



RESEARCH ON THE LINKAGE EFFECT OF SOCIAL SECURITY EXPENDITURE, SOCIAL ORGANIZATIONS, AND HEALTH HUMAN CAPITAL: AN EMPIRICAL TEST BASED ON CHINA'S PROVINCIAL PVAR MODEL

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Abstract

Implementing an “Investing in People” strategy requires not only fiscal resources from the state but also a supportive social environment. Using provincial panel data from 2008 to 2023, this study develops a Panel Vector Autoregression (PVAR) model to examine the dynamic relationships among social security expenditure, social organization development, and health human capital formation, as well as their regional heterogeneity. The results yield three main findings. First, social security expenditure consistently promotes social organizations, providing evidence for a resource-empowerment effect. However, the reverse effect—whereby organizations improve fiscal efficiency—is weak and becomes insignificant after controlling for macroeconomic factors, indicating that this pathway is context-dependent. Second, the two factors influence health human capital through distinct temporal channels. Social security expenditure produces immediate short-term effects, whereas social organizations exhibit a significant lagged effect that varies sharply across regions and is strongest in eastern China. Third, regional patterns diverge notably: the east shows nascent bilateral synergy, the central region remains fiscally driven, and the west exhibits organizational autonomy with limited coordination. These findings offer empirical grounding and region-specific policy insights for refining the Investing in People strategy and strengthening the health foundations of the labor market.

Keywords

Social Security Expenditure; Social Organizations; Health Human Capital; Labor Market; Dynamic Synergy; Panel Vector Autoregression (PVAR) Model; Regional Heterogeneity

1. Introduction

The 2026 Government Work Report sets an economic growth target of 4.5% to 5% and stresses the need to boost consumption and invest in people. As the first year of the 15th Five-Year Plan period begins, the country is shifting its strategic focus from an infrastructure-driven model—long reliant on hard resource inputs—toward a people-centered development stage. The core goal is to create new growth drivers by improving human resources and social capital. In labor economics, health is a key component of human capital (Grossman, 1972). Better health directly raises labor force participation and productivity, and it also supports long-term economic growth (Bloom et al., 2020). Strengthening health human capital is therefore essential—both as the foundation for implementing the 2026 Medical and Health Foundation

Strengthening Project and as a core pathway to achieving high-quality development and realizing the Investing in People strategy throughout the 15th Five-Year Plan period (State Council, 2025, 2026a, 2026b).

Implementing the Investing in People strategy requires aligning the fiscal hard resources provided by state redistribution with the institutional soft environment cultivated through the development of social organizations. To further optimize spending, the government has committed to reallocating funds from inefficient uses toward more productive areas—namely, investing in people's capabilities and health. Such reallocation reflects a broader shift toward the social investment paradigm, which emphasizes using public expenditure to strengthen human capital and foster long-term resilience (Garritzmann et al., 2022; Hemerijck, 2022). At the same time, the 2026 Government Work Report, in its chapter on safeguarding national security and social stability, explicitly calls for "guiding and supporting the healthy development of social organizations, humanitarian rescue, volunteer services, and public charity." This marks a shift in the role of social organizations from past participants in the social sphere to important forces in state governance—a trend observed globally as nonprofit organizations become central to public service delivery (Anheier, 2021; Salamon & Sokolowski, 2021). In China, this evolution reflects the government's growing recognition of the potential of social organizations to address social needs (Guo & Zhang, 2021; Zhang & Guo, 2022). Accordingly, greater expectations have been placed on their capacity to resolve conflicts and respond to livelihood demands. How to effectively coordinate the dynamic linkage between fiscal resource empowerment and the efficiency gains of social organizations has thus become a pressing theoretical question in current policy implementation.

Both social security spending and social organizations are key to the Investing in People strategy, but most studies examine them separately. Fiscal research focuses on how public spending affects the economy and growth, but its success depends on effective utilization and institutional quality (Garritzmann et al., 2022; Hemerijck, 2022; IMF, 2023). Research on social organizations looks at their internal workings and their role in joint governance (Anheier, 2021; Salamon & Sokolowski, 2021; Gazley & Brudney, 2023). As a result, the systemic link between the two—and their joint impact on health human capital accumulation—remains underexplored. To date, there is limited empirical evidence, particularly from dynamic systems approaches such as panel vector autoregression (Love & Zicchino, 2006; Abrigo & Love, 2016), as to whether the resource-empowerment pathway is robust and whether social organizations, as "important forces in state governance," have in turn enhanced the efficiency of fiscal resource use. Moreover, existing research offers few region-specific policy insights regarding the heterogeneous performance of different areas in the process of investing in people.

