The Determination of Household Portfolio Selection in China—Based on the Regionsl Heterogeneity

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Abstract

Due to the rapid growth in household financial market within China, relevant studies in determinations of financial portfolio have appealed to numerous Chinese scholars. Given that the economic heterogeneity exists among different geographical locations, the study here focuses on general determinations affecting the household financial asset selection of families from the East, Midland and the West. Next, based on related statistics analysis, the general version of SEM model is constructed and adjusted in accordance to significant heterogeneities among these regions. Through empirical analysis, the modified model commits to considerable degree of fitness substantially. Based on numeric results coming from the empirical study, the significance of hypothetical variables vary from single specific region to another. However, economic factors always play an important role in household's financial decision-making. In addition, the research provides evidence that residents in Midland and the West prefer to risk-free assets investment instead of risky assets. Finally, there is an obvious crowding effect between real estate and financial asset investment in western household's portfolio.

Keywords

Determination of Portfolio, Household, China, SEM.

1. Introduction

With the rapid development in Chinese financial market, the aggregate financial assets have been increased in volume and in growth rate as well. According to China Household Finance Survey, the value of financial asset per capita ascended from 73,000 Chinese Yuan to 122,200 Chinese Yuan from 2013 to 2015 respectively, increasing by 67.40%. Household investors have been aware of the problem of under-diversification of their financial assets gradually, leading to the diversification of family financial asset. Under such tendency being observed in household financial portfolio, families construct various portfolios because of individual's characteristics and diversified financial objectives. During the process of portfolio establishment, plenty of determinations make the difference on the financial decision. But which influential factors contribute more to the financial asset structure and how these factors impact on household's decision-making? These questions have drawn attention of individual investors, financial asset managers, scholars in the domain of finance and the policy maker.

In foreign jurisdictions, researches associated to the topic have been conducted since 1950s. And researchers summarize their study production and propose abundant theories to explain their findings. Beginning from the mean-variance model(Markowitz, 1952),Markowitz, Tobin and Sharp believe that the difference of asset selection relies on the various risk aversions of the family. The household investors make decisions between risk-free assets and risky assets. More factors are introduced later. Luigi Guiso and Jappelli (2000) find that age, wealth, the liquidity of asset and the education influences the selection of financial assets significantly. Graham, Campbell and Huang (2005) finds that overconfident investors have more frequent trading records and their portfolios are more internationally diversified. Also, they find that male investors are more overconfident than females, and so as Investors with higher education are more overconfident as well, which shows the

importance of gender and education. Later, Jeffery (2010) finds that the individual's social capital has a long-termed continuous impact on the individual's financial decision making.

Compared with their overseas counterpart, Chinese scholars study household's financial asset selection and allocation according to the reality within China. Wei Xianhua, Zhang Yueyan, Wu Weixing and Xiao Shuai (2012) add the parameter self-perception and use the SEM model to study how different factors impact the asset allocation. They find that the deposition effect, life cycle effect, wealth effect and housing crowding effect has significant impacts on household investors' asset selection. Yin Zhichao, Song Quanyun and Wu Yu (2014) conducted the financial survey in Chinese households and they discover that financial knowledge and investment experiences have significant impacts on the degree of taking part in the financial market and asset selection. Huang Qian (2014) used the data from the Chinese Household Survey on Finance(CHFS)found that the family with a more developed social network have a higher probability to invest in stock markets by the tobit model and the probit model.

Based on the above research, the study here includes relevant factors in a wider range with the exploration in the interacting mechanism among these factors. The analysis is made case by case so that the heterogeneity of various areas will be identified through comparison. To achieve the study target, we assemble potential factors to the study and included variables are supposed on the basis of previous research production and some principles. The general related factors include family structure, economic condition and state-perception of individual. On the other hand, the specific related factors of different regions including age, gender, family, education, marriage, income, real estate, economic expectation, the extent of happiness and risk preference. In the process of statistical analysis, we select effective data from China Household Finance Survey (CHFS) which can provide panel data of household from 25 provinces regarding to financial asset selection. After the deletion of invalid samples, we run KMO and Bartlett's test to assure that the selected factors are suitable for further factor analysis. Then, the Structure Equation Model (SEM) is designated for the reason that it is available to solve complicated relationship between dependent variables and multiple latent variables. The model is also adjusted for the variation in geographical regions for better fitness. Finally, we compare the result of different regions and provide suggestion to individual investors and government.

