Urban–Rural Medical Insurance Integration and Out-of-pocket Medical Expenditures

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Abstract. This paper empirically evaluates the impact of China's 2016 urban–rural medical insurance integration on rural residents' out-of-pocket medical expenditures using panel data from Hebei Province in the China Family Panel Studies for 2014 and 2018, with a difference-in-differences approach. The findings reveal three main results. First, the integration reform did not produce a statistically significant reduction in rural residents' out-of-pocket medical expenditures. Second, age emerges as a significant predictor of out-of-pocket medical spending, while gender and household income show no statistically meaningful effects. Third, heterogeneity analysis indicates that the policy exhibits a larger coefficient for the elderly group, though it does not reach conventional significance levels. These findings suggest that simply merging administrative insurance schemes, without complementary measures addressing supply-side cost control and demand-side behavioral responses, may be insufficient to reduce the actual financial burden on rural populations.

Keywords: Urban-Rural medical Insurance Integration, out-of-pocket medical expenditures, difference-in-differences, rural residents.

1. Background and Introduction

Health insurance is a crucial mechanism for reducing financial barriers to healthcare and promoting equity in medical access. In China, however, the long-standing division between urban and rural medical insurance systems has generated significant disparities in financial protection. Prior to 2016, rural residents were mainly covered by the New Cooperative Medical Scheme (NCMS), while urban residents participated in the Urban Resident Basic Medical Insurance (URBMI) or the Urban Employee Basic Medical Insurance (UEBMI). Differences in financing levels and reimbursement policies left rural households more exposed to high out-of-pocket (OOP) medical expenditures [1].

To address these institutional inequalities, the Chinese government implemented a nationwide reform in 2016 to integrate the NCMS and URBMI into a unified Urban–Rural Resident Basic Medical Insurance system. The reform aimed to standardize insurance rules, expand risk pooling, and improve reimbursement generosity, thereby reducing financial barriers to healthcare access for rural residents. By harmonizing coverage across urban and rural populations, the integration represented a major step toward enhancing equity in China's healthcare system. Despite its clear objectives, the reform's effect on residents' financial burden remains empirically uncertain. While higher reimbursement rates may directly reduce OOP medical expenses, expanded insurance coverage can also increase healthcare utilization, potentially offsetting these gains.

2. Literature Review

A growing body of literature has examined the effects of China's urban–rural medical insurance integration on health outcomes and financial protection. Existing studies generally agree that the reform improved insurance coverage and equity, yet its impact on out-of-pocket (OOP) medical expenditures remains inconclusive. Meng et al. employed a difference-in-differences approach using China Family Panel Studies data and found that the 2016 integration significantly improved residents' self-rated health, with stronger effects among rural and low-income groups. Their findings suggest that institutional integration can enhance health equity, though the study focuses primarily on health outcomes rather than financial burden [2]. Similarly, Huo et al. conducted a county-level analysis and reported that improved reimbursement reduced medical impoverishment, indicating enhanced financial protection after the reform [3]. However, their results are limited in external validity due to the localized scope of the analysis. In contrast, Liu et al. examined the reform's impact on medical costs and found that although healthcare utilization increased following integration, OOP expenditures did not decline significantly [4]. Wagstaff et al. emphasized that insurance design and reimbursement generosity are critical determinants of financial protection [5], while Yip et al. argued that insurance integration alone may be insufficient to control medical costs without complementary provider payment reforms [6].

Overall, the existing literature offers mixed evidence on the financial effects of China's urban–rural medical insurance integration and pays limited attention to direct measures of OOP spending using nationally representative panel data. This study contributes to the literature by directly examining the causal impact of the reform on out-of-pocket medical expenditures through a difference-in-differences framework.

3. Research Design

This section outlines the empirical strategy for examining the impact of China's urban-rural medical insurance integration on out-of-pocket medical expenditures. To answer this question rigorously, this section elaborates on model specification and data sources, ensuring a sound research design for the analysis.

