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Research on the Impact of Long Term Care Insurance on Family Medical Expenditure: Empirical Evidence Based on CHARLS Data from 2011 to 2020

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Abstract: In recent years, the long-term care insurance system has played an important role in the social security system under the background of population aging. Different from previous studies that focused on the improvement effect of policies on the health status of the elderly, the evaluation of policy effects, and the limitations of data lag, this study adopts the latest CHARLS data from 2011 to 2020 and uses a difference in differences model to explore the impact of long-term care insurance policies on family medical expenditures, and deeply analyzes the mediating and moderating effects. Research has found that long-term care insurance can significantly reduce household medical expenses; Mechanism analysis shows that this policy improves the physical health status of disabled elderly people by providing professional nursing services, thereby achieving a decrease in family medical expenses; The number of children has a negative moderating effect on the effectiveness of policies; Heterogeneity analysis shows that long-term care insurance has a more prominent effect on reducing medical expenses for families of chronic disease patients and highly educated families. Based on the above conclusions, it is recommended to adopt a gradual promotion strategy, gradually expand the coverage and guarantee objects of the pilot program, develop personalized service plans based on differences in disability level, economic status, etc., strengthen the professional training of nursing talents, and establish a multidimensional evaluation mechanism to regularly monitor the effectiveness of policy implementation and dynamically adjust the implementation plan.

Keywords: Long Term Care Insurance; Medical Expenses; Double Difference Model

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1. Introduction

In 2015, China officially proposed to explore the establishment of a long-term care insurance system, which provides protection for medical expenses related to the basic living needs of disabled elderly people, in response to the care needs of disabled elderly people in the context of population aging, and reduces the expenses incurred by traditional small-scale families for caring for disabled elderly people (Cheng et al., 2023). Based on this, it can be seen that the long-term care insurance policy aims to alleviate the economic pressure of disabled elderly people in terms of home care, and to bear some of the main risks faced by individuals and society in long-term care.

As of January 2025, more than 180 million people in 49 national pilot cities in China have been insured, and over 2 million disabled individuals have received various forms of long-term care services such as institutional care, home care, and family care. Liu (2025) believes that the long-term care insurance program is an important component of the healthcare system aimed at supporting disabled elderly and disabled individuals and their families. In this process, long-term care insurance provides temporary care, some healthcare facilities, economic subsidies, etc., which reduces the original health and medical expenses of these families; Zhao (2025) believes that long-term care insurance has a significant inhibitory effect on the end-of-life medical expenses paid by elderly medical insurance. Long term care insurance reduces the probability of elderly people suffering from major diseases, improves their physical health status, and thus reduces the end-of-life medical expenses of the elderly; Ma (2019) believes that long-term care insurance saves outpatient and inpatient expenses for the elderly, effectively reducing medical insurance fund expenditures. More importantly, the medical expenses saved by long-term care insurance are not based on harming the health of middle-aged and elderly people. To some extent, this insurance has also played a positive role in improving the mental health status of middle-aged and elderly people, while also reducing the likelihood of their physical pain.

On the other hand, Zhu Minglai believes that long-term care insurance can significantly improve the daily activity ability and health level of disabled elderly people by increasing the quality of care for the elderly and replacing children's care; Zhou (2024) believes that long-term care insurance has a positive spillover effect on the employment of children in elderly families, reducing their financial vulnerability and thus improving their overall income situation. In this situation, Chen et al. (2024) believes that long-term care insurance can squeeze out family care, create employment opportunities, and significantly increase household income levels. After the increase in household income, Chen (2014) believes that , household health and medical expenses are related to household income, and health shocks are a direct factor in household asset behavior choices. Therefore, while long-term care insurance improves the health of the elderly, it also increases household income, and medical and health expenditures will actually increase due to the increase in household income.

Coe (2023) believes that the coverage of long-term care insurance in the United States reduces parents' perception of their children's willingness to take care of them in the future, and long-term care insurance has spillover effects on the economic behavior of family members; Hyunjong Song (2025) believes that the long-term care insurance policy introduced by South Korea on July 1, 2008, aims to alleviate the burden on families caring for the elderly in the context of rapid aging and social change. However, there are still shortcomings in fully meeting the end-of-life care, health, and medical needs of the elderly. It is necessary to reform the long-term care insurance system and incorporate end-of-life care into the existing long-term care insurance framework to improve service coverage and enhance the quality of care for the elderly. Patrizio (2024) believes that the aging population in Germany is severe, and the number of elderly people has been continuously increasing in recent years. The government has formulated long-term care insurance policies to meet the rapidly growing demand for nursing staff. Based on population changes, epidemiological trends, specific needs and supply of nursing services, and corresponding costs, predictive models are designed and used as a case study for long-term care insurance in Germany until 2050.

After the implementation of long-term care insurance policies, the health and financial situation of disabled elderly people have been significantly improved (Shu et al., 2022). In the protection system of long-term care insurance, the service items cover two dimensions: life assistance and professional nursing. Specifically, this system can significantly improve the quality of life of the elderly population by providing daily care services such as personal hygiene assistance and dietary management, combined with professional nursing interventions such as rehabilitation training and disease prevention. On the other hand, long-term care insurance policies can further share the responsibility of caring for children by providing more favorable care services and policy based welfare benefits for disabled elderly people, thereby increasing children's labor time, increasing family income, and reducing the burden of elderly care. However, due to the increase in household income, there will also be an increase in medical expenses and nursing needs, resulting in an overall increase in household health and hygiene expenditures. Therefore, overall, the relationship and interaction between long-term care insurance policies and household medical expenditures are still not clear enough, and further research is needed based on the survey data.