This study addresses these gaps by posing three core questions. First, in the context of the Investing in People strategy, does social security expenditure significantly promote the development of social organizations—that is, is the resource-empowerment pathway empirically supported? Second, is the reverse feedback effect of social organizations on fiscal expenditure—the organization-driven efficiency pathway—conditional upon contextual factors? Third, what dynamic temporal patterns characterize the impact of these two factors on health human capital, and does this linkage exhibit significant regional heterogeneity across eastern, central, and western China?

The contributions of this paper are threefold. Theoretically, it constructs an integrated framework linking hard resources, soft environment, and health human capital, bridging the conventional divide between state-centered and society-centered perspectives while clarifying the conditions under which each pathway operates. Methodologically, it applies a PVAR model to capture the temporal interactions and lagged effects between policy instruments. Practically, it identifies a regional pattern of "nascent synergy in the East, fiscal dominance in the Central, and organizational autonomy in the West," offering evidence-based guidance for optimizing expenditure structures and strengthening the capacity of social organizations to participate in public service delivery during the 2026–2030 period and beyond.

2. Literature Review and Theoretical Framework

2.1 Health Human Capital in Labor Economics

The concept of treating health as an investment in human capital originates with Mushkin's (1962) pioneering work, which first systematically articulated how health investment contributes to economic growth. Building on this foundation, Grossman (1972) conceptualized health as a capital stock, arguing that individuals produce health by investing in medical care and time, thereby gaining more healthy time to devote to labor market activities. Early human capital theorists regarded health and education as dual

pillars of individual productivity (Grossman, 1972; Becker, 2010). Subsequent research has further confirmed that health human capital not only directly shapes workers' labor force participation and working hours but also plays a crucial role in enhancing total factor productivity, securing lifetime earnings, and promoting macroeconomic growth (Bloom & Canning, 2000; Bloom, Canning, & Sevilla, 2004; Cutler & Lleras-Muney, 2021). In terms of measurement, existing studies offer a range of multidimensional indicators. Bu et al. (2024) developed a comprehensive indicator system using Chinese labor force data that includes dimensions such as health stock and health investment, providing a methodological foundation for our variable selection. Following their health investment dimension, this study uses the number of health institutions per 10,000 people as a supply-side proxy for health human capital formation, reflecting the conditions under which health human capital can be accumulated.

2.2 Fiscal Expenditure and Social Organizations in Public Service Delivery

Regarding the pathway of public service delivery, there has long been an intensive debate in academia over the logic of "state-led" versus "society-led" approaches. On the one hand, fiscal expenditure provides basic guarantees through redistribution tracks, focusing on fairness (Lindert, 2004). In recent years, the concept of the "social investment state" has further emphasized the role of social spending in strengthening human capital and fostering long-term economic resilience (Garritzmman et al., 2022; Hemerijck, 2022). On the other hand, social organizations deliver empowerment through specialized services, emphasizing efficiency (Salamon & Anheier, 1998; Salamon, 2002). Contemporary scholarship highlights that nonprofit organizations have become central to modern governance systems, often complementing government efforts by providing services that public agencies may not deliver effectively due to resource or bureaucratic constraints (Anheier, 2021; Salamon & Sokolowski, 2021). Empirical research on the relationship between the two presents an intense debate between complementarity and substitution hypotheses: the complementarity hypothesis argues that government procurement of services can stimulate the vitality of social organizations, achieving a dual improvement in the scale and quality of public service supply (Najam, 2000; Yin, 2017); the substitution hypothesis worries that excessive government intervention will crowd out private capital, leading social organizations to lose administrative independence and service flexibility. A recent study based on data from 334 prefecture-level cities in China also confirmed that government social expenditure has a significant positive impact on the scale of nonprofit organizations, supporting the applicability of the complementarity hypothesis in the Chinese context (Lu & Dong, 2018). More recent work on government–nonprofit collaboration underscores the importance of partnership design and institutional context in shaping these outcomes (Gazley & Brudney, 2023). In China, the rapid growth of social organizations has been accompanied by evolving state–society relations, with organizations increasingly involved in public service delivery and community development (Guo & Zhang, 2021; Zhang & Guo, 2022). They also build social capital, which has been shown to improve health outcomes and community resilience (Aldrich & Meyer, 2021). This social capital is part of the soft environment needed for the Investing in People strategy.