3.1. Model Specification

This study exploits the China's urban-rural medical insurance integration in 2016 as a quasi-natural experiment and applies a difference-in-differences approach to examine its impact on out-of-pocket medical expenditures and employs the following fixed-effects model:

$$SelfMedical_{it} = \beta_0 + \beta_1 Treat_i * Post_t + \beta_2 Treat_i + \beta_3 Post_t + \beta_4 Age_{it} + \beta_5 Gender_i + \beta_6 Income_{ft} + \varepsilon \quad (1)$$

where i, t correspond to the individual and year, respectively. The dependent variable *SelfMedical* represents the individual out-of-pocket medical expenses. When the variable $Treat_i$ is equal to 1, it is the treatment group that consists of rural residents. When $Treat_i$ is equal to 0, it is the control group that consists of the urban residents. For the variable $Post_t$, if the policy has been implemented, it will be 1. Otherwise, it is 0. The interaction term, $Treat_i * Post_t$, is the key variable of our paper. The control variable, Age_{it} represents the individual age. For variable, $Gender_i$, males will be 1 and females will be 0. $Income_{ft}$ represents per capita household income. ε is the error term, representing other unobserved factors in the model.

3.2. Data Source

This paper uses panel data from the China Family Panel Studies (CFPS). CFPS is a national, comprehensive social tracking survey project aimed at reflecting changes in Chinese society, economy, population, education, and health by tracking and collecting data at the individual, family, and community levels. CFPS focuses on the economic and non-economic well-being of Chinese residents, covering various research topics including economic activities, physical and mental health, and more. We have used 2014 and 2018's individual data of Hebei from CFPS. In Hebei, this policy was implemented in 2016. Table 2 presents the descriptive statistics for the main variables in this paper.

Table 1. Descriptive Statistics of Main Variables

Variable	Observations	Mean	Std. Dev.	Min	Max
SelfMedical	1429	3944.691	14332.486	-1.000	3.50e+05
Treat	1429	0.145	0.352	0.000	1.000
Post	1429	0.626	0.484	0.000	1.000
Treat* Post	1429	0.087	0.282	0.000	1.000
Age	1429	48.348	16.990	16.000	93.000
Gender	1429	0.862	1.331	0.000	5.000
Income	1429	11704.775	13500.085	3.333	2.50e+05

4. Main Empirical Results

This paper examines the relationship between urban-rural medical insurance integration and out-of-pocket medical expenditures using the difference-in-differences model in Equation (1), with baseline regression results reported in Table 2. Column (1) includes only three variable *Treat*, *Post* and *Treat*Pos*t (without other control variables). The coefficient of the interaction term *Treat*Post* is 3652.945, which means after the implementation of the policy, the changes in the self-medication expenses of rural residents compared to those of urban residents increases by 3652.945rmb. So, with this policy, the medical expenses of rural residents not only did not decrease, but actually increased. And we can see the p-value of *Treat*Pos*t is not less than 5% in 95% confidence interval, which means this variable, *Treat*Post*, is not statistically important.

Column (2) adds two control variables, *age* and *gender*. The p-values of variable *Treat*Post*, *Age* and *Gender* are presented. Only the p-value of *age* is less than 0.05. Also, we can see VIF values of control variables. All of them are less than 5. We don't need to consider much about the multicollinearity. Column (3) has all control variables, *Age*, *Gender* and *Income* (per capita household income). All of the p-values are less than 0.05, expect *Age* and *Treat.* VIF values are also less than 5.

Actually, what we are truly concerned about is the coefficient of the interaction term, *Treat*Post*. All of the coefficients of *Treat*Post* are positive and show us that it is not significant variable. Among the three models, we can see the adjusted R^2 in the model only with control variables *Age* and *Gender* (shown in Column (2)) has the largest one, which means this model may have a better fitting effect among the three models.

However, we do not want to give up the variable of *Income* because for individual out of pocket medical expenses, the impact of household income should be taken into account. Therefore, we took the logarithm of this control variable and did regression analysis again. According to Column (4) in Table 2, the adjusted R^2 is almost identical to that in Column (2), so it is classified as a non-essential control variable and Column (2) is still chosen as the regression model. In the subsequent analysis, we will use the model that includes only the control variables age and gender as our analytical framework.