The relationship between long-term care insurance system and family medical expenses has become a widely discussed

topic in the academic community. Through reviewing existing literature, it is found that domestic and foreign research mainly focuses on the impact of this system on improving the health status of the elderly, changes in household consumption structure, and the transformation of intergenerational care models for disabled elderly. Research has been conducted on the impact of long-term care insurance on the health status, household consumption, and intergenerational care of disabled elderly. However, there is still a clear gap in specialized research on family medical expenditures, and there is no consensus on existing results. At the same time, the academic exploration of the influencing factors of family medical expenditure mainly focuses on traditional variables such as macroeconomic environment, family economic foundation, and the health status of the elderly, lacking in-depth examination of the social security system.

In existing literature on the evaluation of long-term care insurance, there is a common problem of generalization of research subjects. For example, existing studies often mix insured and uninsured populations for analysis, which may lead to bias in evaluating the actual effectiveness of policies. Therefore, this article mainly conducts in-depth research on the relationship and mechanism between long-term care insurance and family medical expenses.

2. Theoretical assumptions

This article mainly discusses the impact of the pilot system of long-term care insurance in China on family medical expenses. Long term care insurance provides care services and economic compensation for disabled elderly people, significantly reducing the care time for their children and reducing the use of medical resources, promoting the optimization of medical resources, and reducing family medical expenses (Zhu et al., 2023). Therefore, this article believes that long-term care insurance has a suppressive effect on family medical expenses and proposes the following hypothesis (Xie et al., 2024).

Assumption 1: Long term care insurance can significantly reduce household medical expenses.

In the process of reducing family medical expenses through long-term care insurance policies, the physical health status of elderly people plays a key mediating role (Zhu et al., 2024). Long term care insurance first affects the mediating variable of health status through resource investment, and then indirectly reduces the burden of family medical care through changes in health status. For example, for the elderly with chronic diseases such as hypertension and diabetes, the regular blood glucose and blood pressure monitoring and medication guidance covered by the long-term care insurance can effectively control the stability of the condition and reduce the cost of hospitalization due to complications. At this time, the stability of the health status directly mediates the inhibitory effect of policies on expenditure.

In addition, the mediating effect of physical health status is also reflected in preventive health management (Yue et al., 2021). If insurance policies include services such as health screening and early intervention, health risks can be identified and intervened in advance to avoid the transformation of health problems into disease states, thereby reducing medical expenses at the source. Based on this, this article proposes hypothesis 2:

Assumption 2: Long term care insurance affects household medical expenses through the health status of the elderly

Long term care insurance mainly targets the care of the elderly. In the process of exploring the impact of long-term care insurance on family medical expenses, elderly people with chronic diseases often require more medical resources and medical expenses (Xie et al., 2022). Their daily expenses are significantly higher than those of elderly people without chronic diseases; On the other hand, families with higher education levels have richer knowledge in health and hygiene, attach more importance to their own health conditions, and have a higher proportion of medical expenses in their living expenses. They will choose more expensive medical services and products; Families with higher education levels often have more social and economic resources, resulting in relatively higher medical expenses. Long term care insurance can significantly reduce the family medical expenses of elderly people by providing care and assistance to highly educated samples (Zhou et al., 2024). Based on this, hypotheses 3 and 4 are proposed:

Assumption 3: The long-term care insurance policy has a stronger effect on reducing medical expenses for families with chronic diseases.

Assumption 4: The long-term care insurance policy has a stronger effect on reducing medical expenses for highly educated families.

The main source of income for families of elderly people with disabilities is the income of their children. In families with

more children, the total income of the family is often higher and the financial situation is better (Li S et al., 2024). The expenses for caring for the elderly and medical care are also correspondingly higher. At the same time, the probability of elderly people choosing to give up treatment and care after becoming disabled is also lower. Children will spend more money to assist the elderly, and even if disabled elderly people have received care services during the long-term care insurance process, their children will continue to receive additional subsidies and medical expenses.

In families with fewer children, the family income is relatively low, and elderly people often do not choose to increase the proportion of medical expenses. They prefer to leave the money to their children, and their children will not provide too much medical care for the elderly. In the process of the elderly's death, there is a greater possibility of giving up treatment (Wang et al., 2021). After long-term care insurance provides corresponding care services, children do not need to continue to pay for healthcare related expenses for the elderly. Therefore, after the long-term care insurance takes effect, the medical expenses of such families often decrease significantly. Based on this, this article proposes hypothesis 5:

Assumption 5: The number of children will weaken the inhibitory effect of long-term care insurance on family medical expenses.

3. Data Explanation, Model Setting, and Variable Construction

3.1 Data Description

Referring to relevant articles on long-term care insurance research, this article uses survey data from five periods from 2011 to 2020 in the CHARLS database. According to the document "Guiding Opinions on Pilot Implementation of Long term Care Insurance System" released by the General Office of the Ministry of Human Resources and Social Security of China in 2016, 15 pilot cities were launched as the first batch of pilot areas for long-term care insurance. As the CHARLS database only contains survey data from 28 provinces and does not collect relevant respondent data from Shihezi, Nantong, and Changchun in Xinjiang, this article mainly evaluates the effectiveness of long-term care insurance policies in the remaining 12 cities. These 12 cities are set as the experimental group in the difference in differences model, and the remaining cities in CHARLS that have not implemented long-term care insurance are used as the control group.