2.3 Institutional Synergy Effect: Empowerment Effect and Conditional Effect

The implementation of the Investing in People strategy relies on the synergy between the input of hard resources and the cultivation of a soft environment. Among them, the resource-empowerment pathway emphasizes that fiscal investment provides a survival basis for social organizations through methods like project subsidies and government procurement of services; whereas the organization-driven efficiency pathway argues that social organizations, relying on localized information advantages, can significantly improve the allocation efficiency of fiscal funds (Ostrom, 2010). However, this synergistic effect is not automatically realized; the feedback effect of social organizations often possesses a high degree of institutional dependence, and its exertion is constrained by regional marketization levels, the rule-of-law environment, and the professional capabilities of the organizations themselves (Acemoglu & Robinson, 2012). This perspective aligns with the broader literature on collaborative governance, which emphasizes that the success of public–nonprofit partnerships depends on factors such as trust, capacity, and institutional design (Gazley & Brudney, 2023). From a broader macro perspective, China's national governance model is undergoing a profound transformation "from total dominance to technical governance" (Qu, Zhou, & Ying, 2009), a shift that provides the institutional background for the growth of social organizations and their synergy with fiscal resources.

2.4 Regional Differences in China's Fiscal Capacity and Social Organizations

Constrained by varying levels of economic development and divergent paths of institutional transition, China's fiscal capacity and social organization development exhibit marked East–Central–West heterogeneity (Acemoglu & Robinson, 2012). The eastern region, characterized by abundant financial resources and a high degree of marketization, has witnessed social organizations reach a specialized and mature stage, creating conditions conducive to bilateral synergy with the government. In contrast, the central region relies heavily on central government transfer payments, displaying typical fiscal dominance characteristics; here, social organization development remains relatively lagging and highly dependent on fiscal absorption. Social organizations in the western region are generally small in scale. Although they exhibit a degree of organizational autonomy, their contribution to livelihood services remains modest due to limited resource empowerment. Recent research further indicates that the impact of government expenditure on social organization development differs significantly across the three regions—exhibiting a certain degree of crowding-out effect in the eastern and central regions while manifesting as a complementary effect in the west (Song et al., 2024). These findings provide direct empirical support for the regional heterogeneity expectations underlying this study.

2.5 Theoretical Framework and Hypotheses

Adopting a cross-disciplinary perspective that integrates labor economics, public finance, and organizational sociology, this paper constructs an integrated analytical framework linking hard resources, soft environment, and health human capital. The core logic of this framework is as follows: the successful implementation of the Investing in People strategy depends on the synergistic interaction between the hard resources provided by state fiscal redistribution and the soft environment cultivated through the development of social organizations. Fiscal resources enhance service delivery capacity by empowering social organizations, while social organizations, leveraging their localized advantages, improve the allocation efficiency of fiscal funds. Together, these mechanisms contribute to the accumulation of health human capital. Building on this framework and the preceding literature review, this study proposes four core research hypotheses.

H1: Social security expenditure has a significant positive (empowerment) effect on the development of social organizations.

Fiscal resources serve as critical support for social organizations in delivering public services (Salamon, 2002; Wang, 2013). Through institutional arrangements such as government procurement of services and project subsidies, social security expenditure provides essential resources for the survival and capacity building of social organizations (Spires, 2011; Huang, 2015). In transitional countries particularly, the development of social organizations is highly dependent on the absorption and guidance of public finance, exhibiting a significant positive correlation (Yu, 2006; Wang, 2010). Therefore, within the strategic context of Investing in People, growth in social security expenditure is expected to effectively stimulate the developmental vitality of social organizations.

H2: Social organizations have a reverse feedback effect on social security expenditure, but this effect is subject to significant conditional dependence.

Relying on their localized information advantages and specialized service capabilities, social organizations can theoretically enhance the allocation efficiency of fiscal funds (Ostrom, 1996). However, this feedback effect is not universally established. Existing studies indicate that the policy feedback capacity of social organizations depends heavily on regional marketization levels, the institutional environment, and their own degree of specialization (Yu, 2006; Wang, 2010; Andrews et al., 2017). Consequently, the existence and strength of this reverse feedback effect must be examined within specific institutional contexts.

H3: There are temporal differences in the impact pathways of social security expenditure and social organization development on health human capital formation—expenditure exhibits a short-term direct effect on health service accessibility (our proxy), while organizations demonstrate a lagged promotional effect.