Table 2. Baseline Regression Results

	(1)	(2)	(3)	(4)
	Selfmedical	Selfmedical	Selfmedical	Selfmedical
Treat	-822.026	-1056.126	-1011.515	-1002.505
	(0.319)	(0.201)	(0.222)	(0.226)
Post	7437.672***	6890.413***	6636.654***	6706.744***
	(0.000)	(0.001)	(0.001)	(0.001)
Treat*Post	3652.945*	3460.385	3675.464*	3625.654*
	(0.088)	(0.105)	(0.089)	(0.091)
Age		75.619***	76.682***	78.306***
		(0.001)	(0.001)	(0.000)
Gender		37.256	40.811	23.727
		(0.929)	(0.922)	(0.955)
Income			0.018	
			(0.515)	
lnIncome				284.479
				(0.385)
Constant	3065.160***	-380.348	-660.224	-3047.619
	(0.000)	(0.753)	(0.607)	(0.356)
N	1429	1429	1429	1429
Adj_R^2	0.056	0.063	0.062	0.062
F	29.371	20.110	16.822	16.881

Note: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses indicate p-values.

5. Further Discussion

Although the baseline regressions have preliminarily confirmed the 2016 urban-rural medical insurance integration did not exert a statistically significant effect in reducing rural residents' out-of-pocket medical expenses, a series of robustness checks were performed to further validate the reliability of this conclusion.

5.1. Testing for Heteroskedasticity

We used BP method for heteroscedasticity testing. After regression, we took the squared residuals *Res_sq* and regressed all explanatory variables. The results are shown in Column (1) of Table 3. Using the R-square of the regression and the sample size n for LM calculation and using chi square to calculate the p-value. The p-value here is 0.488, which is greater than 0.05, proving that there is no heteroscedasticity in the regression. In addition, after this step, we used the built-in BP calculation method in Stata to directly perform heteroscedasticity tests. The p-value is 0.155, which is greater than 0.05 too, showed almost no difference from the previous stepwise test data in the chi square distribution, still proving the absence of heteroscedasticity.

Table 3. Empirical Results of Further Discussion

	(1)	(2)	(3)
	heteroscedasticity testing	young group	elderly group
	Res_sq	Selfmedical	Selfmedical
Treat	-2.9e+08	123.431	-2.6e+03
	(0.139)	(0.775)	(0.134)
Post	-3.7e+08	7381.094***	5323.299
	(0.439)	(0.000)	(0.143)
Treat*Post	7.3e+08	2260.614	5642.182
	(0.145)	(0.105)	(0.138)
Age	8.4e+06	9.470	-4.994
	(0.105)	(0.658)	(0.953)
Gender	7.2e+07	-6.930	37.755
	(0.459)	(0.979)	(0.958)
Constant	-1.1e+08	865.625	5731.366
	(0.711)	(0.297)	(0.302)
N	1429	717	712
Adj_R^2	0.002	0.175	0.034
F	1.605	26.343	5.202

Note: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses indicate p-values.

5.2. Heterogeneity test

In the heterogeneity test, we divided the samples into low age group and high age group based on the median age, and regress them separately. The results are shown in Column (2) and Column (3) of Table 3. The coefficient of *Treat*Post* for the young group was 2260.614, with a p-value of 0.105, which is greater than 0.05, indicating that the policy had no significant impact on the out-of-pocket medical expenses of the young group. The coefficient of *Treat*Post* for the elderly group is 5642.182, with a p-value of 0.143 which is close to 0.1 but greater than 0.05, indicating that the policy has a more significant impact on the elderly group than on the young group (with a larger coefficient), but has not fully reached the significance level of 5%.

5.3. Chow Test

The idea here is to test for differences in regression functions across two groups (e.g., the year of 2014 and the year of 2018). We first considered the restricted model, which assumes that the coefficients for both groups are the same. The model is as follows:

$$Selfmedical = \beta_0 + \beta_1 Post + \beta_2 Age + \beta_3 Gender + \beta_4 Income + \varepsilon$$

After running the regression, we obtained the sum of squared residuals SSR_P for the restricted model. Next, we ran separate regressions for the two groups (2014 and 2018). For each group, we saved the sum of squared residuals: SSR_1 for the 2014 group and SSR_2 for the 2018 group.

