The Influence of Social Networks on Household Income: Based on the Analysis of CHNS Microscopic Investigation Data

Xiao Zheng

State Information Center, Xicheng District, No. 58 Sanlihe Road, Beijing, China

Abstract: This article uses the CHNS microscopic investigation data in 1989-2011, for the influence of social networks on household income to do the empirical analysis. Results show that a family social network significantly increase the family income level, especially the non-agricultural income families. This paper is also divided into urban households and rural households, the results show that compared to urban families, social network has a greater influence on rural family income. In addition, the results show that as to raise level of marketization, the level of economic development level, social services, and the impact of social networks on household income will decrease.

Key words: The Social Network; Relationship; Household Income

Social networks significantly influence economic development by enhancing and coordinating economic activities, thus elevating the level of economic progress (Putnam, 1993). Social networks equip families with vital resources such as information, financing, material capital, and technical expertise. In the realm of employment, they facilitate the dissemination of job opportunities and promote an optimal match between labor forces and job vacancies, aiding job seekers in securing better positions. Regarding financing, social networks effectively mitigate the asymmetry of information in financial markets and serve as an implicit collateral mechanism (Montgomery, 1991), which alleviates financing constraints for families and boosts their opportunities for entrepreneurship and investment. This study utilizes CHNS data to develop an empirical model that examines the impact of social networks on family income

1. Econometric Model Construction

1.1 Research Hypotheses

Hypothesis 1: Family social networks can significantly enhance family income levels. Families engaged in non-agricultural production, such as business operations, have higher financing needs compared to agricultural production, which requires more material capital and information resources. Therefore, non-agricultural income relies more heavily on social networks based on kinship, friendship, and local ties, making the impact of social networks on non-agricultural income greater than on agricultural income.

Hypothesis 2: Urban areas, with their more developed financial markets and social service systems, can meet families' needs for financing and information resources (Putnam, 1993) through the market. In contrast, due to lower levels of market development, rural families are more dependent on social networks for financing.

Hypothesis 3: Relative to urban family income, rural family income is more sensitive to social networks.

1.2 Development of the Econometric Model

To examine the impact of social networks on family income, the dependent variable is the income of each family, while the independent variable is the social network of each family. Additionally, the model controls for family characteristics and characteristics of the household head. The basic econometric equation is as follows:

$$Y_{i,t} = \alpha_i + \gamma_t + \beta_1 SNW_{i,t-1} + \beta_2 Gender_i + \beta_3 Age_i + \beta_4 Marriage_{i,t} + \beta_5 Edu_{i,t} + \beta_6 Minority_i + \beta_7 Size_{i,t} + \mu_{it}$$

In the model, subscript i represents the family, and t denotes time; $Y_{i,t}$ is the income of family i in year t; α_i represents unobservable individual effects, aimed at controlling for individual fixed effects; γ_t is an unobservable time effect, a variable that remains constant across different families and

explains all time-related effects not included in the regression model; $SNW_{i,t-1}$ measures the social network of family i in year t-1; Gender, Age, Marriage, Education, Minority represent the personal characteristics of the household head; Size indicates the size of the family population; μ_{it} is the random error term.

1.2 Definitions of Variables
Dependent variable: Family income $Y_{i,t}$. This study uses various metrics to measure family income, including total net income, business income, agricultural income, livestock income, and other incomes, to examine the impact of social networks on different types of income.
Independent variable, Social Network $SNW_{i,t-1}$.

This study selects "expenditures on family holidays and special occasions in cash or in-kind" as the variable representing family social networks.
Control variables. This study selects variables that reflect the characteristics of the household head and the family as control variables, including the gender, age, marital status, educational background, ethnicity, and family population size of the household head.

The data used in this study to measure social networks and family income are sourced from the China Health and Nutrition Survey (CHNS) provided by the Carolina Population Center at the University of North Carolina. The dataset covers the years 1989 to 2011 and includes collection sites in Beijing, Liaoning, Heilongjiang, Shanghai, Jiangsu, and other provinces and regions.

2. Econometric Results and Analysis

2.1 Results and Analysis of Different Model Estimates
Table 1 presents the empirical results of the impact of social networks on family income, estimated using different methods. Columns 1-6 utilize the logarithmic values of total net family income, with the estimation results as shown in Table 1.

