Comparative Analysis of Farm Households on Financing Medical Care and Education in Rural China

Huashu Wang[1)]
Henk Moll[2)]

Abstract: The questions analyzed in this paper are about the characteristics of financial sources in education and medical care expenditures concerned with living and life of the farmers in rural China. The approach of non-parametric test is used to test the difference in the financial decision of households. The result indicates excessive expense will lead household into financial straits and their livelihood will be worse off under financial constraint. The conclusions implied that the extension of rural financial service to education and health insurance could increase freely disposable income with precautionary savings reduced by household, in addition to better-educated and healthier people in rural China.

1. Introduction

Farm households face an irregular income stream during the year because of the agricultural calendar and substantial differences in income between subsequent periods because of weather conditions that lead to "good" and "bad" seasons or years. The expenditure side of the household budget is only partly predictable and unexpected events like sickness or death may lead to unexpected and substantial cash outlays. Financing the expected and unexpected expenditures is therefore a major concern of rural households that is reflected in a great variety of mechanisms such as diversification of production, maintaining stocks, and building a network of social relationships. The fact that rural households generally have incomes not far above subsistence gives the question of financing special urgency as financial shocks may result in a decline into poverty from where it is difficult to escape (Besley, 1993; Morduch, 1999).

The household and community based financing mechanisms are important, but they have limitations in storing wealth safely and in dealing with co-variant shocks. Financial institutions like rural banks may therefore expand the financing possibilities in rural areas, especially when they operate on an above regional scale and thus intermediate between savers and borrowers living in different areas with different financing requirements and with different risks. Access to reliable savings and credit products from a rural bank thus forms a welcome addition to the households' capabilities to smooth consumption requirements over the year, to deal with financial shocks and to invest in new enterprises. Widespread access to financial services in rural areas surpasses the importance for the individual households because it means an overall shift of resources from low return to higher return enterprises and a more stable overall consump-

1) Associate Professor, College of Management, Guizhou University, China. Email: Wanghs2002@163.com.
2) Associate Professor, Development Economics Group, Wageningen University, The Netherlands. Email: Henk.Moll@wur.nl.

tion pattern due to increased resilience against shocks. Monetization with increased financial savings and intermediation by banks leading to investment is described as "financial deepening" and it forms the core of the theory of financial development (Shaw, 1973; McKinnon, 1973).

Monetization in the production and consumption of rural households has been part of the Chinese economic reform since 1978. The proportion of cash income to total income per household increased from one third before the reform to more than 78 percent in 2003 (Agriculture Department of China, 2004). Savings in financial assets increased substantially in the same period, but lending lagged behind, showing limitations in intermediation in rural financial markets. A closer analysis of lending in China shows that especially the lower income households are deprived (Morduch, 1994). The apparent limited role of financial institutions in the rural financial markets of China is not exceptional, as in many rural areas of the world a large proportion of the population does not has access to regular banking services (Zeller and Meyer, 2002). A closer analysis of this lack of access shows that especially the lower income households are deprived (Murdoch, 1995). This situation on the one hand and the acknowledgement of the importance of access to financial services in economic development on the other hand has resulted in a long term attention for microfinance by policy makers, financial institutions and development agencies (Moll, 2006). As a result, there is presently a wealth of experience available in providing small-scale financial services to low income households in all parts of the world. Additionally, studies on impact provide a sharper insight into the possibilities and limitations of microfinance in the development context (Hulme and Mosley, 1996). Experience and increased insight enable in the first place the avoidance of common pitfalls and in the second place provide guidelines for interventions. However, finance is situation specific and world wide experiences must be combined with insight into the local situation to test whether the common experiences are valid and to give specific directions to the formulation of interventions.

In this paper we analyse and compare the actual financing of education and medical care by rural households in Guizhou Province under the condition of limited access to institutional financial services. Education expenditures are predictable and in principle households are able to include the expected expenditures in their financial planning. Medical care expenditures are much less predictable and we expect that financing is on ad hoc basis. By focusing on the capability to finance education and medical care we expect to gain insight into the capability of rural households to invest and to deal with shocks respectively.

