as in staggered rollouts. In contrast to the traditional Two-Way Fixed Effects (TWFE) model, which assumes constant treatment effects, CSDID estimates ATT for individual "cohorts" of units treated simultaneously, thus sidestepping the weighting issue arising from heterogeneous treatment effects in TWFE models during staggered rollouts. Moreover, the adaptable assumptions of conditional PTA and NA regarding pretreatment covariates facilitate the group-by-year estimation of ATTs conditioned on these covariates. Additionally, the underlying estimation method leverages doubly robust difference-in-difference estimation, as outlined by (Sant'Anna & Zhao, 2020). This approach ensures consistent estimation by employing a well-specified outcome regression for repeated cross-sectional panel data. Finally, the method facilitates the

estimation of heterogeneous treatment effects concerning continuous covariates.

Here, we use the method proposed by Callaway and Sant'Anna (2021) to estimate the following equation:

$$RMWN_{ht} = \alpha_h + \emptyset_t + \sum_{-\underline{T} \le r \le \overline{T}}^{r \neq 0} 1\,[R_{ht} = r]\beta_r + X_{ht}\beta_b + \epsilon_{ht} \qquad (1)$$

Equation (1) delineates a dynamic specification of DID, incorporating household and time-fixed effects denoted by α_h and $\emptyset_t$ respectively. $RMWN_{ht}$ represents the migrant worker numbers within a household, while X_{it} encompasses time-varying and household-varying control variables, including the number of laborers within the household in year t and household h. β_r signifies the dynamic effects of MW implementation on household migrant workers.

The CSDID approach views each (group, time) pair (g, t) as a building block, where $ATT(g,t)$ represents the average treatment effect at time t for the cohort initially treated at group g, given by $ATT(g,t) = \mathbb{E}[Y_{ht}(g) - Y_{ht}(\infty)|G_i = g]$. CSDID offers two distinct options for $\mathcal{G}$: utilizing only never-treated units ($\mathcal{G} = \{\infty\}$) or incorporating all not-yet-treated units ($\mathcal{G} = \{g', g' > t\}$). This novel approach in CSDID allows for the estimation of $ATT(g,t)$ across various events, calendar times, and cohorts. Notably, for enhanced robustness, province-level clustering was implemented.

4.2.The Effects of the Regular Updates to Minimum Wage Standards

We continue to employ dynamic difference-in-differences (DID) methodologies

to estimate the impact of MW standards changes. The dynamic DID model is as follows:

$$Y_{it} = \partial_i + \zeta_t + \sum_{-\underline{T} \le r \le \overline{T}, r \neq 0} 1\,[R_{it} = r]\delta_r + X_{it}\delta_b + \sigma_{it} \qquad (2)$$

where Y_{it} represents the dependent variables, encompassing the decision to migrate for work and the logarithm of deflated monthly wage for migrant work. ∂_i and ζ_t denote individual- and time-fixed effects respectively. X_{it} denotes time-varying and individual-varying control variables, such as the number of laborers within individual i's household in year t. δ_r denotes the dynamic effects of MW updates.

However, as the same county experienced multiple MW increases, the CSDID approach, which is applicable only to binary treatments, becomes impractical. Therefore, we opt for the DID_MULTIPLEGT_DYN estimator proposed by de Chaisemartin and D'Haultfœuille (2024) to estimate the impact. This estimator offers several advantages, notably its applicability to any design and non-binary treatments. Additionally, it provides robust estimation of instantaneous treatment effects, dynamic effects, and a systematic approach to aggregate these effects.

5. Results

5.1.Dynamic Effects of the Implement of Minimum Wage Policies

Figure 6 illustrates the dynamic impact of minimum wage (MW) introduction policies on rural household migrant worker numbers, employing the event study difference-in-differences (DID) model with the estimator proposed by Callaway and Sant'Anna (2021). To address potential correlation within provinces where policies are

introduced, standard errors are clustered at the province level.

Our analysis confirms the satisfaction of the Parallel Trends Assumption (PTA). Notably, the effects of MW introduction on rural migrant household numbers vary across different time periods. Over time, post-MW introduction, these effects exhibit an increasing trend. Initially, during the first four periods, no statistically significant effects are observed using clustered standard errors. However, by the fifth and sixth periods, the positive effects become highly significant.