3.2 Model Setting

The main research method used in this article is the double difference method, which mainly analyzes and evaluates the impact of long-term care insurance pilot policies on family medical expenditures. The constructed model is as follows:

$$Y_{ict} = \alpha_1 + \beta_1 LTCI_{ct} + \delta_1 control_{ict} + \lambda_c + \gamma_t + \sigma_{ict} \quad (1)$$

The subscripts i, c, and t in the model represent the individual being interviewed, the city where the sample family is located, and the time of the interview, respectively. The dependent variable Y_{ict} represents household medical expenses; The core explanatory variable $LTCI_{ct}$ of this article is the implementation status of the long-term care insurance pilot policy, indicating whether the sample studied in this article had implemented the long-term care insurance pilot policy during the time of receiving the CHARLS questionnaire survey. The LTCI variable value of the experimental group was 1 after 2016 and 0 before 2016, while the control group remained 0. Its estimated coefficient β_1 represents the impact of the long-term care insurance policy on family medical expenses; $control_{ict}$ refers to controlling variables, including gender, age, household registration type, marital status, and so on. In order to avoid omissions and biases caused by other factors, the model incorporates time fixed effects and region fixed effects, where λ_c and γ_t represent region and time fixed effects, respectively; σ_{ict} is a random perturbation term.

3.3 Variable Construction and Descriptive Statistics

3.3.1 Explained variable

The dependent variable in this article is household medical expenditure. Referring to the views of scholars Zhao Ming (2025) and Ma Chao (2019), "total outpatient consumption in the past month", "number of outpatient visits in the past month", "total hospitalization consumption in the past year", and "number of hospitalizations in the past year" were also used as the dependent variables for benchmark regression and recorded as direct medical expenses, while transportation expenses, nutrition expenses, and family care expenses incurred due to medical treatment were recorded as indirect medical expenses; Family medical expenses include direct and indirect medical expenses, but do not include the portion already compensated

by medical insurance. Referring to the viewpoint of scholar Chen Jing (2020), the natural logarithm of the amount of family medical expenses is taken to comprehensively reflect the comprehensive level of family medical expenses.

3.3.2 Explanatory variable

The core explanatory variable is “long-term care insurance”, assigned by the specific pilot policies. Implementing “long-term care insurance” is designated as 1, otherwise the variable is 0. Since the implementation of China's long-term care insurance pilot system in 2016, there have been a total of 15 pilot cities nationwide. Due to the absence of relevant information on Changchun City, Nantong City, and Shihezi City in Xinjiang in the CHARLS questionnaire survey database, the main experimental groups in this paper are Chengde City in Hebei Province, Qiqihar City in Heilongjiang Province, Shanghai City, Suzhou City in Jiangsu Province, Ningbo City in Zhejiang Province, Anqing City in Anhui Province, Shangrao City in Jiangxi Province, Qingdao City in Shandong Province, Jingmen City in Hubei Province, Guangzhou City in Guangdong Province, Chongqing City, and Chengdu City in Sichuan Province. The remaining provinces and cities serve as the control group.

3.3.3 Control variable

The control variables include “gender”, “age”, “marital status”, “household registration type”, etc. Referring to the setting of control variables in Zhou Bowen’s work (2024), we select the interviewer's gender, age, and other household demographic characteristics as control variables. Additionally, we control for household income, and in this paper, we log-transform the “household income” variable.

Table 1 Descriptive Statistics

Variable Name	Sample	Mean	standard deviation	minimum value	Maximum value
Family medical expenses	55478	6.21	3.29	0	13.99
Long term care insurance	55478	0.04	0.19	0	1
gender	55478	0.47	0.50	0	1
marital status	55478	0.86	0.35	0	1
household registration type	55478	0.77	0.42	0	1
Number of family members	55478	3.19	1.63	1	16
age	55478	60.68	10.49	11	120
household income	55478	37705.88	189481.60	0	39100000
Logarithm of household income	55478	9.20	2.49	0	17.48

4. Empirical Analysis

4.1 Benchmark Regression Analysis

This article conducts benchmark regression on the dependent variables such as family medical expenses, number of hospitalizations and outpatient visits, and out of pocket expenses. The regression process always controls for fixed effects of time and region, while controlling for a series of control variables such as gender, marital status, household registration type, number of family members, age, and family income, in order to more accurately identify the independent impact of long-term care insurance policies.

From the regression results, it can be seen that long-term care insurance has a negative impact on family medical expenses, monthly hospitalizations, annual outpatient visits, hospital out of pocket expenses, and outpatient out of pocket expenses. The coefficients are all negative and significant at the 1% level. This indicates that the implementation of long-term care insurance policy has a clear inhibitory effect on family medical related expenses and medical behavior, verifying hypothesis one.

By controlling for the influence of variables, long-term care insurance provides targeted care services and economic compensation for disabled elderly people, replacing some of the care needs that originally needed to be met through medical means, reducing the excessive use of medical resources, and alleviating the caregiving pressure and economic burden on family members. This effectively controls family medical costs from the perspectives of medical frequency and expenditure,

fully reflecting the policy value of long-term care insurance in optimizing medical resource allocation and alleviating family medical burden. It also provides empirical support for the promotion and improvement of the long-term care insurance system in the future.