2. The Construction of Model

2.1 Data Description

We chose the CHFS data in 2011, which was provided by China Household Financial Research and Research Center of Southwest University of Finance and Economics. The survey covers 25 provinces within China including about 29,000 individuals from 8,439 families.

According to relevant geographical division, the classification of eastern, western and middle regions is described as following:

Eastern region: Beijing City, Shanghai City, Guangdong Province, Guangxi Province, Liaoning Province, Shandong Province, Tianjin City, Zhejiang Province, Hebei Province, Jiangsu Province; Midland: Anhui Province, Henan Province, Heilongjiang Province, Hubei Province, Hunan Province, Jiangxi Province, Jilin Province, Shanxi Province; Western region: Gansu Province, Guizhou Province, Qinghai Province, Shanxi Province, Yunnan Province, Sichuan Province, Chongqing City.

Table 1. Statistical Description of Observation within 25 Province or City

variables	total		eastern		middle		western	
	average	standard deviation	average	standard deviation	average	standard deviation	average	standard deviation
age	45.27	13.59	44.18	12.77	48.07	12.35	44.16	16.37
gender	0.97	0.70	0.49	0.50	1.49	0.50	1.43	0.50
famnum	3.39	1.31	3.12	1.13	3.65	1.43	3.68	1.40

edu	4.54	1.81	5.25	1.73	3.71	1.46	3.91	1.74
marriage	0.95	0.22	0.93	0.25	0.98	0.13	0.95	0.22
eco	3.76	0.83	3.55	0.85	3.94	0.80	4.01	0.71
riskapp	2.60	1.25	2.80	1.21	2.32	1.22	2.48	1.30
haplnd	3.82	0.74	3.83	0.78	3.81	0.69	3.79	0.70
income	11.04	0.94	11.44	0.93	10.61	0.73	10.61	0.73
rs1	1.22	0.67	1.30	1.38	1.21	0.54	1.02	0.52
asset1	10.49	1.99	11.52	0.77	9.53	2.00	9.24	1.88
rs2	17.38	24.82	12.39	4.07	20.62	15.39	25.23	49.71
riskfree	9.89	1.78	10.18	1.84	9.76	1.71	1.98	3.97
riskass	6.11	5.37	10.62	1.81	0.97	3.00	9.37	1.59

From the standpoint of average, the table releases that the education level of citizens from eastern region is higher than their counterparts from middle and western regions due to relatively higher GDP and more advanced education facilities. In addition, the average value of household assets of families from the East is the highest while that of families from the West is far lower. The gap is generated by the difference of economic background among these subjected areas. Generally speaking, the economic growth in the East is far more rapid than that in other regions, accordingly, the economic condition of eastern household is more advantageous.

From the perspective of standard deviation, the dispersion degree of risk asset and risky asset of residents from the East and Midland are similar. However, the graph illustrates directly that the standard deviation of real estate values (rs2) in the western region is obviously large. The reason for such huge difference is that the region difference in China's housing prices is enormous.

2.2 The Selection of Data

Based on the factor and logical analysis as well as the relative foreign and domestic research, we find that the determinants of household financial asset allocation are classified into three aspects: family structure, economic structure and feeling. According to the portfolio theory, to maximize the investment profit, rational individual investor allocates the financial assets into risk-free assets and risky assets concerning about the trade-offs between risk and return. Here is their decision-making process.

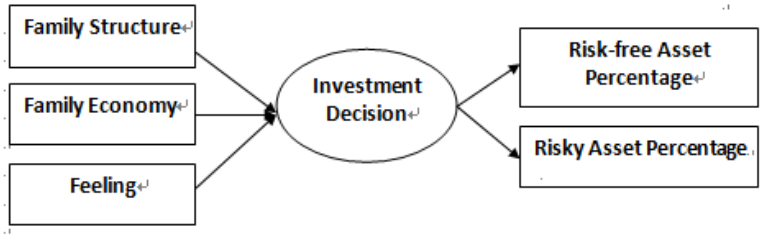

Fig.1 Investment Decision Making Process

From the family decision-making process diagram, we can further summarize the latent and manifest variables which are categorized as following:

Table 2. Variables List

Latent variable	Manifest variable
family structure	Gender
	Age
	Marriage
	Famnum
	Edu
economic structure	Rs1
	Rs2
	Income

feeling	Riskapp
	Haplnd
	Eco
Endogenous variable	Risk free
	Risky asset

In this thesis, both risky assets and risk-free assets are the endogenous variables of the financial assets. In order to avoid the impact of extreme values on the results, we use logarithms. Risky assets are consisted of stocks, funds, bonds, foreign exchange, derivatives, bank financial products, futures, etc. Risk-free assets mainly include cash, insurance, and saving deposit. There are three latent variables ——family structure (Family), economic structure (economy) and individual perception (Feeling). Also, there are 11 manifest variables which is made up of asset, including cash, demand deposits, time deposits, real estate, stocks, bonds, funds, gold, derivatives, social insurance and commercial insurance, and real estate. To avoid extreme values, we treat it as logarithmic. For number of properties (sets) (RS1) and value of properties (RS2), we take a logarithm to prevent the extreme value from occurring. What is more, through the relevant investigation in the level of housing prices across provinces, we set a minimum for housing price and drop out unreasonable property values. When it comes to annual income level (income), it is the annual income of the whole family, including wages and bonuses. Similarly, according to our minimum labor remuneration standards, we set the minimum value and delete the unreasonable samples. In addition, we take logarithms to make the surveyed values stationary. The family number (FamNum) is attained from CHFS directly ranging from 1-18 while gender of household (Gender) is given that 0 is designated for women and 1 is for men. In terms of age of household (Age), we define the reasonable minimum value as 18 and eliminate the invalid samples. The next varable is marriage (Marriage), we have done a dummy variable treatment; 0 is unmarried and 1 is married including divorce, remarriage, widowed and other related circumstances. And for risk preference (RiskApp), Personal happiness index (HapInd), Society Satisfaction (SocSat) and Economic Expectations (Eco), we also denote a dummy variable treatment for these four variables, expressed as 1 to 5, the larger the number, the higher level the individual is in terms of specific characteristic.

In the field of social sciences and economy, the structural equation model is an important tool for multivariate data analysis which can be divided into two parts ——the measurement equation and the structural equation.

2.3 Design for Model

We construct models complying with factors that affect the allocation of family financial assets. There may be correlations among the factors. Therefore we choose the SEM model as the analysis tool to further study in influential factors of the family financial asset allocation.

Structural equation:

$$riskfree = \alpha_{11}\, family + \alpha_{12} economy + \alpha_{13}\, feeling + \zeta_1$$

$$riskasset = \alpha_{21}\, family + \alpha_{22} economy + \alpha_{23}\, feeling + \zeta_2$$

Measure equation:

$$age = \lambda_1\, family + \delta_1$$
$$gender = \lambda_2\, family + \delta_2$$
$$marriage = \lambda_3\, family + \delta_3$$
$$edu = \lambda_4\, family + \delta_4$$
$$rs2 = \lambda_5 economy + \delta_5$$
$$income = \lambda_6 economy + \delta_6$$
$$riskapp = \lambda_7\, feeling + \delta_7$$
$$hap\ln d = \lambda_8\, feeling + \delta_8$$
$$eco = \lambda_9\, feeling + \delta_9$$

Model identification

In the operation of structural equation model, we first test the overall

Identification of model

$$t < \frac{(p+q)(p+q+1)}{2}$$

$$df = \frac{(p+q)(p+q+1)}{2} - t > 0$$

p is the number of exogenous variables; q is the number of endogenous variables; t is the number of parameters to be estimated; df is the degree of freedom.

3. The Result from Model

3.1 KMO and Bartlett's Test

To examine whether the variables are suitable for factor analysis or not, we use the KMO and Bartlett's tests. The more KMO value approaching to 1, the stronger correlation between variables is, the more suitable the original variable is for factor analysis. As the following table presets, KMO are all larger than 0.5, which means that initial variables are generally suitable.

For Bartlett's test, on the other hand, if the value is large and its associated probability value is less than the significance level, then we should reject the null hypothesis, that is, there is correlation between the original variables, which is suitable for factor analysis. It can be observed that the significance levels are all less than 0.05, the Bartlett's test values are large, which is suitable for factor analysis.

Table 3. KMO and Bartlett's test result

KMO and Bartlett's test				
		Eastern	Middle	Western
Kaiser-Meyer-Olkin		.534	.575	.572
Bartlett's test	Bartlett's test value	330.423	1163.726	466.916
	significance level	.000	.000	.000

3.2 The Designation of Model

Through the exploratory factor analysis of the eastern variables, we select the following variables and establish structure equation model of the eastern household financial asset allocation as shown in Figure 2.