The paper is organized as follows: in Section 2 the methodology is given together with a description of the data sources. Section 3 explores education and medical care expenditures in rural China in general. Section 4 compares the financing methods and funding portfolio of education and medical care expenditures in the research area, followed by non-parametric tests to investi-

gate differences between ways of financing and the wealth status of households. In the last section the findings are discussed and conclusions drawn.

2. Methodology and data sources

The rural household is depicted as a decision making unit regarding production enterprises, consumption and asset portfolio, Figure 1.

Production decisions are made in the first place in relation to the productive assets, but the asset portfolio can be shifted through the conversion of non-productive assets, cash or financial savings into productive resources. This part of the asset portfolio is under direct command of the household and its use, possibly after conversion, is stated as internal financing. Additionally, production may be supported by borrowing from institutions in the rural financial market, external financing. Consumption decisions relate in the first place to income earned from the production enterprises, but income shortfalls can be dealt with through selling assets or borrowing, whereas temporary excess income may lead to saving, thus an increase of assets, or reduced debt. Asset management thus forms the link between past, current and future production and consumption. Asset management is either internal, dealing with the assets under direct command, or external through relationships with operators on the credit side of the rural financial market.

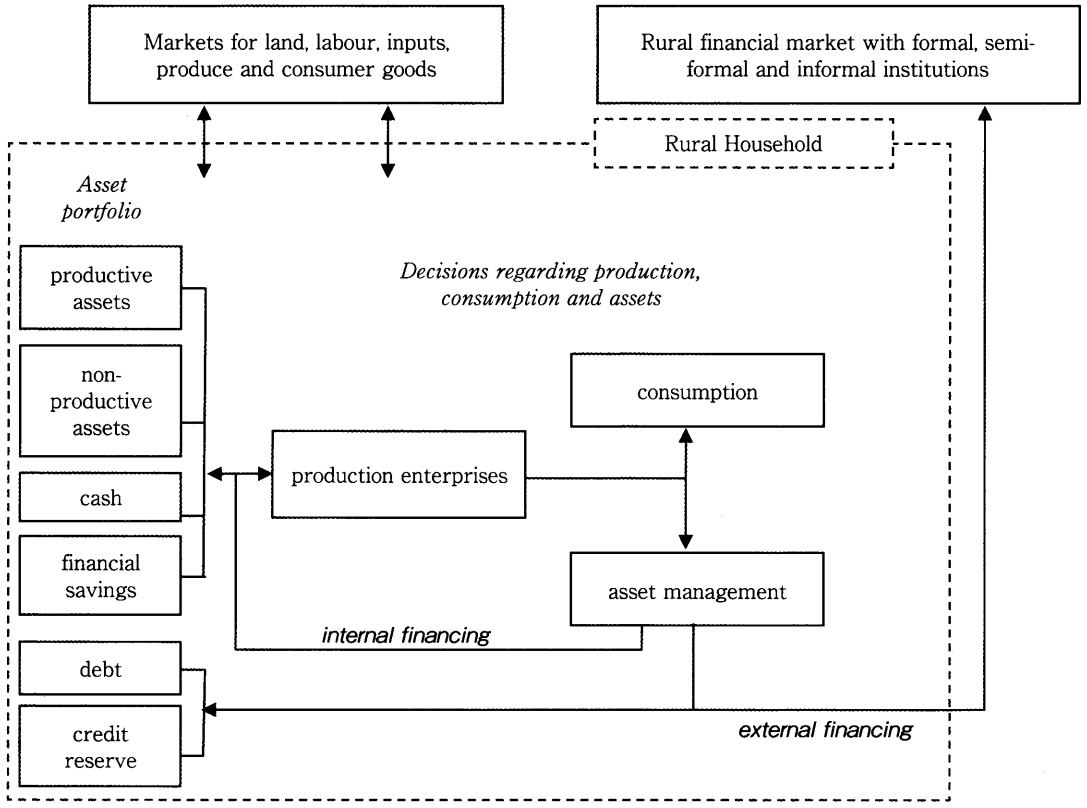

Figure 1. The rural household, decision making and markets.