Table 1. Model Estimation Results

		Household income					
		（1）	（2）	（3）	（4）	（5）	（6）
		POLS	FE	RE	POLS	FE	RE
Family Social Network		0.0423*** (20.07)	0.0273*** (13.57)	0.0396*** (20.83)	0.0775*** (30.51)	0.0324*** (12.97)	0.0423*** (19.46)
Household Head Characteristics	Gender				0.196*** (8.43)	0.0950** (2.48)	0.120*** (5.1)
	Age				0.0373*** (7.55)	0.00453 (0.37)	0.0347*** (6.79)
	Age Squared				-0.0287*** (-8.07)	-8.6E-07 (-0.00)	-0.0214*** (-5.81)
	Marital Status				0.0813*** (3.05)	0.126*** (4)	0.235*** (9.56)
	Years of Education				0.238*** (36.77)	0.0784*** (5.03)	0.209*** (29.96)
	Ethnicity				-0.237*** (-10.43)	-0.0238 (-0.48)	-0.149*** (-6.02)
Family Population Size					0.0596*** (11.17)	0.157*** (23.01)	0.148*** (28.64)
Constant Term		9.250*** (997.92)	7.986*** (476.5)	7.961*** (445.99)	6.407*** (37.7)	6.827*** (15.5)	5.321*** (29.95)
Time Effects		-	Yes	Yes	-	Yes	Yes
Individual Effects		-	Yes	Yes	-	Yes	Yes
Observations		35083	35083	35083	18985	18985	18985
Fitted R²		0.0113	0.5737	0.362	0.159	0.5430	0.332
F-Value		402.6	1690.9	-	450.4	485.9	-

Note: *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively (same below); the parameter estimates are followed by their t-values (same below). Columns 3 and 6 display the

between-group R-squared.

Columns 1-3 show the initial regression results without control variables, estimated using Mixed OLS, Fixed Effects, and Random Effects models, respectively. The results indicate that the coefficient of social networks on family income is significantly positive at the 1% level, suggesting that a 1% increase in family social networks leads to a respective increase in family income of 0.0423%, 0.0273%, and 0.0396%.

Columns 4-6 incorporate variables related to the characteristics of the household head and family, and are estimated using Mixed OLS, Fixed Effects, and Random Effects models, respectively. The results show that the coefficients of social networks on family income are 0.0775, 0.0324, and 0.0423, respectively, and are significantly positive at the 1% level. From Column 4, it can be seen that the gender of the household head has a significantly positive coefficient on family income at the 1% level, indicating that when the household head is male, family income increases by 1.217% ($e^{0.1960}$%); the age of the household head has a significantly positive coefficient at the 1% level, meaning that for every additional year of the household head's age, family income increases by 0.0373%. However, the coefficient of the square of the household head's age is significantly negative at the 1% level, indicating that for every unit increase in the square of the age, family income decreases by 0.0287%, suggesting an inverted U-shaped relationship between the household head's age and family income—initially, an increase in age raises family income, but beyond a certain point, it decreases; the marital status of the household head has a coefficient of 0.0813, significantly positive at the 1% level, indicating that when the household head is married, family income increases by 2.254% ($e^{0.0813}$%); the years of education of the household head have a significantly positive effect at the 1% level, indicating that each additional year of education increases family income by 0.238%; the coefficient for family size is 0.0596, significantly positive at the 1%

level, showing that for each additional family member, family income increases by 1.061% ($e^{0.05960}$%).

Columns 5-6, which analyze using Fixed Effects and Random Effects models, respectively, have yielded similar results. Social networks have been shown to increase family income levels, thus confirming Hypothesis 1.