These findings suggest a positive association between the implementation MW policies and rural migrant worker numbers. However, our study is constrained by data limitations, precluding an examination of the impact on migrant workers' wages. Subsequent sections will delve deeper into this aspect.

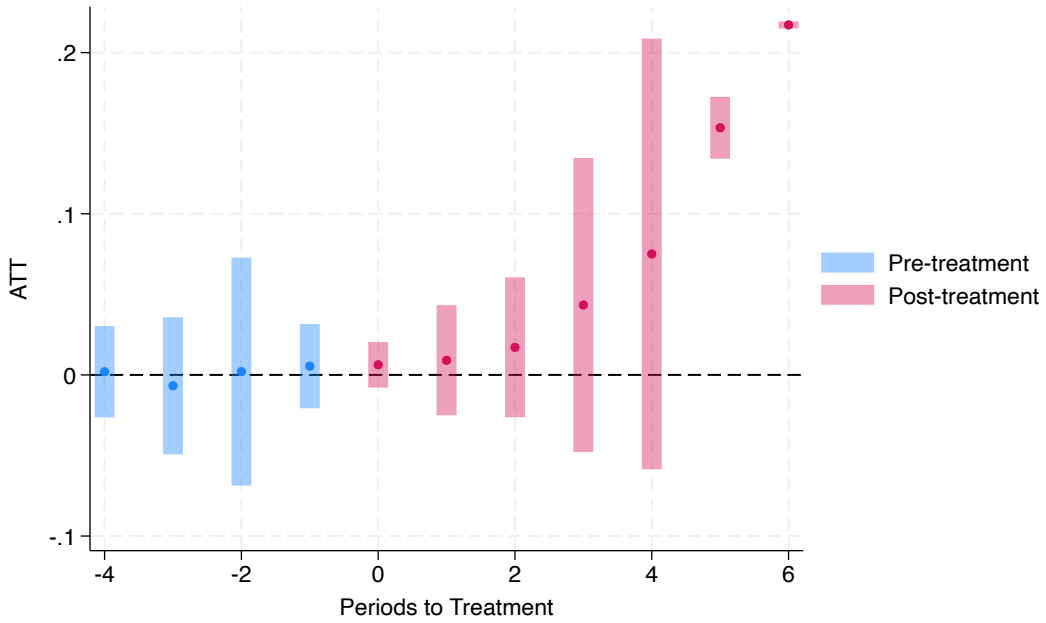


Figure 6: Dynamic Effects of Minimum Wage Introduction on Rural Household Migrant Worker Numbers

5.2.Dynamic Effects of the Regular Updates to Minimum Wage Standards

5.2.1. Dynamic Effects of the Regular Updates to Minimum Wage Standards on Rural Residents' Migration for Work

Table 7 shows the dynamic effects of regular minimum wage (MW) updates on rural residents' migration for work. We employ a dynamic Difference-in-Differences (DID) model following the methodology outlined by de Chaisemartin and D'Haultfœuille (2024), with standard error clustering and successful completion of the placebo test.

Our analysis reveals nuanced shifts in the impact of MW standard updates over time. Initially, the implementation of higher MW standards significantly reduces the likelihood of rural residents migrating for work. However, as time progresses, typically by the second period, this effect reverses, leading to an increase in migration for work.

Consequently, our findings suggest a temporal pattern: initial MW standard increases suppress employment opportunities for migrant workers, followed by a subsequent phase where these opportunities expand.

