



Social Networks and Private Medical Insurance Decisions among Chinese Elderly: Evidence from China Health and Retirement Longitudinal Study on the Roles of Strong and Weak Ties

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Abstract. With advances in medical technology and scientific knowledge, human life expectancy continues to rise, making the challenge of achieving health aging increasingly prominent. While private medical insurance serves as a vital supplement to public healthcare systems, the role of social networks in shaping insurance adoption among older adults remains critically underexplored, despite evidence that social connections influence health-related decision-making. The present research aims to explore the relationship between medical insurance purchase and both “weak ties” and “strong ties” among the elderly by using evidence from the China Health and Retirement Longitudinal Study (CHARLS). Drawing on the data, the relationship was checked via a logistic model which contained a variable representing strong ties and two variables standing for online weak ties and offline weak ties. Subsequently, the results indicate a U-shaped relationship between offline weak ties and insurance purchase, as well as a positive effect of online weak ties on insurance adoption at high usage levels. Importantly, these findings reveal a “threshold effect” in the information diffusion process within social networks. In contrast, strong ties showed no significant association, challenging existing theory predictions. These findings offer actionable insights: insurance companies can leverage social network thresholds for targeted marketing, and policymakers should integrate online/offline network dynamics into health security strategies for aging populations.

Keywords: Social Networks, Private Medical Insurance Decisions, Roles of Strong and Weak Ties.

1 Introduction

By 2050, the population of the elderly is projected to reach 2.1 billion, which strains public healthcare systems, necessitating complementary financing mechanisms such as private medical insurance to ensure sustainable healthy aging [1]. Existing studies on private insurance focus more on individuals’ personal characteristics such as age, income and education [2, 3]. However, as a pivotal factor, social networks are suggested

to be influential but still understudied. One scholar separated social network into “inner network” and “outer network”, finding the purchase will slow down when the inner enlarges, and conversely the outer boosts the purchase [4]. Another study also argued “weak ties” positively affects insurance purchase [5]. Although these studies have explored the relationship between social networks and purchasing behavior, they all have certain limitations. First, they all overlooked the impact of online social interactions, which constitute a significant portion of weak ties. Second, none of these studies have specifically focused on the elderly population. Building on these gaps, the present research achieved three key contributions. First, this study conceptualizes and operationalizes “online weak ties” through WeChat usage metrics, capturing a previously neglected dimension of insurance purchase. Second, by focusing specifically on China’s elderly through CHARLS data, this study addresses the demographic specificity gap. Third, this study identifies a U-shaped relationship between offline weak ties and insurance purchase, revealing a critical threshold effect that challenges the linear assumption in prior work. These contributions not only advance social network theory in health economics but also provide actionable insights for insurance providers targeting elderly populations in digitally connected societies.

2 Literature Review and Research Hypothesis

With the rapid improvement of medical standards, people are no longer as helpless when facing complex and difficult diseases as they were in ancient times. As a result, life expectancy is also increasingly growing globally. According to a report in 2020, population aged 60 and above has already reached 1.4 billion and is continuously increasing. Based on the prediction, there will nearly be double the elderly population in 25 years [1]. In China, the largest developing country, the population aged 65 or older is still expected to reach 20% [6]. For this reason, a series of policies to encourage households to raise multiple children are promulgated [6]. While it is undeniably a remarkable achievement that life expectancy keeps growing in global health and human society, it can also bring a series of problems like social isolation and dependency on care. One of the most rigorous issues is poor health among the elderly [1]. Previous research has proved that health conditions gradually deteriorate with individuals’ age especially beyond a certain age and the economic burden of diseases among the elderly is also increasing with the intensification of population aging, affecting both individuals and society as a whole [7, 8]. What could be a reasonable solution is private medical insurance which is relatively less noticeable compared to public insurance. Moreover, if governments implement effective regulations, private health insurance can provide medical coverage comparable to public health insurance for a significant portion of the population, undoubtedly including the elderly, a point that is particularly pronounced in developing countries [9].