The mechanisms through which these two factors influence health human capital differ systematically. Social security expenditure primarily supports health service demand indirectly by enhancing residents' ability to pay; its impact pathway is short but the effect is direct (Grossman, 1972; Marmot et al., 2008). Social organizations, by contrast, directly improve service accessibility and quality through specialized and localized health services. However, their capacity building, trust accumulation, and network embedding require time. As a result, their promotional effect on health human capital often exhibits a significant lag (Putnam, 1993; Wilkinson & Marmot, 2003). Cross-national studies also indicate that the impact of social security expenditure on health human capital is moderated by the composition of the welfare system, and the duration of effects differs across various types of expenditure (Santos, Simões, & Simões, 2023). This suggests that, in the Chinese context, social security expenditure and social organizations may operate on different temporal sequences.

H4: The dynamic relationship between social security expenditure and social organization development, as well as their respective impacts on health human capital, exhibit significant heterogeneous synergy patterns across China's eastern, central, and western regions.

Constrained by varying levels of economic development and divergent paths of institutional transition, China's fiscal capacity and social organization development display marked regional heterogeneity (Kang et al., 2011; Gao & Yuan, 2008). It is therefore expected that: in the eastern region, where local governments possess strong financial resources and social organizations have reached a mature stage of development, the two may form a benign and mutually reinforcing bilateral synergy. In the central region, fiscal expenditure assumes a greater role in directly providing livelihood services, exhibiting fiscal dominance characteristics, while the feedback effect of social organizations remains relatively limited. In the western region, the development of social organizations relies more heavily on their own internal dynamics, reflecting organizational autonomy characteristics; however, due to limited resource empowerment, their contribution to health human capital remains modest.

3. Research Design

3.1 Sample Selection and Data Sources

This study utilizes a panel dataset of 31 Chinese provinces spanning 2008–2023. After removing observations with missing values, the final sample comprised 495 valid observations. Data were primarily sourced from the *China Statistical Yearbook*, the *China Financial Yearbook*, and various provincial statistical yearbooks.

3.2 Model Specification

We use a Panel Vector Autoregression (PVAR) model to study the dynamic links between spending, groups, and health. The model is:

$$Y_{it} = \alpha_i + \lambda_t + \sum_{p=1}^P \beta_p Y_{i,t-p} + \varepsilon_{it}$$

where i^* and t^* denote the province and year, respectively. The dependent variable vector is defined as $Y_{it} = [\ln \text{SecExp}_{it}, \ln \text{SocOrg}_{it}, \ln \text{Service}_{it}]'$, representing the logarithms of per capita social security and employment expenditure, the number of social organizations per 10,000 people, and the number of health institutions per 10,000 people. α_i and λ_t represent province-specific and time-specific fixed effects. β_p denotes the coefficient matrix to be estimated, capturing the impact of the p^* -period lagged values on current realizations. The term ε_{it} is the random disturbance, assumed to be independent and identically distributed (i.i.d.) with a mean of zero and a variance-covariance matrix Ω . Based on the AIC and BIC criteria, the optimal lag length is set at two periods. To address potential endogeneity, the model is estimated using the System Generalized Method of Moments (System GMM).

3.3 Variable Descriptions

Table 1 Variable Measurement Table

Variable Type	Variable Name	Variable Measurement Method
Explanatory Variables	Social Security Expenditure (lnSecExp)	Logarithm of per capita social security and employment expenditure.
	Social Organization Development (lnSocOrg)	Logarithm of the number of social organizations per 10, 000 people.
Dependent Variable	Health Service Accessibility (lnService)	Logarithm of the number of health institutions per 10, 000 people. This indicator reflects the supply-side conditions for health human capital accumulation.
Control Variables	Economic Development Level (lnPGDP)	Logarithm of per capita GDP. Used to control the basic impact of the macroeconomic environment.
	Livelihood Expenditure Ratio (FiscalRatio)	(Healthcare + Social Security + Education Expenditure) / Total Fiscal Expenditure. Measures the proportion of fiscal expenditure used for social development and health human capital.

Note: We use the number of health institutions per 10,000 people (lnService) as a supply-side proxy for health human capital accumulation.

4. Empirical Results and Analysis

4.1 Descriptive Statistics and Stationarity Tests

Table 2 presents descriptive statistics for all variables. The core variables exhibit substantial variation across both provinces and time periods, satisfying the requirements for panel data analysis. Results from the Fisher-type Augmented Dickey-Fuller (ADF) panel unit root test indicate that the core endogenous variables—lnSecExp, lnSocOrg, and lnService—are all stationary. Among the control variables, lnPGDP is stationary, and dFiscalRatio, obtained by taking the first difference of FiscalRatio, also passes the stationarity test. Accordingly, all variables are suitable for subsequent PVAR modeling.