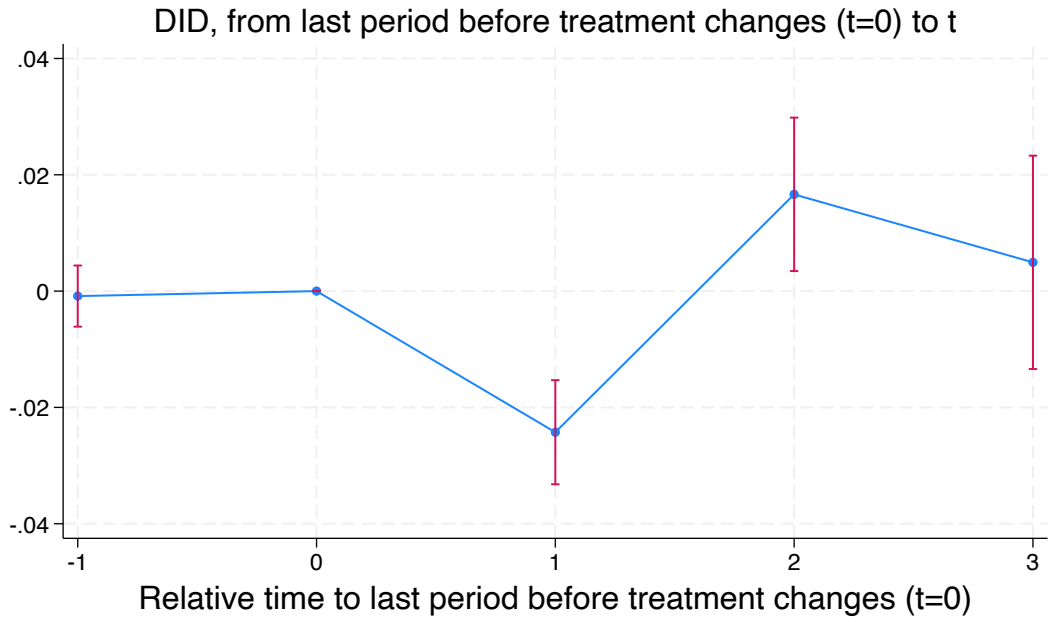


Figure 7: Dynamic Effects of Regular Minimum Wage Updates on Rural Residents' Migration for Work

5.2.2. Dynamic Effects of the Regular Updates to Minimum Wage Standards on Rural Migrant Workers' Wages

Table 8 illustrates the dynamic effects of regular MW standard updates on the logarithm of monthly wages for rural residents engaged in work migration. Monthly wages are computed by dividing migrant workers' annual income from migrant work, as reported in the questionnaire, by their number of workdays, and then multiplying by 21.75—the standard number of workdays in China per month.

Our analysis indicates a positive elasticity of MW standard updates on migrant workers' wages. Moreover, as the treatment period progresses, this effect intensifies, with the elasticity increasing from approximately 0.02 to 0.05.

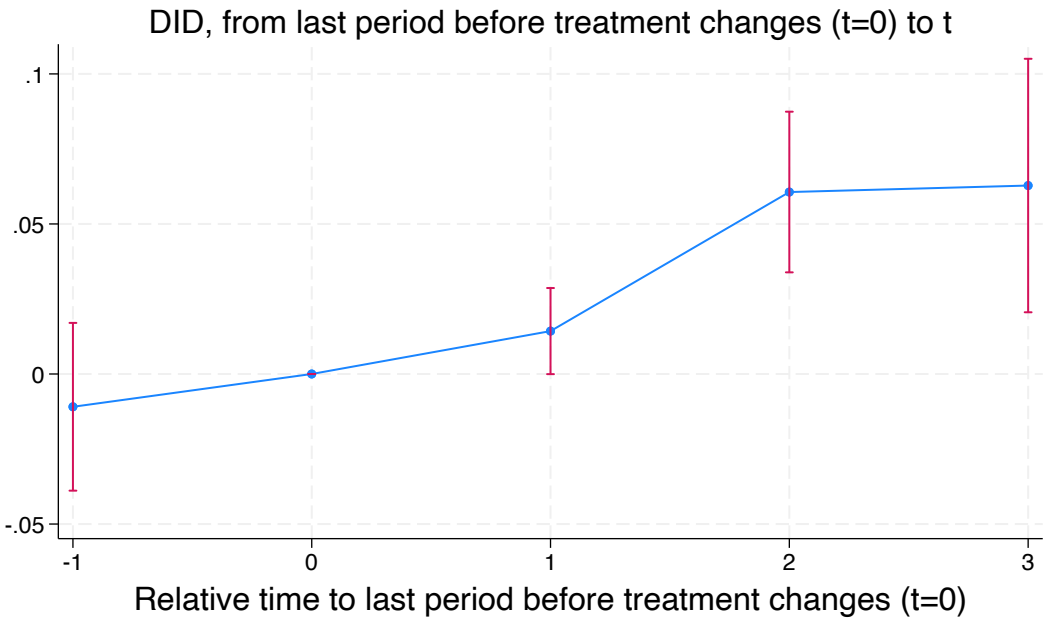


Figure 8: Dynamic Effects of Regular Minimum Wage Updates on Logarithm of Monthly Wages for Rural Residents' Migration for Work