In Column 5, where time effects and individual effects were controlled for, the results show that the coefficient for the gender of the household head is 0.0586, which did not pass the significance level test; the coefficient for the age of the household head is significantly positive at the 5% level, at 0.00515; the coefficient for the marital status of the household head is 0.116, significantly positive at the 1% level, indicating that when the household head is married, family income increases by 1.123% ($e^{0.116}$%); the coefficient for the years of education of the household head is significantly positive at the 1% level, indicating that each additional year of education increases family income by 0.064%; the coefficient for family size is 0.14, significantly positive at the 1% level, showing that each additional family member increases family income by 1.15% ($e^{0.14}$%). The adjusted R-squared of the model is 0.5472, indicating an ideal fit of the model, and suggesting that social networks can well explain the variation in family income. The Random Effects model also yielded similar estimation results, albeit with larger coefficients. These results confirm Hypothesis 1, that social networks enhance the level of family income.

2.2 Estimation Results and Analysis for Different Types of Family Income

To analyze whether social networks have different impacts on various types of family income, this study categorizes family income into total net income, business income, agricultural income, livestock income, and other incomes, and conducts empirical analyses for each category.

Table 2. Estimation Results Based on Different Types of Family Income

Variable Name	（1）Total Net Family Income	（2）Family Business Income	（3）Family Agricultural Income	（4）Family Livestock Income	（5）Family Other Income

Family Social Network		0.0423***	0.0197***	0.00800**	0.00411	0.0357***
		(19.46)	(3.83)	(2.36)	(0.99)	(9.79)
Household Head Characteristics	Gender	0.120***	0.044	-0.150***	-0.0296	0.341***
		(5.1)	(0.82)	(-3.34)	(-0.56)	(8.61)
	Age	0.0347***	-0.0395***	0.0303***	0.0456***	0.0331***
		(6.79)	(-3.44)	(3.68)	(4.25)	(3.64)
	Age Squared	-0.0214***	0.0268***	-0.0223***	-0.0370***	-0.0129**
		(-5.81)	(3.16)	(-3.65)	(-4.73)	(-1.98)
	Marital Status	0.235***	0.0414	0.0971**	0.113**	0.197***
		(9.56)	(0.72)	(2.42)	(2.27)	(4.77)
	Years of Education	0.209***	0.0604***	-0.00999	-0.0334*	0.360***
		(29.96)	(3.49)	(-0.72)	(-1.87)	(29.76)
	Ethnicity	-0.149***	-0.0564	0.0433	-0.0918**	-0.269***
		(-6.02)	(-1.16)	(1.28)	(-2.07)	(-6.01)
Family Population Size		0.148***	0.0521***	0.104***	0.0898***	0.131***
		(28.64)	(4.49)	(14.01)	(9.52)	(14.88)
Constant Term		5.321***	8.065***	5.281***	4.627***	4.155***
		(29.95)	(20.32)	(18.72)	(12.47)	(13.11)
Time Effects		Yes	Yes	Yes	Yes	Yes
Individual Effects		Yes	Yes	Yes	Yes	Yes
Observations		18985	3580	8895	9625	14871
Fitted R²		0.332	0.401	0.311	0.128	0.218

Note: All family income and social network data were logarithmically transformed; a random effects model was used, controlling for time effects and individual effects.

The results show that the coefficients of social networks on total net family income, business income, agricultural income, livestock income, and other income are 0.0423, 0.0197, 0.008, 0.00411, and 0.0357, respectively. The coefficients for total family income, business income, and other income are significant at the 1% level, agricultural income is significant at the 5% level, while livestock income did not pass the significance test. It can be observed that the impact of family social networks on family business income is significantly greater than on agricultural and livestock income. Given that capital, information, and networking are crucial for family business operations, family social networks can provide informal financing and information resources, significantly enhancing family income, making family business income more sensitive to social networks. This finding supports Hypothesis Two, that social networks have a greater impact on non-agricultural income compared to agricultural income.

2.3 Estimation Results Based on Urban-Rural Differences

To examine the urban-rural differences in the impact of social networks on family income, this study categorizes all sample data into rural families and urban families, conducting empirical analyses for each group separately.