The two components of the asset portfolio that result from external financing are debt as consequence of loans received and credit reserve as the remaining potential to borrow (Baker and Bhargava, 1973). The household decisions on production, consumption and asset management are linked and this is expressed in both the permanent income hypothesis (PIH), dealing with income and saving behavior, and in the life cycle (LC) model where borrowing and saving, income and consumption are related to age.

The mechanisms of internal and external financing of rural households are widely described and analysed from different angles. Coping with shocks through the sale of productive assets has been discussed by Chambers and Leach (1987) regarding cutting down trees and their sale as firewood; by Rosenzweig (1993) regarding the sale of bullocks and by Udry (1995) regarding the sale of grain inventories. Moll and Dietvorst (2000) discuss the sale of cattle in relation to both production and urgent, substantial consumption requirements. Other studies focus on specific shocks and describe the coping mechanisms deployed: Paxton (1992) on natural disasters, and Gertler et al. (2002 and 2003) on illness of household members. The role of the external financing of productive assets by microfinance institutions is the central issue in the discussion of microfinance and poverty alleviation and the related impact studies: Zeller and Sharma on the linkage between food security and access to formal credit (2002), and Morduch on the role of the insurance mechanism in helping poor household in the face of disadvantages (1994 and 1999). The role of informal institutions such as ROSCAs in dealing with foreseeable and not foreseeable events in rural households has been analysed by Bouman (1995) and others. A common issue in the majority of these studies is the role of wealth: wealthier households have in general more possibilities of internal financing as their asset portfolio is larger and more diversified as well as better access to external finance from formal and informal sources than poorer households. Wealth is therefore incorporated in our analysis through a division of the rural households into five wealth categories.

Education and medical care expenditures can both be considered investments in human capital (Grossman, 1972). However, education expenditures (for children) are predictable and the required investments can be planned years in advance. The expected returns will materialise on the long run through increased market and non-market productivity. Education expenditures differ substantially with the type of schooling: primary, secondary or higher education, and this distinction is maintained in our analysis of financing education. Medical care requirements are not predictable in type and quantity and given the universal wish or even need to regain health as soon as possible, urgent financing of the resulting expenditures is required. Medical care expenditures thus form a financial shock for the household and the ability to deal with this shock may determine labour output with direct income effects. These possible income effects may lead to differences between expenditures for working and for non-working household members, and

these differences may be more pronounced in the lower wealth groups. A distinction between working and non-working household members is thus included in the analysis: one group comprises of household members who earned income in the year covered by the survey; the other group contains children, elders and people with an illness that precluded working.

The classification of households, expenditures, and household members outlined above is summarised in The first part of the analysis is descriptive and follows the classifications stated. Thereafter, we use the Wilcoxon signed-rank test to identify differences in financing between education and medical care expenditures as well as among the wealth groups. This non-parametric test is used because part of the numerical scores represents ranks and as the tests does not require specifications regarding the distribution of the variables. The difference in financing education and medical care expenditure is explored with the Kruskal-Wallis test.

The data for the analysis are from two sets of sources. The general data on the background of rural household incomes, savings and credit are from national surveys involved twenty thousand households in 300 permanent observation sites in rural China from 1986 to 2003. The data on financing education and medical care is from the household survey by the International Centre for Agricultural and Rural Development (ICARD) of the Chinese Academy of Agricultural Science (CAAS) and the International Food Policy Research Institute (IFPRI) in 2005. All heads of households in three villages in Guizhou Province, South West China, were interviewed, a total of 793 respondents. Authors are grateful to ICARD of CAAS and IFPRI for the permission to use the survey data.

Table 1. Classification of households and expenditures.