5.2.3. Dynamic Effects of the Regular Updates to Minimum Wage Standards on Rural Migrant Workers' Locations

Tables 9 to 11 present the dynamic effects of MW standards updates on rural migrant workers' locations, including whether they work within county borders, outside county borders but within provincial borders, or outside provincial borders.

Our findings indicate that, in the long run, as MW standards increase, rural migrant workers are more inclined to work within county borders and less likely to work outside provincial borders. Notably, while Table 11 did not pass the placebo test, indicating a positive pre-trend, post-MW standard updates resulted in a shift to negative effects. Therefore, it is reasonable to conclude that MW standards updates decrease the likelihood of migrant workers working outside their local province.

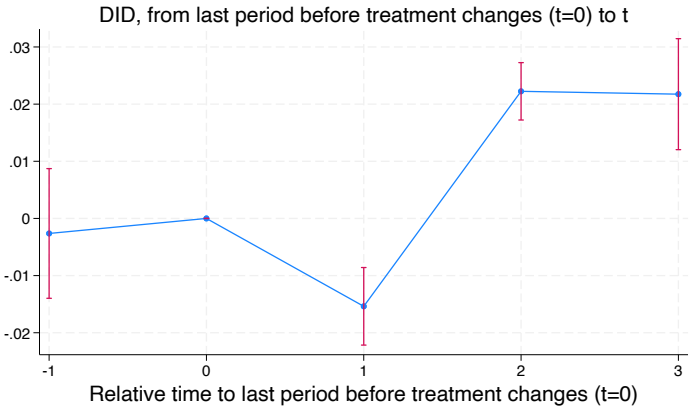
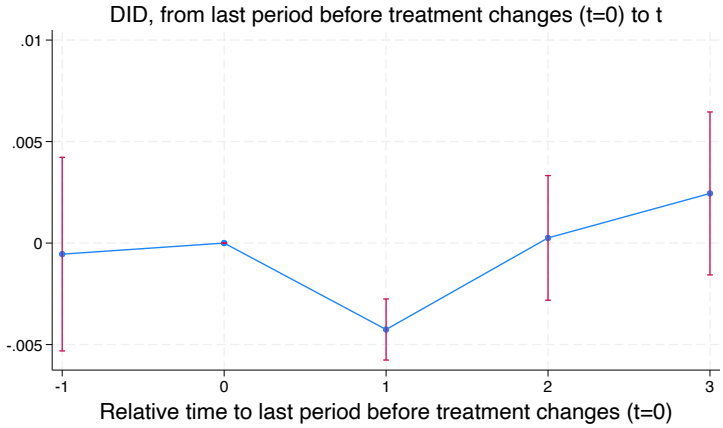


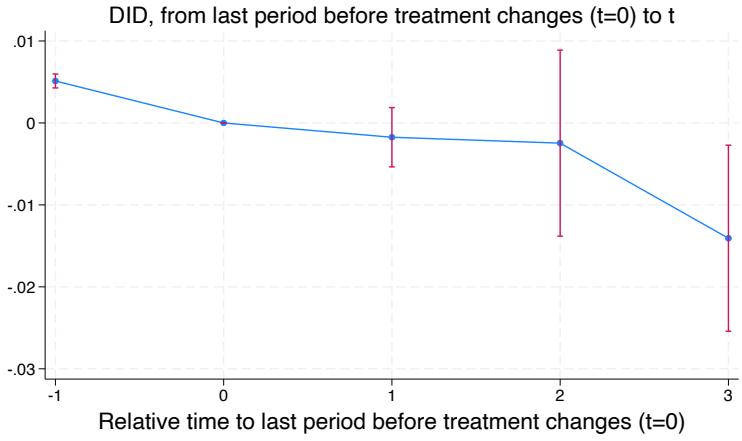
Figure 9: Dynamic Effects of Regular Minimum Wage Updates on the Likelihood of Finding