Given the significant role on healthy population aging played by private medical insurance, research on its mechanisms, particularly the purchase mechanisms, is of great importance. Existing research on insurance purchasing primarily focuses on characteristics such as gender, age, educational attainment, and income level. Additionally,

as a distinct group, the elderly are rarely singled out for discussion. Some scholars suggested that individuals who are divorced, obese, and well-educated are more willing to purchase private insurance [2]. Another research pointed out a positive education effect on life insurance purchase, a positive but decreasing income effect on it and so on [3]. Despite being a crucial factor in social science research, social networks are seldom addressed. Since Granovetter's research in 1973, social network has been separately discussed as "strong ties" and "weak ties" and have become more known for their effects on diffusion of influence and information, mobility opportunity, and community organization [10]. Consequently, this study naturally questions: whether there is a relationship between social networks and insurance purchasing. Among a few related studies, some scholars suggested that "inner network" has a negative relationship with general commercial insurance purchasing while "outer network" has a positive, where "inner network" and "outer network" have similar meaning with strong ties and weak ties [4]. However, Shi's definition of inner network only involves siblings instead of other family members [4]. According to some scholars' definition, parents, children and siblings should all belong to "close relatives" [11]. Besides, online weak ties such as the usage of social media are also out of consideration. OSNs (online social networks) have been demonstrated to share similar significance and characteristics with common social networks [12]. While another study, Zhang's research, paid more attention to social network's consequences on family saving rate, it still holds significance for subsequent research on insurance [5]. This study aims to address the existing research gap in this field by focusing specifically on the elderly population. Accordingly, the following hypotheses were proposed:

H_{1a}: Social interacting expenditure (weak ties) exhibits a U-shaped relationship with private medical insurance purchases among the elderly.

H_{1b}: The use of social software (weak ties) has a positive impact on private medical insurance purchases among the elderly.

H₂: Family size (strong ties) has a negative impact on private medical insurance purchases among the elderly.

3 Empirical Framework

3.1 Data Collection

The data used in this research is all from the CHARLS Wave 4 (2018) Questionnaire. CHARLS is an interdisciplinary research project jointly conducted by Wuhan University and Peking University aiming to collect personal information, health conditions and economic situations of elderly population from different regions and families in China [13]. The present research used its fourth dataset which is collected in 2018. There are two main reasons to use this database. First, databases before have no evidence about social media usage. Second, databases after 2018 do not collect the same questions about private medical insurance, which makes it incapable of conducting panel analysis. After cleaning outliers and missing values, there finally are 9568 samples remaining.

3.2 Variables

Considering the different strengths of the connection, this research separated the social network into weak ties and strong ties and designed four variables to evaluate the social network.

Due to the difficulty of directly enumerating the weak ties (since no one can accurately count how many friends they have and the degrees of their relationship), this research opted to use the logarithm of expenditures on social interactions, squared logarithm and WeChat usage as proxy variables to analyze the impact of the outer layer network. The logarithm of expenditures on social interactions has been proved to be reasonable and effective by existing studies and the present research added its square for a better fit [4, 14]. Additionally, with the rapid development of the Internet across various domains, online social interactions have achieved nearly equal status to offline interactions [12]. However, due to the expenditure insensitivity of online social platforms—where most social software is freely accessible to the public, the sole consideration of social interaction expenditure fails to comprehensively cover online social engagement. Therefore, this study further incorporates WeChat usage as an additional variable to assess the weak ties.

In contrast to Shi's conceptualization of inner network which focused solely on siblings, this study draws on and refine Fafchamps' definition of "close relatives" to perform strong ties [4, 11]. Specifically, this research defined strong ties as the sum of parents, children, and siblings currently alive. This expanded framework offers a more comprehensive measure of strong ties.

According to research in 2015, a series of control variables describing respondents' fundamental information is prepared to diminish the bias [3]. This information includes respondents' age, squared age, gender, education years, health status, net assets (without properties) and purchase of other medical insurance.