Table 2 Benchmark regression results of the impact of long-term care insurance on household medical expenses

Variable	(1)	(2)	(3)	(4)	(5)
	Family medical expenses	Monthly hospitalizations	Number of outpatient visits per year	Self paid hospitalization expenses	Outpatient out of pocket expenses
Long term care insurance	-0.0135***	-0.1550***	-0.0468***	-0.1384***	-0.1972***
	(-2.9556)	(-3.4805)	(-2.6596)	(-3.0078)	(-5.3180)
gender	-0.0099***	-0.1009***	-0.0128*	0.0150	-0.1257***
	(-8.0771)	(-8.3340)	(-1.6707)	(0.7491)	(-7.7757)
marital status	0.0006	-0.0271	0.0070	0.0475	-0.0332
	(0.3238)	(-1.4461)	(0.6231)	(1.6138)	(-1.3984)
household registration type	-0.0049***	0.0206	0.0383***	-0.1951***	-0.0145
	(-2.7902)	(1.1887)	(4.0683)	(-7.9242)	(-0.7326)
Number of family members	0.0019***	-0.0000	0.0036	0.0044	0.0446***
	(4.4516)	(-0.0067)	(1.4764)	(0.6821)	(8.6528)
age	0.0014***	0.0041***	-0.0089***	0.0161***	-0.0008
	(20.8840)	(6.6367)	(-22.0682)	(15.2367)	(-0.9499)
Logarithm of household income	-0.0004	0.0033	0.0019	-0.0268***	-0.0298***
	(-1.2881)	(1.2910)	(1.1606)	(-6.2470)	(-8.6036)
constant term	0.0889***	0.2044***	0.2444***	0.0730	0.9771***
	(14.9343)	(3.7455)	(6.8571)	(0.7836)	(13.0137)
Fixed time effect	Yes	Yes	Yes	Yes	Yes
Regional fixed effects	Yes	Yes	Yes	Yes	Yes
N	55478	55478	55478	55478	55478

Note: The values in parentheses are the statistical values of t; *, **, *** represent significance levels of 10%, 5%, and 1%, respectively.

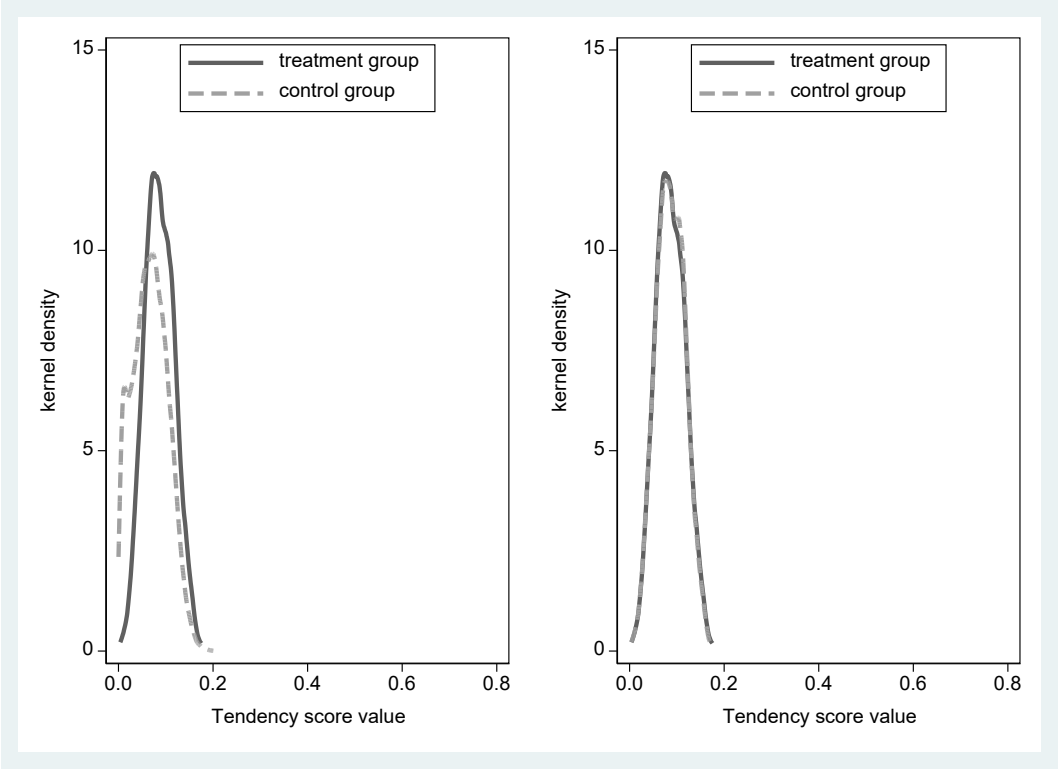
4.2 PSM-DID Inspection

The core function of PSM-DID is to optimize the comparability between the experimental group and the control group through a two-stage method: firstly, propensity score matching (PSM) constructs statistical weights based on observable covariates (such as household income, number of household members, etc.), selects control group samples with highly similar characteristics to the experimental group, and effectively alleviates baseline differences caused by non random sample allocation; Secondly, the double difference method (DID) eliminates the combined effects of time trends and individual fixed effects through differential processing, further separating the net effects of policy interventions.

After propensity score matching, the percentage deviation of all variables significantly decreased to within 10%, and the p-values of t-test were not significant ($p>0.1$), indicating that the matching significantly reduced the covariate imbalance between the experimental group and the control group.

The results of the balance test indicate that a control group sample with highly similar characteristics to the experimental group was selected to achieve statistical balance between the two groups on key variables such as the number of chronic diseases, household registration type, gender, and income. This result not only satisfies the balance assumption of propensity score matching, but also lays a reliable foundation for subsequent DID analysis - by eliminating the influence of observable confounding factors before the policy, ensuring the accuracy of policy effect estimation.