Table 3: Urban-Rural Differences in the Impact of Social Networks on Family Income

Variable Name		Total Family Income					
		（1）	（2）	（3）	（4）	（5）	（6）
		POLS		FE		RE	
		Urban	Rural	Urban	Rural	Urban	Rural
Family Social Network		0.0751***	0.0799***	0.0310***	0.0349***	0.0427***	0.0442***
		(18.87)	(25.06)	(7.89)	(10.99)	(12.76)	(16.03)
Household Head	Gender	0.0664**	0.167***	0.043	0.114**	0.0471	0.0781**
		(2.02)	(5.24)	(0.78)	(2.22)	(1.46)	(2.41)

Character istics	Age	0.0421***	0.0373***	0.0289	0.00211	0.0327***	0.0393***
		(5.34)	(6)	(1.52)	(0.13)	(4.14)	(6.12)
	Age Squared	-0.0317***	-0.0314***	-0.0148	0.00315	-0.0193***	-0.0277***
		(-5.67)	(-6.94)	(-1.14)	(0.27)	(-3.45)	(-5.90)
	Marital Status	0.0395	0.0386	0.181***	0.0665*	0.251***	0.175***
		(0.94)	(1.15)	(3.63)	(1.66)	(6.65)	(5.6)
	Years of Education	0.182***	0.227***	0.0891***	0.0715***	0.166***	0.190***
		(20.33)	(24.5)	(3.92)	(3.44)	(17.47)	(19.3)
	Ethnicity	-0.392***	-0.153***	0.0174	0.0189	-0.179***	-0.109***
		(-9.49)	(-5.72)	(0.22)	(0.31)	(-4.15)	(-3.78)
Family Population Size		0.0819***	0.0659***	0.188***	0.144***	0.183***	0.143***
		(8.72)	(10.29)	(14.9)	(17.74)	(20.26)	(23.24)
Constant Term		6.722***	6.440***	6.048***	7.057***	5.701***	5.257***
		(24.34)	(30.17)	(8.68)	(12.44)	(20.38)	(23.67)
Time Effects		-	-	Yes	Yes	Yes	Yes
Individual Effects		-	-	Yes	Yes	Yes	Yes
Observations		6309	12608	6309	12608	6309	12608
Fitted R²		0.174	0.148	0.5700	0.5122	0.328	0.344
F-Value		166.8	275.5	149.1	346.9	-	-

Note: 1. Columns 1 and 2 employ the results of the Pooled OLS estimation model, columns 3 and 4 use the Fixed Effects model, and columns 5 and 6 use the Random Effects model.
2. Columns 1, 3, and 5 present estimation results for urban areas, while columns 2, 4, and 6 present results for rural areas.

Table 3 shows the empirical results based on urban and rural families. The results indicate that, regardless of using Pooled OLS, Fixed Effects, or Random Effects models, the coefficients of the family social network variable are significantly positive at the 1% level, with the coefficients for rural areas being higher than those for urban areas. This suggests that social networks can significantly enhance family income, and rural family income is more sensitive to social networks. This is primarily due to the following reasons: First, rural families rely more on informal finance. Financial development in rural areas is severely behind that in urban areas, and compared to urban families, rural families have more difficulty accessing formal financial resources, making them more dependent on informal financing. Second, the level of marketization and social service provision in rural areas is lower. If rural families choose to start businesses or engage in economic activities, the resources needed are hard to obtain through the market and rely more on kinship and friendship networks based on blood, marital, and geographical ties. Therefore, compared to urban family income, rural family income is more sensitive to social networks, validating Hypothesis Three.

3. Robustness Check

3.1 Estimation Results of Different Measurement Indicators

To test the robustness of the results, this paper re-measures social networks using "family cash or in-kind income received from friends and relatives".

Table 4: Estimation Results of Different Measurement Indicators

Variable Name		（1）Total Family Net Income	（2）Family Business Income	（3）Family Agricultural Income	（4）Family Livestock Income	（5）Family Other Income
Family Social Network		0.0279***	0.0712	0.0226***	0.0125	0.0208
		(6.49)	(0.7)	(-3.09)	(-1.43)	(-0.32)
Characteristics of the Household	Gender	0.113***	0.0438	-0.148***	-0.0291	0.331***
		(4.73)	(0.81)	(-3.29)	(-0.55)	(8.32)
	Age	0.0367***	-0.0397***	0.0308***	0.0459***	0.0350***