3.3 Methodology

The logistic regression model used in this paper is as follows:

$$P(\text{insurance}_i = 1) = \phi \left(\beta_0 + \beta_1 \times WT^{off}_i + \beta_2 \times WT^{off}_i^2 + \beta_3 \times WT^{on}_i + \beta_4 \times WT^{on}_i + \beta_5 \times ST_i + \gamma \times ctrl_i \right) \quad (1)$$

insurance_i is the purchase of private medical insurance, which means if $\text{insurance}_i = 1$, individual i have purchased at least one private medical insurance, otherwise individual i haven't. WT^{off}_i is offline weak ties measured by logarithmic social expenditure of i . WT^{on}_i is online weak ties represented by WeChat usage of i . $WT^{on}_i = 0$ means this respondent never uses WeChat at that time, while $WT^{on}_i = 1$ means using without WeChat Moments and $WT^{on}_i = 2$ means using WeChat and posting Moments. ST_i is the strong ties equaling to family size. $ctrl_i$ is a vector containing a series of control variables discussed before.

4 Result

Through logistic regression, correlations between different variables and private medical insurance purchases are gained, which has been shown as Table 1. The relationship between the purchases and social networks will be explained below.

Table 1. Result from basic regression.

	(1)
	Private_medical_insurance
Private_medical_insurance	
weak_ties_offline	-0.368*** (0.134)
weak_ties_offline_sq	0.052*** (0.012)
weak_ties_online =0	0.000
weak_ties_online =1	0.314 (0.226)
weak_ties_online =2	0.549*** (0.145)
strong_ties	-0.015 (0.029)
age	0.068 (0.099)
age_sq	-0.001 (0.001)
gender	-0.353*** (0.120)
education_years	0.086*** (0.018)
health_status	0.178*** (0.058)
cbirt_net_assets	0.005*** (0.002)
employee_insurance	-0.576** (0.287)
urban_rural_insurance	-0.455 (0.294)
resident_insurance	-0.098 (0.324)

new_rural_insurance	-0.631** (0.260)
gov_insurance	-0.090 (0.514)
unit_insurance	-0.377 (0.752)
Constant	-3.681 (3.198)
Pseudo R ²	0.142
Observations	9568

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Firstly, the logistic regression ties reveal a statistically significant non-linear relationship between the offline weak ties and the purchase of private medical insurance. Initially, since the linear term exhibits a negative coefficient ($\beta_1 = -0.368$, $p = 0.006$), elderly people with larger offline weak ties are less likely to purchase private medical insurance when monthly social interacting expenditure is less than the threshold $e^{3.58} \approx 35.7$ RMB. But as the level of weak ties increases beyond the threshold, the quadratic term becomes dominant, exerting a stimulation effect on purchasing behavior at the significant level of 1% ($\beta_2 = 0.052$, $p = 0.000$). This finding could be supportive evidence to H_{1a}. Furthermore, this effect shares some similarity with previous studies: due to the uneven distribution of offline weak ties (Table 2), for the majority respondents (86.6%), more weak ties lead to larger probability to purchase, which is similar to those reported by Shi in 2022 and Zhang in 2022 [4, 5]. But what's different is that Shi and Zhang's research didn't show the inhibitory influence of weak ties on the low-expenditure people [4, 5].

Table 2. Distribution of offline weak ties.

weak_ties_offline	Freq.	Cum.
weak_ties_offline < 3.58	1282	13.40
weak_ties_offline $\geq$ 3.58	8286	100.00
Observations	9568	100.00

Secondly, in addition to the offline variable, the categorical variable, online weak ties, demonstrated a positive relationship between online weak ties and medical insurance purchase. Setting non-WeChat users ($weak_ties_offline = 0$) as the reference group, the regression results show that elderly people who use WeChat but do not engage with Moments ($weak_ties_offline = 1$) are more willing to be consumers of this type of insurance. However, this effect is statistically insignificant ($\beta_3 = 0.314$ $p = 0.165$). On the contrary, individuals who use WeChat and post on Moments ($weak_ties_online = 2$) also prove a higher probability of insurance uptake, which is highly statistically significant ($\beta_4 = 0.549$ $p = 0.000$). Doubtlessly, H_{1b} can be proved but only the elderly who have high-level usage will be significantly stimulated.