Figure 1: Kernel Probability Density Map before and after Matching



Furthermore, the above figure shows the kernel probability density map before and after PSM matching, which is used to determine whether there is a difference in propensity score values between the two groups before and after matching. It can be seen that the two curves are closer after matching, indicating that the matching is effective. Based on the sample results matched by propensity score, the double difference method is used for regression.

Table 3 PSM-DID Regression Results

Family medical expenses	**(1)**	**(2)**
	benchmark regression	**PSM-DID regression**
Long term care insurance	-0.0135***	-0.0102***
	(-2.9556)	(-5.3242)
gender	-0.0099***	-0.0077
	(-8.0771)	(-1.0466)
marital status	0.0006	-0.0005
	(0.3238)	(-0.1592)
household registration type	-0.0049***	-0.0089***
	(-2.7902)	(-3.0891)
Number of family members	0.0019***	0.0030***
	(4.4516)	(4.2076)
age	0.0014***	0.0015***
	(20.8840)	(13.7297)
Logarithm of household income	-0.0004	-0.0003
	(-1.2881)	(-0.7104)
constant term	0.0889***	0.0832***
	(14.9343)	(8.9398)
Fixed time effect	Yes	Yes
Regional fixed effects	Yes	Yes
N	55478	32553

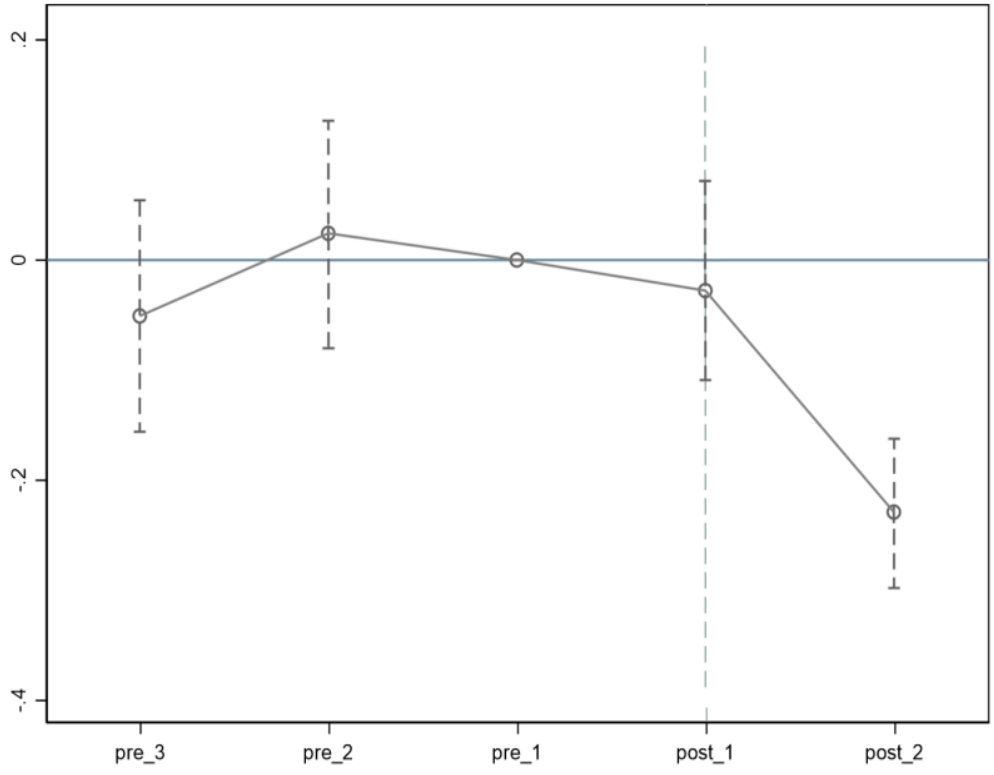
Note: The values in parentheses are the statistical values of t; *, **, *** represent significance levels of 10%, 5%, and 1%, respectively.

From the regression results of PSM-DID in the table above, it can be seen that long-term care insurance has a significant negative impact on household medical expenses at the 1% level, which fully proves that long-term care insurance policies can effectively reduce household medical expenses, thus verifying hypothesis one.

4.3 Parallel Trend Test

The parallel trend assumption is the core premise of the DID model. If there is a systematic difference in the trend of medical expenditure changes between the two groups before policy implementation, the subsequent estimation of policy effects may be mixed with unobservable confounding factors, leading to biased causal inference. Therefore, based on the China Health and Retirement Longitudinal Study (CHARLS) database, this study selected 12 pilot cities and non pilot areas for long-term care insurance, and constructed a time span to cover the data before and after the implementation of the policy for ten years (2011-2020). Using the policy launch year of 2016 as the base year, the pre policy period was divided into three periods (pre-1:2011, pre-2:2013, pre-3:2015), and the post policy period was divided into two periods (post-1:2018, post-2:2020). The dynamic effects model was used to capture the differences and evolution between the experimental group and the control group in each period. In the specific operation, the individuals in the pilot cities before policy implementation are first defined as the "virtual experimental group", and individuals in non pilot areas are used as the control group. The model is used to estimate the interaction coefficients between the virtual variables (pre_1 to post_2) in each period and the virtual variables in the experimental group. These coefficients directly reflect the differences in medical expenditures between the experimental group and the control group before policy implementation, as well as the dynamic effects after policy implementation.

Figure 2: Parallel Trend Test Results



In order to visually present the test results, this study plotted the dynamic changes in coefficient values before and after the policy period (as shown in the above figure). If the coefficient before the policy is not statistically significant, it indicates that there is no systematic difference in trend between the experimental group and the control group before the policy, which satisfies the parallel trend hypothesis.