Classification according to:	Categories				
Wealth	Lowest (Wealth 1)	Lower (Wealth 2)	Middle (Wealth 3)	Higher (Wealth 4)	Highest (Wealth 5)
Presence of Education and Medical expenditure	None		Education		Medical
Types of education expenditure	Primary school only	Secondary school only		Primary and secondary	Higher and secondary
Direction of medical expenditure	Employed members only		Non-employed members only		Employed and non-employed members

3. Analysis

3.1. Income and financing in rural China

Savings in financial assets increased substantially in real terms and as proportion of the rural incomes in rural China since the start of the economic reform in 1986, possibly at the expense of holding cash.

The volume of loans from financial institutions stagnated in the period under review, while informal lending and the role of transfers increased in the period recorded. The divergence between developments in financial savings and formal loans, and the expansion of informal lending points to limitations in the intermediary role of rural financial institutions in rural China

Both education and medical care expenditures became a substantial part of households' living expenditures in China, Table 3. Financing the increasing expenditures on education and medical care poses a real question for rural households and by focusing on the capability to deal with this question we expect to gain insight into the general capability of rural households to invest and to deal with shocks respectively.

3.2. Financing education and medical care: the overview

The households surveyed were classified into 5 groups according to their wealth as measured by their asset portfolio. The groups are presented in Table 4 with the group averages on wealth

Table 2. Household income and finance in rural China, 1986 to 2003 (¥ at 2004 price level).

Period/year	Income	Cash[1)]	Financial savings [2)]	Loans			transfer
				total	formal	informal [3)]	
1986-1990	12928	3012	1832	1047	311	735	329
1991-1995	15277	2714	2974	1225	292	933	358
1996-2000	17344	2033	4576	1402	333	1069	367
2001	18667	2414	6353	1567	458	1109	429
2003	19604	2495	7601	1482	387	1095	480

Sources: National Rural Social-Economic Survey Data Collection from 1986 to 1999. Agriculture Department of China, Agriculture Press of China, 2001; Data of 2001 and 2003: Research Centre for Rural Economy www.rcre.org.cn, Agriculture Department of China. The rural consumption price index is from China Statistical Yearbook, 2004. National Bureau of Statistics of China.
Note 1. Cash on hand at the end of the year;
Note 2. Financial savings include other financial assets (such as Treasury bond) at the end of the year;
Note 3. Informal includes the loans from private providers, cooperatives and farmers' groups.

Table 3. Household expenditure on education and medical care in rural China, 1886 to 2003 (¥ at 2004 price level).

Period/year	Living expenditure (1)	Education expenditure		Medical care expenditure	
		total	Proportion in (1) (%)	total	Proportion in (1) (%)
1986-1990	6650	182	3.9	127	2.7
1991-1995	7439	348	5.1	225	3.3
1996-2000	8134	550	6.8	331	4.1
2001	8035	667	8.3	417	5.2
2003	8711	720	8.3	478	5.5

Sources: See Table 1.
Note: The expenditures of medical care exclude medicines. The expenditures of education before 1993 include school tuition, miscellaneous fees, and cost of training and cultural entertainment; after 1993 only school tuition is considered.

and income and the presence of expenditures on education and medical care.

The group averages on wealth and income show the same sequence from group 1 to group 5, but with differences in wealth much more pronounced than differences in income. As we assume that wealth plays a larger role than income in the financing of expenditures we maintain the household classification based on wealth. There is no significant relationship between wealth category and whether or not expenditures are incurred for education and/or medical care, and we may conclude that households incur expenditures for both purposes if possibilities and needs respectively arise. The households without expenditures for the two purposes are excluded from the analysis.

Education expenditure is a major component in consumption expenditures in the households with school going children, a proportion of 55% in the sample, Table 5.

Expenditures for primary, secondary and higher education show a distinct increase which is understandable as locations are further away and requirements increase. Household expenditure for primary education is similar for all wealth classes, but for secondary and higher education the expenditures tend to increase with increasing wealth. The standard deviation of education expenditures per group shows the existence of a wide divergence of expenditures within the

Table 4. Wealth, income and the presence of education and medical expenditures in rural households in research area.