After the analysis of the result of strong ties, the third finding can be concluded, which is there is no significant association between strong ties and insurance purchase. Although strong ties show a negative association with private medical insurance purchasing in the regression results, their poor statistical significance ($\beta_5 = -0.015$, $p = 0.615$) suggests insufficient evidence to confirm their influence or support H_2 . In contrast to this finding, Shi suggested that the inner network inhibits the participation of households in commercial insurance at the 1% significance level [4]. As shown in Table 3, to examine whether differences in the operationalization of strong ties account for the observed regression results, this study disaggregates strong ties into the number of living parents, siblings, where Shi's study of inner network based, and children and re-estimates the model using these subcomponents [4]. However, the regression results based on the disaggregated strong ties variables still fail to demonstrate statistically significant effects on insurance purchasing behavior ($p_{parents} = 0.837$ $p_{siblings} = 0.998$ $p_{children} = 0.268$). There might be two reasons to explain the difference: First, the present research is specialized to evaluate the elderly's condition so that the population also contained the elderly (upper than 45) only while Shi's involved all ages. Second, family support is declining. According to two sociological literatures, the diminishing family size and outflow of population is influencing family support for the rural aged [15, 16].

Table 3. Results from verifying regression.

	(1)
	Private_medical_insurance
Private_medical_insurance	
weak_ties_offline	-0.367*** (0.133)
weak_ties_offline_sq	0.052*** (0.012)
weak_ties_online=0	0.000 (.)
weak_ties_online=1	0.309 (0.226)
weak_ties_online=2	0.545*** (0.145)
parents_alive	0.018 (0.087)
siblings_alive	-0.000 (0.035)
children_alive	-0.072 (0.065)
Pseudo R ²	0.142
Observations	9568

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5 Discussion

Existing literature indicates that social networks reduce decision-making costs through the sharing of insurance knowledge, thereby promoting insurance purchase [17]. This study reveals a "threshold effect" in the impact of offline weak ties on private medical insurance uptake, further suggesting that the information diffusion function of social networks only becomes effective when network size reaches a certain scale. Additionally, online weak ties show no significant influence at moderate usage levels but demonstrate a significant promotion at high usage levels, which further corroborates the threshold effect of information sharing.

Besides, this study also indicates the non-significant effect of strong ties, which contradicts previous conclusions. There are two potential reasons: First, concentration on the elderly reduces the risk-sharing effect, as the strong ties within this demographic are also predominantly elderly. Second, the risk-sharing effect itself is weakening over time, because of the decreasing family support [15, 16].

The above findings provide potential feasible strategies for improving insurance coverage, which could help address the challenges of healthy aging. For insurers, they can leverage the positive effects of online weak ties on purchase to develop a "diffusion-discount" strategy. By requiring purchasers to share and promote insurance-related knowledge on social media platforms such as WeChat and Facebook, and subsequently offering them certain discounts, insurance coverage rates can be increased. From the government's perspective, policymakers can improve internet literacy among the elderly to help them increase their use of social media and also strengthen community connections to enhance individuals' offline weak ties. These strategies indirectly disseminate insurance information through social networks. Another direct approach is promoting medical insurance information online through official media channels or conducting community presentations.

What limits the research is that the cross-sectional data adopted in this study, since CHARLS did not cover completely consistent insurance categories after 2018. However, considering limitations, this study still has sufficient evidence to support the result.

6 Conclusion

The present study explored how strong ties, offline weak ties and online weak ties influence private medical insurance purchases among Chinese elderly. The result revealed a U-shaped relationship between offline weak ties and insurance purchase and a significant positive effect of high social software usage. Moreover, strong ties demonstrated no significant association with insurance purchases. These findings indicate a threshold effect of weak ties which means only those with weak ties exceeding a certain level can access information sharing through social networks. Although this study has made valuable findings, the use of cross-sectional data still raises questions about rigor. Future research using panel data could better establish temporal relationships between social networks and insurance decisions.

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