Head		(7.06)	(-3.44)	(3.74)	(4.28)	(3.84)
	Age Squared	-0.0235***	0.0268***	-0.0227***	-0.0372***	-0.0149**
		(-6.28)	(3.14)	(-3.72)	(-4.76)	(-2.28)
	Marital Status	0.252***	0.0473	0.102**	0.115**	0.211***
		(10.17)	(0.82)	(2.54)	(2.32)	(5.08)
	Years of Education	0.216***	0.0624***	-0.00912	-0.0329*	0.366***
		(30.49)	(3.6)	(-0.65)	(-1.84)	(30.13)
	Ethnicity	-0.133***	-0.0432	0.0465	-0.0904**	-0.257***
		(-5.30)	(-0.88)	(1.38)	(-2.05)	(-5.70)
Household Size		0.156***	0.0549***	0.106***	0.0904***	0.138***
		(29.97)	(4.73)	(14.25)	(9.61)	(15.73)
Constant Term		5.387***	8.127***	5.280***	4.627***	4.210***
		(29.85)	(20.43)	(18.73)	(12.48)	(13.2)
Time Effect		Yes	Yes	Yes	Yes	Yes
Individual Effect		Yes	Yes	Yes	Yes	Yes
Observations		18985	3580	8895	9625	14871
Fitted R^2		0.325	0.4	0.312	0.128	0.215

From Table 4, it is evident that the coefficients of social networks on total family income, family business income, family agricultural income, family livestock income, and family other income are positive, with the coefficients for family business income being relatively higher compared to agricultural and livestock income. This indicates that family social networks can enhance the level of family income and that non-agricultural income is more sensitive to social networks compared to agricultural income. Using another indicator to measure family social networks also yielded conclusions similar to those previously discussed, confirming that the results are robust.

3.2 Estimation Results for Different Levels of Marketization, Economic Development, and Social Services

To test whether social networks might have different impacts on family income due to varying levels of marketization, economic development, and social services, this paper categorizes families based on the level of marketization, economic development, and social services in their region into three groups: high, medium, and low. Empirical analyses are conducted for each group to further test the robustness of the results.

Table 5: Estimation Results for Different Levels of Marketization, Economic Development, and Social Service

Variable Name		Family Income								
		Marketization Level			Economic Development Level			Level of Social Services		
		（1）	（2）	（3）	（4）	（5）	（6）	（7）	（8）	（9）
		Low	Medium	High	Low	Medium	High	Low	Medium	High
Family Social Network		0.0453***	0.0443***	0.0373***	0.0441***	0.0407***	0.0380***	0.0509***	0.0436***	0.0334***
		(11.19)	(11.96)	(10.8)	(11.3)	(11.09)	(10.94)	(13.07)	(11.66)	(9.37)
Characteristics of the Household Head	Gender	0.000326	0.169***	-0.0179	0.109**	0.0977**	-0.0525	0.134***	0.0872**	0.0123
		(0.01)	(4.14)	(-0.54)	(2.24)	(2.44)	(-1.52)	(2.86)	(2.12)	(0.33)
	Age	0.0565***	0.0345***	0.0300***	0.0447***	0.0266***	0.0384***	0.0262***	0.0326***	0.0400***
		(6.18)	(3.96)	(3.55)	(5.13)	(3)	(4.49)	(2.98)	(3.67)	(4.43)
	Age Squared	-0.0438***	-0.0199***	-0.0201***	-0.0352***	-0.0175***	-0.0259***	-0.0180***	-0.0189**	-0.0274***
		(-6.47)	(-3.20)	(-3.33)	(-5.46)	(-2.76)	(-4.25)	(-2.82)	(-2.96)	(-4.23)
	Marital Status	0.130***	0.291***	0.209***	0.152***	0.195***	0.288***	0.237***	0.202***	0.233***
		(2.76)	(6.86)	(5.56)	(3.42)	(4.66)	(7.5)	(5.46)	(4.68)	(5.78)
	Years of Education	0.146***	0.179***	0.190***	0.118***	0.164***	0.156***	0.133***	0.196***	0.188***
		(9.24)	(15.09)	(18.3)	(7.68)	(12.29)	(15.08)	(8.79)	(15.04)	(17.34)
	Ethnicity	-0.0950**	-0.196***	-0.0984**	-0.0863**	-0.0208	-0.0455	-0.0852**	-0.146***	-0.023