The empirical results show that the confidence intervals of the regression coefficients before policy implementation intersect with 0, and there is no significant difference in the trend of household medical expenditure between the experimental group and the control group in 2011, 2013, and 2015; After the implementation of the policy, the coefficient reached its maximum in the second phase, and the reduction effect of surface long-term protection insurance has a certain lag. This result strongly

supports the parallel trend hypothesis and provides a reliable basis for subsequent analysis of policy effects.

5. Mechanism of Action and Heterogeneity Analysis

5.1 Mechanism of Action

On the basis of the benchmark regression model 3.1, a two-stage regression model is further constructed to explore the transmission mechanism of long-term care insurance affecting family medical expenses through the health status of the elderly. The model is set as follows:

$$Health_{ct} = \alpha_0 + \alpha_1 LTCI_{ct} + \delta_1 control_{ict} + \lambda_c + \gamma_t + \sigma_{ict} \quad (2)$$

$$Y_{ict} = \beta_0 + \beta_1 LTCI_{ct} + \beta_2 Health_{ct} + \delta_1 control_{ict} + \lambda_c + \gamma_t + \sigma_{ict} \quad (3)$$

Among them, $Health_{ct}$ represents the mediating variable of physical health status. Referring to Xue (2025), the value of physical health status ranges from 0 to 33 points, with higher scores indicating better physical health status for the elderly; The parameter α_1 represents the impact of long-term care insurance on mediating variables; β_1 represents the direct effect of long-term care insurance on household medical expenses; $\alpha_1 \times \beta_2$ represents the indirect effect of long-term care insurance on household medical expenses.

Table 4 Regression Results of Mediating Effects

Explained variable	(1)	(2)	(3)
	Family medical expenses	health condition	Family medical expenses
Long term care insurance	-0.0135***	0.4172**	-0.0010
	(-2.9556)	(2.0680)	(-0.8043)
health condition			-0.0111***
			(-6.1558)
control variable	Control	Control	Control
Fixed year effect	Control	Control	Control
Urban fixed effects	Control	Control	Control
N	55478	55478	55478

Note: The values in parentheses are the statistical values of t; *, **, *** represent significance levels of 10%, 5%, and 1%, respectively.

In the mediation regression results of the table above, model (2) shows that the implementation of long-term care insurance policy has a significant positive impact on health status at the 1% level, indicating that the health level of insured individuals is significantly improved compared to the uninsured group. The core mechanism of this effect is that long-term care insurance significantly improves the physical health status of disabled elderly people by covering professional nursing services such as home rehabilitation training and chronic disease management support.

After introducing health status as a mediator variable, the direct effect of long-term care insurance in model (3) decreased and was not significant; The coefficient of health status is significantly negative, indicating that long-term care insurance policies indirectly suppress medical expenditures by improving health, which verifies hypothesis 2.

5.2 Heterogeneity Analysis

5.2.1 Heterogeneity test of chronic diseases

Due to the long course of illness, multiple complications, and complex nursing needs, elderly people with chronic diseases often face higher consumption of medical resources, manifested in frequent outpatient follow-up, long-term medication expenses, professional nursing service fees, and the cost of purchasing assistive devices or home environment renovation caused by disability. These factors collectively push up the baseline level of family medical expenses (Ke J et al., 2025). Long term care insurance can theoretically alleviate family financial pressure by covering part of nursing expenses, providing home care subsidies, or reimbursing institutional care. However, its policy effect may show significant heterogeneity due to differences in chronic disease types, disease severity, and family resource endowments.

The study divided the total sample into two groups based on chronic disease status, with 42944 samples having chronic diseases and 12003 samples not having chronic diseases. According to the formula, the sample was regressed and heterogeneity analysis was conducted. The regression results are shown in the following table.

Table 5 Heterogeneity Analysis of Chronic Diseases

Family medical expenses	(1)	(2)
	Not suffering from chronic diseases	Suffering from chronic diseases
Long term care insurance	-0.0042*	-0.0189***
	(-1.9550)	(-2.8501)
control variable	Control	Control
Fixed year effect	Control	Control
Urban fixed effects	Control	Control
N	12003	42944

Note: The values in parentheses are the statistical values of t; *, **, *** represent significance levels of 10%, 5%, and 1%, respectively.

The regression results showed that long-term care insurance significantly reduced household medical expenses in both groups, but there were significant differences in the strength of the effect. In samples without chronic diseases, the coefficient of long-term care insurance is only significant at the 10% level, and the coefficient is relatively small; Among the samples with chronic diseases, the policy significantly reduced household medical expenses, confirming that the policy dividends for families with chronic diseases are more significant. Therefore, it indicates that long-term care insurance has a stronger effect on samples with chronic diseases, significantly reducing their family medical expenses, thus verifying hypothesis 3.

5.2.2 Heterogeneity analysis of educational level

Education level, as a core proxy variable of social and economic status, shapes family healthcare decisions through a dual path of resource acquisition ability and health literacy: higher education groups usually have higher income levels, broader social networks, and better information acquisition channels, and can prioritize high-quality medical services and preventive health management, thus forming a “resource health” positive cycle; At the same time, its strong learning ability and health knowledge reserve enable it to identify disease risks earlier and optimize expenditure structure more accurately by utilizing insurance terms, such as selecting the most cost-effective service by comparing reimbursement ratios of different nursing institutions, or using policy allowed preventive care projects to reduce later treatment costs (Zhang et al., 2025). On the contrary, the low education group is limited by economic capital and health awareness, and their medical behavior relies more on passive treatment rather than active prevention. They also have a lower understanding and utilization efficiency of insurance policies, which may lead to insufficient release of policy dividends. From this, it can be concluded that long-term care insurance may have differences in medical expenses for families with different levels of education.