Table 2 Descriptive Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
lnSecExp	495	-1.913	0.680	-3.620	-0.443
lnSocOrg	495	10.715	0.428	9.257	11.657
lnService	495	7.622	0.722	5.312	9.369
lnPGDP	495	10.746	0.562	9.180	12.207
dFiscalRatio	464	0.004	0.019	-0.068	0.072

Note: dFiscalRatio is obtained by taking the first difference of FiscalRatio. Differencing removes the first observation for each province, reducing the sample size to 464.

4.2 PVAR Model Estimation and Granger Causality Tests

Table 3 shows the PVAR(2) results. After controlling for lnPGDP and dFiscalRatio, growth in social security spending still boosts growth in social organizations. Specifically, the coefficient on the one-period lag is 0.094, weakly significant at the 10% level, while the coefficient on the two-period lag is 0.097, significant at the 5% level. In turn, growth in social organizations has a significantly positive impact on health service accessibility at the two-period lag (coefficient = 0.140, $p < 0.01$). Notably, growth in social security expenditure also shows a significant positive effect on health service accessibility (our proxy for health human capital formation) at the one-period lag (coefficient = 0.100, $p < 0.05$). These findings suggest that both factors contribute to the supply-side conditions for health human capital accumulation, but with different temporal patterns: the effect of social security expenditure materializes more quickly, while that of social organizations operates with a longer lag.

Table 3 Baseline Regression Results of the PVAR (2) Model

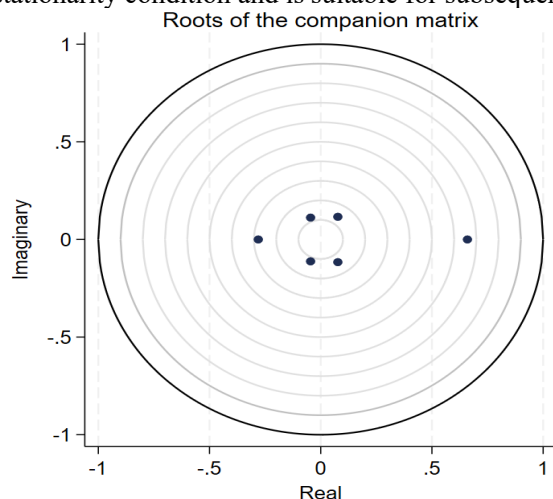
Equation	Variable	Coefficient	Robust Std. Error	P-value
$\Delta \ln \text{SocOrg}$	L1. $\Delta \ln \text{SecExp}$	0.094*	0.054	0.082
	L2. $\Delta \ln \text{SecExp}$	0.097**	0.042	0.022
	L1. $\Delta \ln \text{SocOrg}$	0.415***	0.09	0
$\Delta \ln \text{Service}$	L1. $\Delta \ln \text{SecExp}$	0.100**	0.039	0.01
	L2. $\Delta \ln \text{SocOrg}$	0.140***	0.049	0.004

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The model controls for $\ln \text{PGDP}$ and $d\text{FiscalRatio}$; their coefficients are omitted from the table. Estimation is performed using system GMM, with the instrumental variables comprising the first and second lags of each endogenous variable as well as the exogenous variables.

Further Granger causality tests indicate that growth in social security expenditure Granger-causes growth in social organizations ($p = 0.061$), while the reverse causality is not significant ($p = 0.792$). This suggests that the resource-empowerment pathway is robust, whereas the organization-driven efficiency pathway may be contingent on external contextual factors. In summary, Hypothesis H1 is supported: social security expenditure exerts a robust positive effect on the development of social organizations, confirming the resource-empowerment pathway. Hypothesis H2 is also supported: the reverse feedback effect from social organizations to social security expenditure does not emerge in the full sample, indicating that the organization-driven efficiency pathway is indeed conditional and institutionally dependent, consistent with theoretical expectations.

4.3 Impulse Response Analysis

Prior to conducting the impulse response analysis, we first tested the stability of the PVAR(2) model. As shown in Figure 1, all characteristic roots lie within the unit circle, indicating that the model satisfies the stationarity condition and is suitable for subsequent dynamic analysis.

**Figure 1** Roots of the Companion Matrix - Unit Circle Distribution

Given the confirmed stability of the model, we then proceed with impulse response analysis to trace the dynamic interactions among the variables. Table 4 reports the key numerical results.

Table 4 Cumulative Impulse Response Function Values

Period	D lnSecExp → D lnSocOrg	D lnSocOrg → D lnSecExp	D lnSecExp → D lnService	D lnSocOrg → D lnService
0	0.000	0.000	0.000	0.000
1	0.094	0.009	0.100	0.014
2	0.210	0.063	0.132	0.163
3	0.256	0.086	0.148	0.262
4	0.295	0.103	0.169	0.331
5	0.319	0.113	0.181	0.375
6	0.335	0.120	0.189	0.404

Note: This table reports cumulative impulse response function values. Period 0 represents the time of the shock, while periods 1 through 6 show the cumulative responses in each subsequent period. The underlying model is a differenced PVAR(2) estimated using forward orthogonal deviations and system GMM, with lnPGDP and dFiscalRatio included as controls.