Migrant Work Within County Borders"

Figure 10: Dynamic Effects of Regular Minimum Wage Updates on the Likelihood of Finding Migrant Work Outside County Borders but Within Provincial Borders

Figure 11: Dynamic Effects of Regular Minimum Wage Updates on the Likelihood of Finding Migrant Work Outside Provincial Borders



5.3.Heterogeneous Analysis

The updates to minimum wage (MW) standards can have varied impacts on rural migrant workers earning different wages. Employers may opt to terminate workers earning below MW standards rather than raise their wages to avoid increased costs. To investigate this, we categorized rural migrant workers into two groups based on their wages: lower and higher. We utilized panel data at the individual level, calculating the mean wage across sample years and then sorting them at the county level, resulting in these two wage categories.

Figure 12-1 and Figure 12-2 illustrate the dynamic effects of MW updates on migration work, representing lower-wage and higher-wage workers. We observed a significant negative impact of MW updates on lower-wage workers, with a notable decrease in the likelihood of migration for work. Among higher-wage workers, the effects were dynamic, initially leading to a decrease in migrant work followed by an increase.

Figure 13-1 and Figure 13-2 display the dynamic effects of MW updates on migrant workers' wages for lower and higher wage earners. We found that MW updates initially led to a significant increase in wages for lower-wage workers, with the positive effect showing a lag for higher-wage workers. Additionally, the positive effects were more pronounced for lower-wage workers.

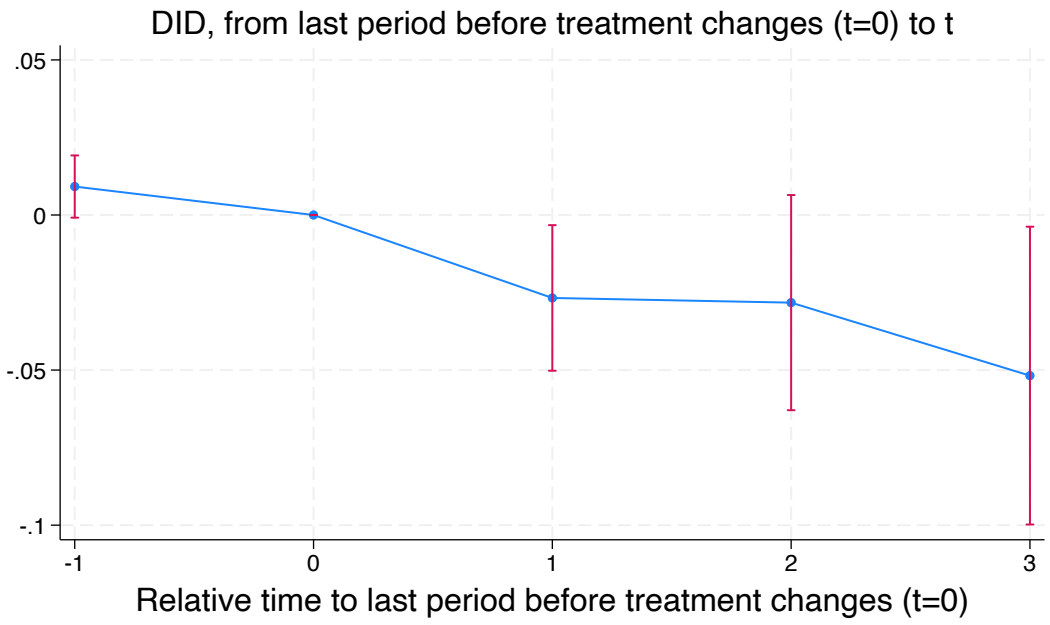


Figure 12-1: Dynamic Effects of Regular Minimum Wage Updates on Rural Residents' Migration for Work among Lower-Wage Workers