Wealth group	Household (number)	Wealth (¥ / capita)	Income (¥ / capita)	Presence of education and medical expenditures (number of households)		
				None	Education	Medical
Wealth 1	158	259	1012	30	110	135
Wealth 2	159	547	1292	17	95	124
Wealth 3	159	859	1491	21	89	121
Wealth 4	159	1285	1720	12	78	123
Wealth 5	158	2980	2690	9	64	118
total / average	793	1185 (1242)	1641 (1488)	89	436	621

Note: The numbers in the parenthesis are the standard deviations.

Table 5. Average household expenditure on education of school going children (¥/year).

Wealth group	School children per household	Average	Primary	Secondary	Primary and Secondary	Higher and secondary
number of households			*270*	*84*	*74*	*8*
Wealth 1	1.9	691 (820)	284	1580	1482	-
Wealth 2	2.0	763 (1107)	259	1636	1124	3750
Wealth 3	1.8	925 (1375)	335	1691	1120	6500
Wealth 4	2.0	796 (1023)	311	1290	1639	6500
Wealth 5	1.7	1319 (1898)	254	2248	2399	5750
Average	1.9 (0.9)	866 (1251)	290 (228)	1726 (1509)	1475 (1047)	5625 (2335)

Note: Education expenditure includes the schooling tuition and other necessary expenses such as board and lodging. The numbers in parenthesis are standard deviations.

wealth groups.

The financing of education expenditure by the households is stated in Table 6.

Internal financing is predominant with financial savings as the main source for all wealth categories. External financing covers around 30% of the expenditures with loans from relatives and friends as the main source. Relief refers to support from the Government, NGOs and private donations in the form of subsidies mainly meant for primary school children. The contributions of transfers and formal loans are small. These findings show the capability of households in all wealth categories to meet the expected education expenditures largely by saving in financial assets, particularly in group 5. Loans from formal financial institutions do not play a significant role on average.

A proportion of 78% of the households incurred medical care expenditures in the survey year and part of these households, 63% of the total sample, gave details on the family members that became ill and received treatment,

The average expenditures for the employed and the non-employed do not support the hypothesis that the employed receive preference over the non-employed because of economic reasons, which applies to all wealth categories. The averages point to a reverse situation indicating that children and elderly people receive more medical care. The total expenditures per individual

Table 6. Financing household expenditure on education of school going children (proportion).

Wealth Group	Internal financing			External financing			
	Savings	Selling assets	total	Informal loans	Formal loans	Transfers	total
Wealth 1	0.66	0.14	0.79	0.16	0.02	0.03	0.21
Wealth 2	0.74	0.08	0.82	0.16	0.00	0.02	0.18
Wealth 3	0.76	0.14	0.91	0.07	0.01	0.01	0.09
Wealth 4	0.72	0.13	0.85	0.12	0.00	0.03	0.15
Wealth 5	0.83	0.10	0.93	0.02	0.02	0.03	0.07
Average	0.73 (0.43)	0.12 (0.32)	0.85 (0.34)	0.12 (0.30)	0.01 (0.09)	0.02 (0.15)	0.15 (0.34)

Table 7. Average household expenditure on medical care per category of household member (¥/year).

Wealth group	Member per household	Average1)	Employed	Non-employed	Employed and Non-employed
number of households			*261*	*107*	*133*
Wealth 1	4.8	1269 (1964)	1385	1486	1629
Wealth 2	4.4	972 (1687)	958	876	1887
Wealth 3	4.2	1784 (5660)	945	4581	3310
Wealth 4	4.2	1547 (3012)	1563	2155	1754
Wealth 5	3.5	1089 (2050)	982	2090	1459
Averages	4.2 (1.6)	1331 (3204)	1146 (2113)	2104 (5476)	1956 (3370)

Note 1. Medical expenditure includes the medical care, medicine and traveling expenses.
The number in the parenthesis is standard deviation.
1. Average medical expenditure in column M includes the household which report their medical expenditure, but not all reported their family members that fell ill. Therefore the averages do not equal the sum of the figures in columns L, V and LV.

seem to be not related to wealth groups. The standard deviations of expenditures are wide as can be expected because of the very different types of medical care required.