The impulse response analysis reveals several key patterns. A shock to social security expenditure generates a steadily increasing empowerment effect on social organizations—the cumulative response rises from 0.094 in period 1 to 0.335 in period 6. In contrast, the feedback from social organizations to social security expenditure is considerably weaker, with a cumulative response of only 0.120 by period 6. The two factors also exhibit distinct temporal pathways in their effects on health service accessibility (our proxy for health human capital formation). Social security expenditure produces a short-term direct effect: the cumulative response reaches 0.100 in period 1 and increases to 0.189 by period 6. Social organizations, by contrast, display a stronger lagged promotional effect—the cumulative response is only 0.014 in period 1 but rises sharply to 0.163 in period 2 and reaches 0.404 by period 6. This temporal divergence supports Hypothesis H3. Additionally, improvements in health service accessibility yield an initial positive feedback effect on fiscal expenditure, with a cumulative response of 0.060 in period 1, after which the effect tends to stabilize.

4.4 Variance Decomposition

The variance decomposition results, presented in Table 5, quantify the relative contributions of each variable from a long-term perspective.

Table 5 Forecast Error Variance Decomposition Results (Period 10)

Variable	Contribution of D lnSecExp	Contribution of D lnSocOrg	Contribution of D lnService
D lnSecExp	99.65%	0.30%	0.05%
D lnSocOrg	3.98%	95.90%	0.12%
D lnService	3.21%	2.95%	93.84%

Note: The table entries represent the percentage contribution of each shock variable (columns) to the forecast error variance of each row variable. The decomposition is based on the differenced PVAR(2) model with a 10-period forecast horizon, by which point the contribution shares have effectively converged.

The results reveal several patterns. Fluctuations in social security expenditure are almost entirely explained by their own lagged values (99.65%), indicating strong path dependence. For social organizations, their own shocks account for 95.90% of their forecast error variance, while social security expenditure contributes 3.98%. In the case of health service accessibility, its own lagged terms explain 93.84% of its variance, with social security expenditure and social organizations jointly accounting for approximately 6.16%. This suggests that, after controlling for macroeconomic and fiscal factors, the direct explanatory power of the two policy variables on health service accessibility—while still modest—is enhanced relative to the baseline model.

4.5 Regional Heterogeneity Analysis

To test Hypothesis H4, we split the full sample into three subsamples—East, Central, and West—and estimated separate differenced PVAR(2) models for each region. Table 6 summarizes the results of the regional heterogeneity analysis.

Table 6 Summary of Regional Heterogeneity Analysis

Analytical Dimension	Specific Indicator / Variable Relationship	Eastern Region	Central Region	Western Region
Granger Causality	Social Security Expenditure→Social Organizations	0.0526*	0.3914	0.0206**
	Social Organizations→Social Security Expenditure	0.4063	0.2659	0.967
	Social Security Expenditure→Social Organizations	0.198	-0.45	0.286
Impulse Response (Cumulative by Period 2)	Social Organizations→Social Security Expenditure	-0.078	0.297	0.027
	Social Security Expenditure→Health Service Accessibility	0.154	0.779	0.088
	Social Organizations→Health Service Accessibility	0.479	0.093	0.031
	Contribution of D_InSocOrg to Fluctuation in D_InSecExp	0.80%	4.54%	0.12%
Variance Decomposition (Period 10)	Contribution of D_InSecExp to Fluctuation in D_InSocOrg	7.70%	20.74%	8.03%
	Own Contribution of D_InSocOrg	90.76%	78.82%	89.48%
	Contribution of D_InSecExp to Fluctuation in D_InService	3.48%	32.59%	3.54%
	Contribution of D_InSocOrg to Fluctuation in D_InService	10.13%	3.51%	4.60%

Note: Granger causality results are reported as p-values, with * $p < 0.1$ and ** $p < 0.05$. Impulse response values represent the cumulative response over the first two periods (period 1 + period 2). Variance decomposition values indicate the percentage contribution of each variable to the forecast error variance at the 10-period horizon.

The regional heterogeneity analysis reveals pronounced differences in the relationships among social security expenditure, social organizations, and health service accessibility across the three regions, thereby confirming Hypothesis H4.