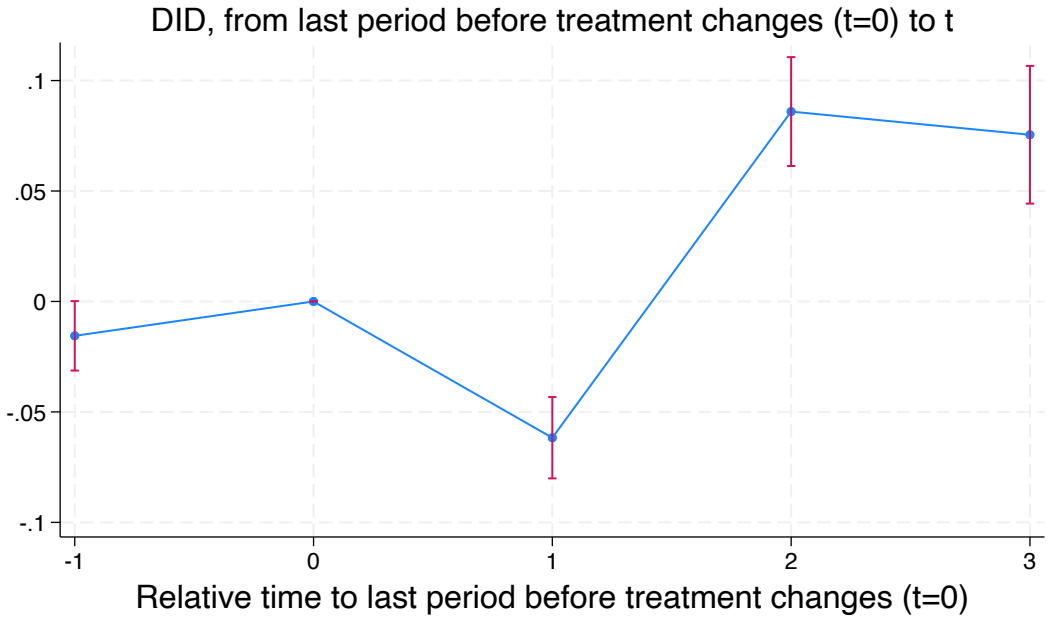


Figure 12-2: Dynamic Effects of Regular Minimum Wage Updates on Rural Residents' Migration for Work among Higher-Wage Workers

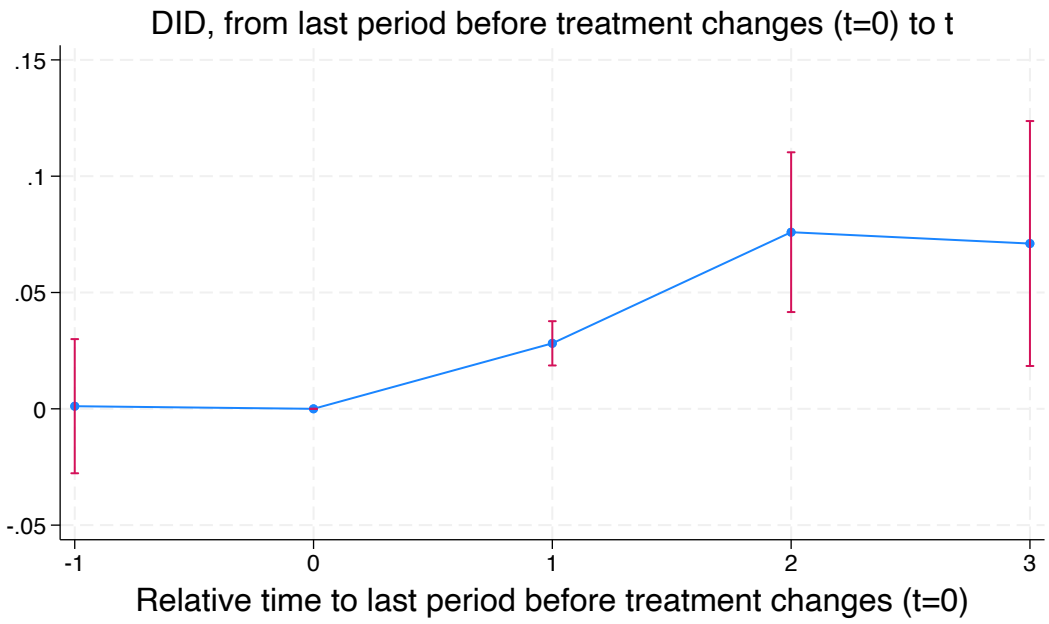


Figure 13-1: Dynamic Effects of Regular Minimum Wage Updates on Logarithm of Monthly Wages for Rural Residents' Migration for Work among Lower-Wage Workers