Table 6 Heterogeneity Analysis of Educational Level

Family medical expenses	(1)	(2)
	Primary school education or below	Primary school education or above
Long term care insurance	-0.0092	-0.0169***
	(-1.4066)	(-2.6188)
control variable	Control	Control
Fixed year effect	Control	Control
Urban fixed effects	Control	Control
N	24833	30667

Note: The values in parentheses are the statistical values of t; *, **, *** represent significance levels of 10%, 5%, and 1%, respectively.

As shown in the table above, long-term care insurance has a significant inhibitory effect on both types of household medical expenditures, but the strength of the effect increases with the level of education. In the sample of primary school and below education, the policy effect is not significant; However, the coefficient of samples with primary school education or above is significantly negative, indicating that the long-term care insurance policy has a stronger effect on reducing household medical expenses for highly educated samples, which verifies hypothesis 4.

6. Further analysis

This study is based on family decision-making theory and health economics models, and explores in depth the moderating effect of the number of children on the long-term care insurance policy. On a theoretical level, medical decision-making in families with multiple children exhibits collective bargaining characteristics, especially in the care of elderly people with chronic diseases or disabilities. An increase in the number of children may affect medical expenses through two pathways: on the one hand, the participation of multiple people in decision-making may prolong the treatment period or choose higher cost treatment plans (such as intensive care or overseas medical treatment), forming a "decision-making inertia" that drives up expenses; On the other hand, economic sharing and emotional support among children may alleviate the financial pressure of a single decision maker, reduce the probability of giving up treatment, and indirectly maintain the rigid characteristics of medical expenditures.

As an external intervention tool, the policy effect of long-term care insurance may vary due to differences in the number of children - in families with fewer children, the economic compensation provided by insurance can directly replace the direct care cost of children and reduce medical expenses; In families with multiple children, insurance reimbursement may be seen as an additional resource that stimulates more active treatment investment, but instead weakens the effectiveness of policy cuts. Therefore, this article investigates whether there is a moderating effect of the number of children, and the results are shown in the table below.

Table 7 Regression Results of the Moderating Effect of the Number of Children

Family medical expenses	**(1)**	**(2)**
	Excluding interactive items	**Including interactive items**
Long term care insurance	-0.0179***	-0.0142***
	(-2.6375)	(-3.1055)
Interaction term with the number of children		0.0017***
		(2.8766)
number of children	0.0018***	0.0019
	(3.0280)	(0.8192)
control variable	Control	Control
Fixed year effect	Control	Control
Urban fixed effects	Control	Control
N	21975	21975

Note: The values in parentheses are the statistical values of t; *, **, *** represent significance levels of 10%, 5%, and 1%, respectively.

This study systematically tested the moderating effect of the number of children on the impact of long-term care insurance policy on family medical expenditure by constructing a moderating effect model (Model 2). The regression results showed that the interaction item was significantly positive, and this result remained stable after controlling family income, the prevalence of chronic diseases, urban and rural registered residence, and the region time fixed effect. It verified the negative

moderating mechanism of the number of children on the reduction of family medical expenditure by long-term care insurance, and verified Hypothesis 5.

Its internal logic can be decomposed into three paths: firstly, the substitution effect of family care resources. Multi child families form informal nursing networks through intergenerational division of labor, such as shift based home care and shared responsibility for medical decision-making, which can partially replace the professional services provided by long-term care insurance (such as home care subsidies, institutional care reimbursements, etc.), reduce the economic dependence of families on insurance, and thus weaken the direct effect of policies on reducing expenditures; Secondly, the ethical inertia of medical decision-making is deeply influenced by the concept of "filial piety and longevity" in traditional Chinese filial piety culture. Even in cases where medical treatment is deemed ineffective, families with multiple children tend to maintain active treatment through collective bargaining (such as continuous use of intensive care, high priced targeted drugs, or overseas medical treatment) to avoid bearing the social stigma of "unfilial". This decision-making rigidity causes insurance covered nursing fees to be reallocated to high cost treatment projects, forming an expenditure cycle of "policy compensation treatment upgrade"; Thirdly, the psychological effect of risk diversification is that families with multiple children are less sensitive to financial pressure due to the sharing of economic responsibilities (such as medical expenses and loss of work) and emotional support, and tend to view long-term care insurance as a supplementary resource rather than a necessary guarantee, resulting in lower than expected insurance utilization efficiency.

7. Conclusion and Policy Suggestions

This study is based on CHARLS 2011-2020 panel data and uses a double difference method to systematically evaluate the impact of long-term care insurance policies on household medical expenditures and their pathways of action. The main research conclusions of this article are as follows:

Firstly, the long-term care insurance policy significantly reduces household medical expenses, and after multiple robustness tests, the research conclusion still holds true. Long term care insurance directly replaces the out of pocket medical costs of families by providing professional nursing services for disabled elderly people. At the same time, it indirectly reduces the incidence of complications and subsequent treatment needs by improving the health status of insured individuals. The policy effect of improving health status indicates that health improvement is an important transmission path for policy reduction. Secondly, the study revealed significant heterogeneity in the effectiveness of long-term care insurance policies. The cost reduction effect of chronic disease families is significantly higher than that of non chronic disease families, as their rigid medical needs are higher, and the nursing services covered by the policy can directly replace high treatment costs; The moderating effect of education level is significant, and the policy dividends for families with higher education are more prominent than those with education below high school, reflecting the advantages of the higher education group in understanding insurance terms, resource integration, and preventive health management. Thirdly, the moderating effect of the number of children weakens the policy effect through "alternative care resources" and "ethical decision-making inertia", indicating that collective treatment decisions under traditional filial piety culture offset the economic compensation function of insurance.