		(-2.43)	(-4.18)	(-2.41)	(-2.53)	(-0.45)	(-0.92)	(-2.47)	(-2.88)	(-0.43)
Family Size		0.131***	0.162***	0.170***	0.144***	0.157***	0.209***	0.146***	0.146***	0.189***
		(14.7)	(17.81)	(19.83)	(16.93)	(18.29)	(21.85)	(17.1)	(16.61)	(19.28)
Constant Term		4.910***	5.248***	5.927***	5.151***	5.790***	5.635***	5.630***	5.335***	5.561***
		(15.56)	(17.17)	(20.15)	(17.28)	(18.61)	(18.76)	(18.28)	(17.17)	(17.71)
Time Effect		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Effect		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		6284	6416	6285	6550	6748	5687	6749	6452	5784
Fitted R²		0.362	0.33	0.315	0.35	0.335	0.332	0.346	0.353	0.316

Note: 1. Columns 1-3 present estimated results based on the level of marketization in different regions, arranged from low to high. Columns 4-6 analyze results based on varying levels of economic development. Columns 7-9 estimate results based on differing levels of social service provision, also arranged from low to high.

2. The estimates were conducted using a random effects model, controlling for time and individual effects.

The results in Table 5 indicate that the explanatory coefficient of family social networks on family income is significantly positive at the 1% level, suggesting that social networks significantly enhance family income. As seen in columns 1-3, the estimated coefficients for family social networks on income, arranged from low to high marketization levels, are 0.0453, 0.0443, and 0.0373, respectively, showing a decreasing trend. This indicates that the influence of social networks on family income diminishes as marketization levels increase. In regions with higher marketization, families do not need to rely on networks based on kinship, friendship, or locality to obtain necessary resources such as funding and information through markets. Conversely, in regions with lower marketization levels, families tend to depend more on social networks. Therefore, the lower the level of marketization, the more families rely on social networks, making family income more sensitive to social network influences.

From columns 4-6, it can be seen that the estimated coefficients for family social networks on family income, based on different levels of economic development, are 0.0441, 0.0407, and 0.038, respectively, showing a decreasing trend. This indicates that the impact of social networks on family income diminishes as economic development levels increase. In regions with higher economic development, financial systems and infrastructure are better established, allowing families to more easily obtain loans and other financial resources through markets. As a result, families in economically developed areas rely less on social networks, leading to a lower sensitivity of family income to social network influences.

From columns 7-9, it is evident that the estimated coefficients for family social networks on family income, arranged from low to high levels of social service provision, are 0.0509, 0.0436, and 0.0334, respectively, indicating a decreasing trend. This suggests that the influence of social networks on family income decreases as the level of social services increases. In areas with higher levels of social services, family members have greater access to employment, entrepreneurship, and business activities, utilizing the social service system more effectively. Conversely, in areas with lower levels of social services, families lack this support and must rely on social networks. Therefore, as the level of social services improves, family income becomes less sensitive to social network influences.

These results are consistent with previous analyses, indicating that the conclusions of this study are robust.

4. Main Research Conclusions

This study utilizes micro-survey data from the 1CHNS to empirically analyze the impact of social networks on family income, leading to the following conclusions:

Firstly, Significant Influence of Social Networks: Social networks can significantly enhance family income, particularly non-farm income. The presence of family social networks provides essential resources for non-farm production, including informal financing, information, and connections, making non-farm income more sensitive to social networks.

Secondly, Greater Impact on Rural Families: Compared to urban families, social networks have a more pronounced effect on rural family income. This is due to lower levels of financial development and marketization in rural areas,

leading rural households to rely more heavily on social networks.

Thirdly, Diminishing Impact with Development: As levels of marketization, economic development, and social service provision increase, the influence of social networks on family income diminishes.

References

[1] Karlan, D. , Social Connections and Group Banking [J]. Economic Journal，2007(117), 52-84.

[2] Montgomery ，D. ，Social Networks and Labor Market Outcomes: Toward an Economic Analysis [J]. American Economic Review, 1991, 81(5), 1408-1418.

[3] Putnam R., R. Leonardi and R. Nanetti. MakingDemocracy Working: Civic Tradition and Modern Italy [J]. Princeton:Princeton University Press, 1993.