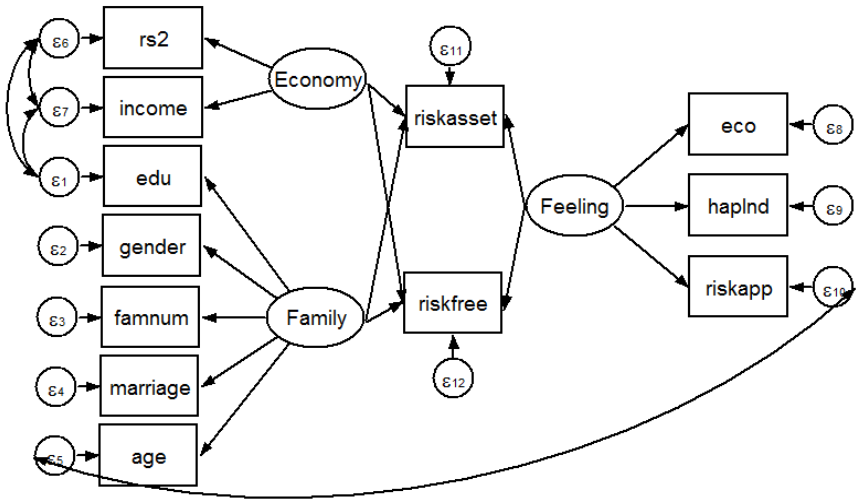

Fig.2 SEM Model of Eastern Region

In this model, $p+q=10, t=14, df=27$,which commits to the requirement of identification so that the model can be identified.

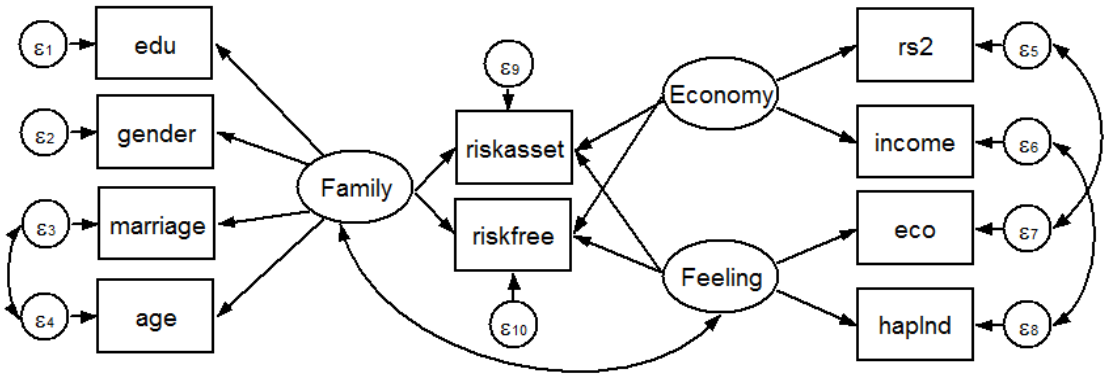

Fig.3 SEM Model for Middle Region

In this model, $p+q=10, t=14, df=27$,which also meets the requirement of identification so the model can be identified.

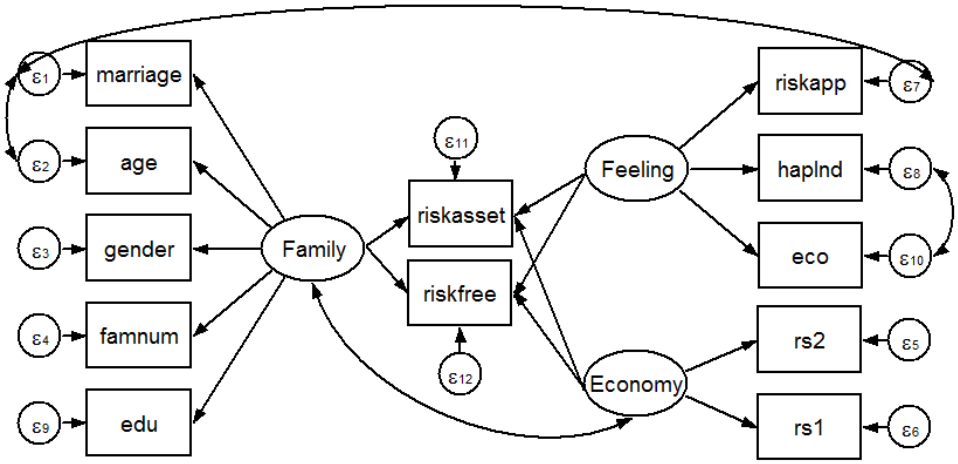

Fig.4 SEM model for western region

In this model, $p+q=12, t=14, df=46$,which meets the condition of identification, consequently, the further study can be undertaken in the following section.