The financing of medical care expenditures is stated in Table 8.

Medical expenditures are primarily financed through external financing with informal loans as main source. Financial savings and selling assets together cover on average 40% of the expenditures. Formal loans provide for a minor proportion of the funding. Households in wealth group 5 tend to use a higher proportion of savings and borrow less than the other wealthy households.

Comparing education and medical care expenditures shows that the average expenditures for education are lower than for medical care and that standard deviations are high for education and very high for medical care expenditures. Further analysis of the expenditures shows that both types of expenditures are not normally distributed. Education expenditures are positively skewed towards the low end of the expenditure scale, related to the predominance of primary education expenditures, whereas medical care expenditures are negatively skewed towards the high end of the scale. The latter makes the financing problem for medical care the more pressing.

The wide standard deviations of expenditures and the individual differences in the combinations of financing sources limit the value of the averages stated in Tables 5 to 8. To determine whether or not the funding sources for education and medical care are significantly different we used the Wilcoxon signed rank test is, Table 9.

Table 8. Financing household expenditure on medical care (proportion).

Wealth Group	Internal financing			External financing			
	Savings	Selling assets	total	Informal loans	Formal loans	Transfer	total
Wealth 1	0.23	0.12	0.35	0.52	0.06	0.08	0.65
Wealth 2	0.27	0.13	0.40	0.47	0.05	0.08	0.60
Wealth 3	0.21	0.14	0.35	0.35	0.05	0.25	0.65
Wealth 4	0.28	0.11	0.39	0.38	0.05	0.18	0.61
Wealth 5	0.38	0.19	0.57	0.34	0.02	0.07	0.43
Average	0.26	0.14	0.40	0.41	0.05	0.14	0.60

Table 9. Differences in financing education and medical care.

	Internal financing			External financing			
	total	Savings	Selling assets	total	Formal loans	Informal loans	Transfer
Z[1]	-5.97***	-6.21***	-1.78**	-5.97***	-5.26***	-2.92***	-1.22
Monte Carlo. Sig.	0.00	0.00	0.04	0.00	0.00	0.01	0.12

Note 1. Z-value of saving is based on positive ranks of Wilcoxon test, while the others on the negative. **, *** significance at 5% and 1% respectively.

The test shows significant differences in financing education and medical care for the sample in total: the proportions of internal and external financing differ, while the contributions of savings, selling assets, informal and formal loans are significantly different for the two types of expenditures. Subsequent analysis with the same test shows the difference in financing education and medical care within the wealth groups, Table 10.

All wealth groups show a significant difference in the proportions of internal and external financing for education and medical care: education expenditures are predominantly financed internally by all wealth groups, whereas medical care expenditures are predominantly financed through external financing by wealth groups 1 to 4 and by internal financing by wealth group 5. Savings and informal loans are the major significant contributors to internal and external financing respectively.

The difference in financing education and financing medical care among the groups is analysed with the Kruskal-Walls test, Table 11.

The comparison of financing education and medical care among the groups shows significant differences for both types of expenditures. The use of informal loans in financing both education

Table 10. Differences in financing education and medical care within the wealth groups.

			Wealth 1	Wealth 2	Wealth 3	Wealth 4	Wealth 5
Internal financing	Saving	Z	-3.59***	-2.94***	-2.87***	-2.80***	-1.44
		Monte Carlo.Sig	0.00	0.00	0.00	0.01	0.08
	Selling assets	Z	-0.96	-2.08**	-0.15	-1.88	-0.42
		Monte Carlo.Sig	0.34	0.04	0.88	0.06	0.67
	total	Z	-3.54***	-2.06**	-3.69***	-2.26***	-1.77**
		Monte Carlo.Sig	0.00	0.02	0.00	0.01	0.05
External financing	Formal Loans	Z	-1.96**	-1.84	-1.60	-1.83	-1.00
		Monte Carlo.Sig.	0.02	0.06	0.12	0.06	0.51
	Informal loans	Z	-3.02***	-1.57	-3.35***	-1.86**	-2.04**
		Monte Carlo.Sig.	0.00	0.06	0.00	0.03	0.02
	total	Z	-3.54***	-2.06**	-3.69***	-2.26***	-1.77**
		Monte Carlo.Sig	0.00	0.02	0.00	0.01	0.05

Note. The differences in internal and external finance are equal because the sum of the proportions of internal and external finance is equal to 1. The Z-values of savings are based on positive ranks of Wilcoxon test, while loans on the negative ranks. The indications **, *** refer to a significance at 5% and 1% respectively.