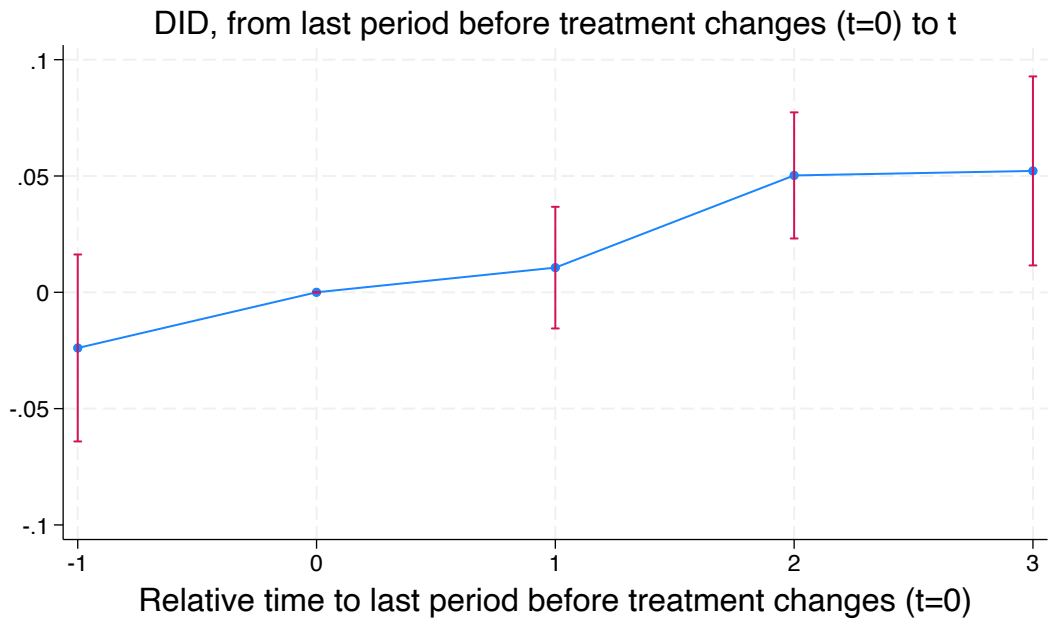


Figure 13-1: Dynamic Effects of Regular Minimum Wage Updates on Logarithm of Monthly Wages for Rural Residents' Migration for Work among Higher-Wage Workers

6. Conclusion and Policy Implications

Through the utilization of long-period data and dynamic DID models, we delved into the multifaceted impacts of minimum wage (MW) policies, examining both their implementation and subsequent updates. Our findings unveil intriguing insights.

Regarding the implementation of MW policies, we uncovered a positive correlation between their enactment and the influx of rural migrant workers.

Regarding the regular updates of MW standards, we explored their effects on migration patterns, wages, and work locations. Firstly, we identified a temporal pattern: initial increases in MW standards initially suppress employment opportunities for migrant workers, followed by a subsequent expansion phase. Secondly, we observed a positive elasticity between MW standard updates and migrant workers' wages, with this effect intensifying over time. Finally, in the long term, as MW standards rise, rural migrant workers tend to work more within county borders and less outside provincial borders.

Furthermore, we scrutinized the heterogeneous effects of MW updates. We noted a significant negative impact on lower-wage workers, while among higher-wage workers, the effects were dynamic, initially decreasing migrant work followed by an increase. Additionally, MW updates initially led to a substantial wage increase for lower-wage workers, with a lagged positive effect for higher-wage workers, particularly pronounced among the former.

Drawing from our findings, we propose several policy suggestions. Firstly, MW policy implementation significantly enhances migrant work opportunities,

necessitating its continuation. However, careful consideration of MW standards' impact on rural migrant workers' welfare is crucial, as it can profoundly affect their employment prospects.

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