3.3 The Estimation of Parameters

According to the following table, we can conclude that the impact of economic characteristics on the allocation of financial assets of eastern residents is significant at 5% significant level, which affects the investment of risk-free financial assets and risky financial assets of eastern region residents. It points out that economic conditions affects the allocation of family financial assets. Generally speaking, for family with more advantageous economic conditions, they show preference to investing in financial assets. For the family with less privileged economic conditions, they lack of sufficient fund to make investment in risky assets because they hold more risk-free assets to meet their demand for liquidity. However, family structure and individual's perception are less significant for the distribution of risk-free financial assets, which indicates that household commonly chooses to invest in risk-free financial assets regardless of family structure and state perception. This can be explained by Chinese cultural background which results in excessive investment in risk-free assets. Family structure and individual's perception have significant influence on risky asset allocation, in particular in the case of eastern residents. In general, factors such as age, marriage, educational level, risk preference, and future economic expectations have impact on the allocation of risky financial assets of the eastern residents.

From the estimates of latent variables to the manifest variables, it can be noticed that at the 5% significance level, all the factors except the age, happiness and economic expectations, are significance. Firstly, it is observed that at the significance level of 5%, the future economy expectation and happiness is not significant and meanwhile only gender, family number, and marriage is significant. This indicates that men, families with less members or unmarried people tend to invest in financial assets. It is understandable because those people have less financial burden. Finally for the economy structure, Income and real estate value is also significant. We can see that the higher the annual income of households, the more willing he is to invest in financial assets. The reason is that the higher the income, the more the assets he owns. With the high inflation rate in China, in order to prevent depreciation, people are more willing to invest in financial assets.

Apart from the case of eastern region, the illustration of Midland shows that at 5% significant level, economic structure and individual's perception have more significant effect on the allocation of financial assets of households from the middle region. To be more specific, family structure and state perception are less significant for risk-free financial asset allocation, which suggests that households prefer to invest in risk-free financial asset, regardless of family structure and perceived state. The findings associates to the characteristics of risk-free financial assets as well as the Chinese recognition of asset management. At the significant level of 5%, when it assumes that the state-perceived regression weight is 1, the family structure and economic characteristics is quite significant. The result can be understood that the better the economic conditions, the better the family can afford the risk and the more investment in risky financial assets.

From the perceptive of parameter estimation, only the happiness and gender pass the significance test referring to the significance level of 5%. The influence of gender variables is not significant, which indicates that there is not huge difference between men and women in family investment decision making, and gender difference is not large enough to influence asset selection behavior. With the reference of 5% significance level, it assumes that the regression weight for family structure is 1, the education level and marriage is significant. It indicates that unmarried people and the family with higher education level will be more willing to invest in financial assets, which is also consistent with previous findings. Income and real estate value is also significant, the higher the annual income the households have, the more willing they are to invest in financial asset. Furthermore, the richer the family is, the higher possibility that they hold risky financial asset to protect their assets from great depreciation.

The last survey subject is households from the western region. The table exploits that at 5% significant level, the impact of family structure, economic characteristics and state perception on the allocation of western region residents' financial assets are not significant. The following aspects provides insight for the finding. From the economy aspect, the regional economy is less developed in the West, as a result, the average income of the family is so low that fewer families participate in financial investment. From the scope of household's background, the characteristics of family are quite different which leads to failure to pass the significance test.

Based on the analysis of the parameter estimation, it shows that at the significance level of 5%, the rest of the factors cannot pass the significant test excepting the real estate value. It implies that impact of above variables on the allocation of financial assets is not significant. This is consistent with the results obtained from the preceding structural model. The value of real estate can affect the allocation of financial assets in western region, indicating that there is a certain substitution effect on the value of real estate relative to the investment of financial assets. In conclusion, residents in western regions show more interests in housing instead of financial assets, and therefore, western families seldom participate in financial assets trading compared with their counterparts from eastern region and Midland.