Based on the above research results, this article proposes relevant policy recommendations:

One suggestion is to optimize the differentiated design of long-term care insurance: for families with chronic diseases, expand the reimbursement scope of nursing services (such as psychological rehabilitation and remote medical care), and establish a dynamic subsidy mechanism to match disease progression; For non chronic disease families, strengthen the coverage of preventive services (such as health screening and early intervention for chronic diseases), guide them to shift from "passive treatment" to "active health management", and thus improve the overall efficiency of policies. The research results not only verify the cost control function of long-term care insurance, but also provide empirical evidence for the construction of a precise medical security system, helping to achieve the goal of fair and sustainable access to medical resources under the "Healthy China" strategy.

Secondly, the research findings call for the development of education sensitive long-term care insurance optimization strategies: for higher education groups, personalized insurance products should be developed (such as high-end nursing

service packages, cross-border medical reimbursements), and digital tools (such as AI insurance consultants) should be used to improve service accuracy; For the low education group, it is necessary to simplify the language of policy promotion, popularize insurance knowledge through community lectures, graphic manuals, and other forms, while increasing the reimbursement ratio for basic nursing services (such as family doctor contracts and chronic disease management), and lowering their medical expenditure threshold (Yin, M., & Hu, M. Y. , 2016).

Thirdly, targeted optimization of institutional design: for families with multiple children, a "nursing treatment" expenditure classification reimbursement mechanism should be established, and the reimbursement ratio for basic nursing services (such as home care and rehabilitation training) should be increased to 90%. For high-end treatment projects (such as ICU maintenance and experimental therapy), an annual payment limit (such as 50000 yuan) should be set, guiding resources to tilt towards nursing fields with higher cost-effectiveness; At the same time, the "Family Decision Support Program" is being implemented, which involves professional social workers intervening in medical consultations for families with multiple children, providing end-of-life care knowledge training and ethical conflict resolution, and alleviating irrational treatment investment.

For families with fewer children, it is necessary to strengthen the accessibility of insurance, such as simplifying the reimbursement process in different places, expanding the network coverage of nursing institutions, and exploring bundled products of "insurance+commercial supplements" to compensate for the shortage of nursing manpower. The limitations of the study include the heterogeneity of the impact of children's living distance and economic contribution, and the possibility of measurement errors in the proxy variable of filial piety concept. In the future, dynamic decision-making details can be captured through follow-up surveys and in-depth interviews.

Fourthly, at present, the number of pilot cities for long-term care insurance in China is relatively limited, and the regional distribution is concentrated in the economically developed eastern regions, resulting in significant regional imbalances. In the future, on the basis of existing pilot projects, priority should be given to including cities in the central and western regions with high aging rates and relatively scarce medical resources, gradually building a nationwide pilot network. At the same time, the current policy mainly covers the urban employee medical insurance insured group, and rural residents have been excluded from the security system for a long time. Compared to cities, the aging situation in rural areas is more severe, and the shortage of elderly care resources is prominent. Therefore, it is necessary to break down the dual barriers between urban and rural areas, extend the pilot scope to counties and rural areas, and focus on covering areas with high risk of disability and urgent care needs. In addition, a dynamic adjustment mechanism should be established to timely include individuals with moderate to mild disabilities, cognitive impairment patients, etc. in the scope of protection, forming a hierarchical and classified protection system.

Fifthly, in response to the diverse needs of the elderly population, it is necessary to abandon the "one size fits all" service model and establish a personalized care system that accurately identifies and dynamically responds. Specifically, for the home-based elderly care group, home care services (such as wound treatment and rehabilitation training) and subsidies for home aging adaptation (such as the installation of anti slip facilities) should be strengthened; For institutional elderly care recipients, focus on improving specialized medical care (such as postoperative rehabilitation, chronic disease management) and psychological support services; Exploring low-cost community mutual aid models (such as neighborhood care networks) for empty nest elderly in rural areas. At the same time, beneficiaries are given the right to choose independently, allowing for flexible allocation between cash subsidies and service payments, and encouraging family members to participate in care training (such as basic nursing skills courses) through policy support, forming a "family community institution" collaborative service ecosystem.

Sixly, the key to improving the quality of nursing services lies in optimizing the professional abilities of practitioners. At the higher education level, elderly care majors should be added to medical colleges, offering interdisciplinary courses that integrate pathology, rehabilitation medicine, and psychology; In the field of vocational education, we will improve the short-term skills training system (such as disability assessment and emergency operations), and implement a dual track assessment and certification system of "theory+practice". Establish regional training bases to simulate real care scenarios (such as home

care and institutional collaboration) and strengthen the emergency response capabilities of practitioners. Implement an annual mandatory continuing education program for employees, focusing on modules such as mental health intervention and cross-cultural communication skills.

In addition, it is necessary to systematically improve the nursing environment: firstly, improve the salary guarantee mechanism and implement tiered subsidies based on service difficulty and working hours; Secondly, establish a system for monitoring labor intensity and implementing job rotation and compensatory leave to avoid occupational burnout; The third is to enhance the social recognition of the nursing profession and attract high-quality talents to join the field of elderly care through media promotion and social honor selection. Through the above measures, a virtuous cycle of "talent supply service quality policy effectiveness" can be achieved.

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