In the "security expenditure → social organizations" pathway, the eastern and western regions exhibit positive promotional effects ($p = 0.0526$ and $p = 0.0206$, respectively), while the central region shows no significant Granger causality ($p = 0.3914$) and a negative impulse response (-0.450), suggesting possible resource competition in the central region. The reverse pathway—"social organizations → security expenditure"—is not statistically significant in any region, indicating generally weak feedback effects across all areas.

Turning to health service accessibility, the contribution of social organizations is most pronounced in the eastern region (cumulative response = 0.479, variance contribution = 10.13%), followed by the central region (0.093 and 3.51%), and weakest in the western region (0.031 and 4.60%). Conversely, the direct effect of social security expenditure on health service accessibility is strongest in the central region (cumulative response = 0.779, variance contribution = 32.59%), far exceeding the eastern (3.48%) and western (3.54%) regions, reflecting a pattern of fiscal dominance.

The variance decomposition results provide further insights. In the central region, social organization development is highly dependent on public finance, with social security expenditure contributing 20.74% to its forecast error variance. In the eastern region, social organizations exhibit strong own inertia (90.76%) and make a substantial contribution to health service accessibility, demonstrating "initial potential for bilateral synergy." In the western region, social organizations also display strong autonomy (own inertia = 89.48%), but their contribution to health service accessibility—together with that

of social security expenditure—remains limited (8.14% in total), reflecting a pattern of "organizational autonomy but insufficient synergy."

In summary, the relationships among the three variables exhibit a distinct regional heterogeneous pattern: the eastern region shows nascent synergy with prominent social organization empowerment; the central region is characterized by fiscal dominance with significant direct effects of security expenditure; and the western region displays organizational autonomy but weak synergy. These patterns reflect deeper institutional contexts. The east's nascent synergy stems from its mature market economy, strong fiscal capacity, and long-standing government–nonprofit collaboration. The central region's fiscal dominance likely comes from heavy reliance on central transfers and a weaker social organization sector, so public spending there directly fills the gap left by limited organizational capacity. The west shows organizational autonomy but weak synergy, which may result from limited fiscal resources and geographic barriers that hinder the scaling up of social organizations. Together, these findings provide strong support for Hypothesis H4 and highlight the need for regionally tailored policies.

4.6 Robustness Checks

To ensure the reliability of our findings, we conducted a series of robustness tests examining three dimensions: lag order specification, inclusion of control variables, and sample selection. Table 7 summarizes the results.

Table 7 Robustness Checks—Granger Causality Test Results under Alternative Specifications

Test Category	Test Method	Security Exp. → Social Org.	Social Org. → Security Exp.	Explanation
Lag Order	PVAR (1)	0.495	0.445	Not significant in short-term model
	PVAR (2) (Baseline)	0.061*	0.792	Medium-term model; Security Exp. → Social Org. marginally significant at 10% level
	PVAR (3)	0.052*	0.278	Long-term model, Security Exp. → Social Org. is significant at 10% level
Control Variables	No control variables	0.000***	0.028*	Both directions significant without controls
	Per Capita GDP (lnPGDP)	0.051*	0.926	After adding lnPGDP, Security Exp. → Social Org. remains marginally significant
	Per Capita GDP+Livelihood Exp. Ratio (Baseline)	0.061*	0.792	Conclusions hold; Social Org. → Security Exp. remains insignificant across specifications

Note: The table reports p-values from joint Granger causality tests, with *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Sample sizes vary across tests depending on data availability. The baseline model uses two lags and includes lnPGDP and dFiscalRatio as controls.

The robustness checks confirm that the positive effect of social security expenditure on social organizations remains relatively stable across different lag structures, achieving statistical significance at the 10% level in both the PVAR(2) and PVAR(3) specifications. In contrast, the reverse feedback effect from social organizations to social security expenditure is significant only when macroeconomic controls are omitted; it becomes insignificant once lnPGDP and other controls are included. This pattern suggests that the apparent feedback effect may be driven by common factors, such as the level of economic development, rather than by social organizations per se.

These results reinforce our core conclusion: after accounting for macroeconomic conditions, the resource-empowerment pathway exhibits independent and robust predictive power, whereas the organization-driven efficiency pathway appears contingent on specific institutional conditions or may require a longer time horizon to materialize. This finding further corroborates the theoretical expectation regarding the conditionality of Hypothesis H2.

5. Conclusions and Policy Implications

5.1 Summary of Research Results

Based on provincial panel data from 2008 to 2023, this study empirically examines the dynamic synergy between social security expenditure and social organization development, as well as their joint impact on health human capital, using a PVAR model. The main findings are summarized below.