Using these residuals, we calculated the F-statistic for the Chow test:

$$F = \frac{\left[SSR_p - (SSR_1 + SSR_2)\right]}{SSR_1 + SSR_2} \cdot \frac{Df \text{ for unrestricted}}{\text{The number of restriction}}$$

Substituting the values, we obtained an F-statistic of 0.02. The critical value for $F_{2,1422}$ at the 5% significance level is 3.002. Since the calculated F-statistic (0.02) is less than the critical value (3.002), we fail to reject the null hypothesis. This suggests that there is no significant difference in the regression coefficients between the 2014 and 2018 groups, implying that the relationship between self-medical expenditures and the independent variables does not significantly change between these two years.

6. Conclusion

6.1. Core Findings

Using a difference-in-differences framework with panel data from Hebei Province (CFPS 2014 and 2018), this study finds that the 2016 urban-rural medical insurance integration did not produce a statistically significant reduction in rural residents' out-of-pocket medical expenditures. The coefficient of the key interaction term *Treat*Post* remains positive and insignificant across all model specifications, indicating that the reform failed to alleviate the financial burden on rural populations in Hebei within the observed period. Age consistently emerges as a significant predictor of out-of-pocket medical spending, while gender and household income show no statistically meaningful effects. These findings suggest that simply merging administrative insurance schemes, without complementary measures addressing supply-side cost control or demand-side behavioral responses, may be insufficient to reduce actual financial exposure for rural enrollees.

6.2. Policy Implications

It is suggested to further optimize the medical insurance reimbursement mechanism, increase the reimbursement ratio for rural residents, and focus on meeting the healthcare needs of the elderly. First, policymakers should consider further increasing reimbursement rates for rural residents, particularly for inpatient and chronic disease care, where out-of-pocket medical expenses remain high [7]. Second, targeted supplementary benefits for the elderly population are warranted, as age is the most robust determinant of medical spending. Third, integration reforms should be paired with provider payment reforms (e.g., global budgeting, diagnosis-related groups) and strengthened primary care to prevent cost-shifting or overutilization that offsets insurance gains. Fourth, given the lack of significant effects in Hebei, regional pilot evaluations should be expanded before nationwide scaling, allowing heterogeneous local conditions to be addressed. Finally, future integration efforts must move beyond coverage harmonization toward actively monitoring and reducing out-of-pocket medical spending, using it as a core performance indicator for financial protection [8].

References

[1] Feng J., Chen X., Hu B. The medical insurance based on efficiency and equity: evidence from the integration of the National Basic Medical Insurance Program for urban and rural residents. Econ Res J. 2022,12:154–72.

[2] Meng, Y., Yu, R., Bai, H., & Han, J. Evidence from the China Family Panel Studies. Survey on the effect of integrating the basic medical insurance system for urban and rural residents on the health equity of residents: A difference-in-differences analysis. JMIR Public Health and Surveillance, 2024,10, e50622.

[3] Huo, J., Hu, M., & Li, S. The impact of urban–rural medical insurance integration on medical impoverishment: Evidence from China. International Journal for Equity in Health, 2023, 22, Article 245.

[4] Liu, C., Su, Q., Wang, M., & Xing, H. How did the urban and rural resident basic medical insurance integration affect medical costs? Evidence from China. PLOS ONE, 2025, 20(7), e0325614.

[5] Wagstaff, A., Lindelow, M., Gao, J., Xu, L., & Qian, J. Extending health insurance to the rural population: An impact evaluation of China’s New Cooperative Medical Scheme. Journal of Health Economics, 2009,28(1):1-19.

[6] Yip, W., Hsiao, W., Chen, W., Hu, S., Ma, J., & Maynard, A. Early appraisal of China’s. huge and complex health-care reforms. The Lancet, 2012, 379(9818): 833-842.

[7] Mingzheng Hu, Jinkang Huo, Yingying Ouyang, et al. Urban-rural medical insurance integration and universal health insurance coverage in China: A quasi-experimental study, Economics & Human Biology,2026,61, 101593.

[8] Liu C, Kong Y, Su Q, Xing H and Tian Z. The impact of the urban-rural residents’ medical insurance integration on rural residents’ out-of-pocket medical costs: based on the deductible, reimbursement rate, and ceiling line. Front Public Health,2025, 13:1576978.