Table 11. Differences in financing education and medical expenditures among the wealth groups.

		Internal financing			External financing		
		Savings	Selling assets	Total	Formal loans	Informal loans	Total
Education	$\chi^2(4)$[1)]	6,76	1.56	10.63**	2,93	13,37***	10.63**
	Monte Carlo. Sig.[2)]	0,15	0.82	0.03	0,57	0,01	0.03
Medical care	$\chi^2(4)$	5,74	6.90	13.06***	5,90	13,97***	13.06***
	Monte Carlo. Sig.	0,21	0.14	0.01	0,21	0,01	0.01

Note: 1) df= (number of wealth groups-1); 2). **, *** significance at 5% and 1%.

and medical care differs significantly among the groups.

4. Conclusion and Remarks

Exploration of financial source in education and medical expenditures in China indicated that financing medical care for rural population was ineligible for most insurance programs publicly financed. Education of children is primarily financed by savings, which applies to all wealth categories. Loans from relatives and friends and selling assets are also important part. Supporting from government and NGOs refers to subsidies and donations, mainly for primary school children. The amount of transfers and formal finance are small, but the role is important for lower wealth groups. Medical expenditures are primarily financed through informal loans followed by financial savings, selling assets and transfers. Formal loans provide for a minor proportion of the funding. The total expenditures per household seem to be not related to wealth groups. But wealthier households tend to pay more by savings, although there is substantial deviation among the observations. Individual households finance their expenditures according to their individual options.

The specification of education expenditures with the outlay portfolio shows that primary education is financed predominantly by interior savings because of the lowest outlay. Informal loans become more and more important as education becomes more expensive. Financial support from government and NGOs is almost completely focused on primary education. Compared with the source in education and medical care expenditure, predictable expenditure represented by education outlays is financed by more self-ensured way (higher proportion of savings) whereas unpredictable represented by medical outlays by more exterior-ensured way (higher proportion of loans and transfer). We also test the difference in financial source of education and medical expenditure by non-parametric method. According to the result, the difference of finance between education and medical expenditures mainly exists on savings and loans. Interior way as savings is more important to finance the expected education expenditures while exterior way as loans more important to fund the unexpected medical expenditures.

Chinese government plans for more social spending and improvement of financial and other institution in rural area (as "Construction of the new socialist countryside") stood out in the policy draft "Five years Plan (FYP) (2006-2010). The best option for raising living standards of rural household may be increasing spending notably on basic education and extension of the health insurance system resulting in better educated and healthier people in rural areas and increasing freely disposable income with precautionary savings reduced by household (The World Bank Quarterly Update, 2006). Financial condition of rural household will be benefit from government mitigation in education and medical expenditures, which contribute largely to the financial strait of rural household. However, because of

the threatening from unexpected serious urgencies, or the expected but than that initially planned, the policy may not be effective enough to release the financial strait from rural household, as the result that the present mitigation only focuses on the primary school and medical insurance extending to serious illness is inaccessible. The policies mapped out to facilitate alleviation of the financial strait of rural household are to improve the financial system in rural education and medical insurance service for farmers, shift the government concerning to high education level and serious illness. On the one hand, it will improve the holistic financial condition because of the high financial pressure of high education on rural household; on the other hand, the pool finance of insurance will relieve the shocks from unpredictable illness. The measurements include expanding and improving the financial services in education loan for high school and medical insurance for serious illness, reforming the mitigation policy and improve the construction of education infrastructure to decrease the access cost.

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