First, the resource-empowerment pathway is robust, whereas the organization-driven efficiency pathway is conditional. Social security expenditure exerts a consistently positive, unidirectional effect on social organizations, confirming Hypothesis H1. However, the reverse feedback effect from social organizations to social security expenditure becomes insignificant after controlling for macroeconomic factors, indicating that this pathway depends on specific institutional environments and organizational capabilities, thereby supporting Hypothesis H2.

Second, the two factors influence health human capital formation through distinct temporal pathways. Social security expenditure produces a short-term direct effect on health service accessibility (one-period lag), while social organizations exhibit a significant lagged promotional effect (two-period lag), with the cumulative effect strengthening over time. These findings validate Hypothesis H3.

Third, the synergy effects exhibit marked regional heterogeneity. The eastern region demonstrates "initial potential for bilateral synergy," with social organizations contributing prominently to health human capital. The central region is characterized by "fiscal dominance," where social security expenditure exerts a strong direct effect. The western region displays "organizational autonomy," but the synergistic effect of the two factors has yet to fully materialize. These patterns confirm Hypothesis H4.

5.2 Theoretical Contributions

The theoretical contributions of this study are threefold. First, by integrating perspectives from labor economics, public finance, and organizational sociology, it develops an analytical framework linking hard resources, soft environment, and health human capital. This framework bridges the conventional divide between state-centered and society-centered approaches, situating them within a systemic dynamic relationship. Second, by distinguishing between the resource-empowerment and organization-driven efficiency pathways, the study reveals their differing conditions of operation—the former is robust and generalizable, while the latter is institutionally dependent. This distinction offers a more nuanced theoretical lens for understanding government–society relations. Third, the study identifies temporal differences in how social security expenditure and social organizations affect health human capital formation, as well as three distinct regional synergy models (East, Central, and West), thereby enriching the spatiotemporal dimensions of social policy research.

5.3 Policy Implications

Based on these findings, the following policy recommendations are proposed to enhance the effectiveness of the Investing in People strategy.

At the national level, efforts should focus on consolidating the resource-empowerment pathway while creating conditions conducive to the organization-driven efficiency pathway. This can be achieved by establishing specialized funds linked to social organization development and building coordination mechanisms among civil affairs, finance, and health departments. Promoting government procurement of services can help stabilize organizational expectations. Simultaneously, a dynamic evaluation mechanism should be established to assess both the use of fiscal funds and the performance of social organizations, thereby gradually cultivating the institutional conditions and organizational capabilities required for the reverse feedback pathway to emerge.

In the eastern region, the policy focus should shift from "resource support" to "empowering participation." Deepening administrative reforms to expand the participation of social organizations in public service planning will help fully leverage their efficiency in health human capital provision. Given that social organizations in this region rank first in their variance contribution to health service accessibility, such efforts can help translate "bilateral synergy" from potential into reality.

In the central region, while maintaining necessary fiscal inputs, greater attention should be paid to cultivating the professional capabilities and autonomy of social organizations. Policymakers should avoid overlooking their long-term value due to the prominence of the direct effect of social security expenditure. A phased cultivation plan is recommended: project subsidies during the start-up phase, comprehensive

funding during the growth phase, and encouragement of participation in policy consultation during the mature phase.

In the western region, a dual emphasis on "resource downward delivery" and "endogenous cultivation" is essential. Increasing transfer payments and establishing direct fund delivery mechanisms can support rural-oriented social organizations. East–West twinning assistance programs can help transfer developmental experience. At the same time, it is important to respect the region's organizational autonomy characteristic and avoid excessive intervention that might stifle endogenous momentum.

5.4 Limitations and Future Research

This study has several limitations. First, the measurement of health human capital formation relies solely on supply-side proxy indicators (number of health institutions per capita) and does not capture residents' health outcomes—such as life expectancy or self-rated health—or demand-side factors. This may underestimate the full impact of the policy tools examined. Second, the PVAR model reveals dynamic correlations well, but it cannot fully isolate endogeneity. Potential omitted variables, reverse causality, and measurement errors remain concerns. Unobserved factors—such as local political will, historical legacies, or cultural attitudes toward social organizations—may jointly shape fiscal expenditure, organizational growth, and health outcomes. Also, the dynamic panel GMM estimator addresses some endogeneity, but it relies on internal instruments that may be weak in the presence of persistent shocks. Causal identification ultimately requires more rigorous methods. Instrumental variable approaches, difference-in-differences, or regression discontinuity designs could help uncover deeper causal mechanisms beyond the dynamic correlations shown here.

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