Table 4. Structural model: Parameter estimation between latent variables

Variable relationship	Eastern			Middle			Western		
	Parameter Estimation	Standard error	P value	Parameter Estimation	Standard error	P value	Parameter Estimation	Standard error	P value
riskfree ← family	0.1309	0.0419	0.158	0.0856	0.0629	0.174	0.5451	1.2333	0.658
riskfree ← economy	1	/	/	1	/	/	1	/	/
riskfree ← feeling	0.4449	0.6536	0.496	-0.3785	0.4769	0.154	4.4908	3.4601	0.194
riskasset ← family	0.8401	0.2448	0.001	-0.1278	0.0877	0.145	-0.0623	0.3223	0.847
riskasset ← economy	3.577	0.3753	0.000	0.9924	0.4769	0.0046	0.2462	0.5900	0.570
riskasset ← feeling	1	/	/	1	/	/	1	/	/

Table 5. Measurement model: parameter estimation of latent variables to manifest variable

Variable relationship	Eastern			Middle			Western		
	Parameter Estimation	Standard error	P value	Parameter Estimation	Standard error	P value	Parameter Estimation	Standard error	P value
age ← family	0.1140	0.1837	0.535	1	/	/	1	/	/
marriage ← family	-0.0186	0.002	0.006	0.0074	0.0026	0.005	-0.0251	0.0349	0.472

gender ← *family*	-0.0003	0.556	0.001	-0.0038	0.095	0.689	0.0101	0.0389	0.794
famnum ← *family*	-0.1296	0.0412	0.002	/	/	/	-0.4128	0.5048	0.414
edu ← *family*	1	/	/	-0.3581	0.1533	0.020	1.2050	1.6573	0.467
*rs*2 ← *economy*	1.8461	0.5071	0.000	0.1012	0.6291	0.004	0.1330	0.2330	0.568
income ← *economy*	1.8998	0.5240	0.000	0.6555	0.2551	0.010	0.0613	0.0843	0.467
riskapp ← *feeling*	1	/	/	/	/	/	0.2431	0.3272	0.467
hap ln *d* ← *feeling*	-3.1943	3.8450	0.406	-0.3951	0.2732	0.148	3.6438	7.0962	0.608
eco ← *feeling*	-8.6004	10.3280	0.450	-0.2963	0.1102	0.007	-0.0545	0.2994	0.856

3.4 The Fitness of Model

Table 6. Model fitting result

	Index				Evaluation standard
		Eastern	Middle	Western	
Absolute fitting index	χ^2	163.000	57.071	49.649	The small the better
	χ^2 / df	3.543	2.114	1.079	Less than 5 and The small the better
	RMSEA	0.038	0.064	0.021	Less than 0.08 and The small the better
Relative fitting index	*CFI*	0.926	0.854	0.935	Larger than 0.85 and The large the better
	TLI	0.894	0.818	0. 907	Larger than 0.80 and The large the better

From the model fitting results, we can see that the indicators are within the standard value, which proves that our model is suitable to study the impact factors of family financial asset allocation. All the CFI indexes are larger than 0.85 and all the TLI indexes are larger than 0.8. To be specific, for both the absolute fitting index and the relative fitting index, western model has best performance. For Eastern model, relative fitting model fits better than Middle model while for Middle model absolute fitting index performs better.

4. Conclusion

Since the starting point of the study is the heterogeneity of three geographical location within China, the study specifies in characteristics of financial portfolio constructed by households from different areas.

Through the empirical study, the significance of factors affecting household financial assets selection has been uncovered. In general, the economic factor plays an important role in portfolio construction while other potential factors are not significant as we assumed before the model testing. However, what should not be ignored is that the state perception has considerable effect on household's financial decision.

Based on the finding, we suggest that Chinese household should enhance their level of wealth so that the flexibility of using funds would be improved and more money could be put into financial asset investment. From the perspective of policy maker, namely Chinese government, they should activate the financial market in the Midland and the West because household from these regions under-diversify their portfolio apparently. Especially family from western area tend to set large amount of money in housing which is normally regarded as risky investment. Finally, from the standpoint of financial asset managers, they should innovate their financial products since more and more investors have been aware of the problem of under-diversification in portfolio.

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