Risk Coping Measures against Different Types of Shocks:
Empirical Evidence from Vietnam Household Living Standard Survey

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【Abstract】 Income variability and additional medical consumption should be major shocks for farm households in developing countries. This paper investigates risk coping measures against these different types of shocks using Vietnamese Living Standard Measurement Study. Estimating results suggest that productive fixed assets are used for medical shock, while non-productive assets such as consumer goods are disposed for coping with income shock. This can be interpreted by nature of shocks, loan interest rate for coping shocks, and households' time preference under liquidity constraint. Consumer goods could be accumulated for precautionary motive and heavy debt of sickness may result in loss of productive fixed assets.

1. Introduction

Agricultural households in developing countries face risk of both income drop and additional expense which often cause severe economic damage to them. While income shock is generally attributed to crop failure, consumption shock is suggested to be generated by sickness of household's members (Gertler and Gruber, 2002; Wagstaff, 2005). In Vietnam, for example, about a third of farm households reported that they suffer from these shocks for the last 12 months, in which households lacking food and suffering sickness, each of which constitutes income shock and additional consumption shock, account for 13% and 19%, respectively[i]. To cope with these shocks, farm households use such various measures as borrowing, selling assets, and additional working. These risk coping measures have attracted many researchers' attention in the context of permanent income hypothesis[ii]. They studied how consumption can be smoothed well against income shock by analyzing real assets of buffer stock such as livestock (Rosenzweig and Wolpin, 1993; Fafchamps et al, 1998; Udry, 1995), grain stocks, and cash (Udry, 1995; Jalan and Ravallion, 2001) or by shedding light on additional labor (Kochar, 1999; Jacoby and Skoufias, 1997) or mutual aid (Udry, 1994; Townsend, 1995; Fafchamps and Lund, 2003). On the other hand, sickness shock has been studied mainly in the context of household's labor supply (Gertler and Gruber, 2002). Some studies suggested that sickness shock should cause more serious damage when additional labor was a chief measure to cope with income shock, and that informal borrowing could prevail to smooth consumption there (Kochar, 1995; Jalan and Ravallion, 2001; Wagstaff, 2007).

The nature of shocks may play key role to understand household's risk coping measures combined with market imperfections (Dercon, 2002; Fafchamps and Lund, 2003). For instance, income shock is often characterized by such aspects as being more collective, more forecastable, and easier to be covered by additional labor if labor market is relatively complete, while sickness shock is regarded as more idiosyncratic, more unexpected, and often needs lump-sum medical costs which cannot be earned by additional labor for a short period of time. These differences of shocks' nature should call for different risk coping measures. However few studies have attempted to investigate such differences except for those below. This paper tries to fill this gap.

Yagura (2005) demonstrated the difference of risk coping measures by comparing the case of illness with that of crop failure in rural Cambodia, in which he depicted that shocks of crop failure can be coped with by additional labor, but illness households have to sell their productive assets such as land. Takasaki et al. (2004) also reported the different measures between flood and health shock in Amazonian tropical forests, where flood and health shock were coped with mainly by ex-post labor efforts and livestock liquidation, respectively. The reason why sickness households likely to sell their productive assets is attributed to the fact that lump-sum treatment cost cannot be made just by earning additional income for the short period (Yagura, 2005). Or it can be explained that productive assets are easier to be sold in the case of idiosyncratic health shock because assets values are likely to have covariance under common income shock (Fafchamps et al., 1998; Dercon, 2002). Or it can be possibly credited to difference of loan interest rate or extent of mutual aids for the different types of

shocks. In this paper, farm households' risk coping measures against two different types of shocks are investigated using data of Vietnam Household Living Standard Survey (VHLSS) 2002 and 2004, and why different measures are employed is tried to be explicated from the light of shock's nature, loan interest rate or mutual aids, and household's time preference in such developing countries as Vietnam.

The contribution of this paper is firstly to find that non-productive liquid assets including consumption goods such as electric appliances, furniture, and bicycles are used to cope with income shock and to suggest the reason why they use these assets could be high discount rate for the future among Vietnamese farm households. Secondly, it is to empirically confirm that productive fixed assets are disposed to cope with sickness shock, which may be caused by necessity for lump-sum medical costs and unfavorable credit market and mutual aids for the sickness shock. Thirdly this paper can empirically clarify the difference of coping measures against different types of shocks after confirming the impact of those shocks on income and additional consumption. The rest of this paper is organized as follows. In chapter two, after introducing the data used here, household's loan, assets, and shocks are explained from the perspective of risk coping measures based on the data. In chapter three, analytical models estimating impacts of shocks on risk coping measures are explained and their results are described in chapter four. In chapter five, summary and policy implication will be suggested as concluding remarks.

2. Data

This paper uses data in Vietnam Household Living Standard Survey (VHLSS) 2002 and 2004. The VHLSS 2002 and 2004 were implemented by General Statistics Office (GSO) of Vietnam with technical assistance from UNDP and the World Bank, of which samples were selected by three-stage stratified sampling based on 1999 Population Census to guarantee their representation[iii]. Like other Living Standard Measurement Studies, the VHLSS 2002 and 2004 contain such various data as income, assets, expenditure, borrowing, employment, and households' characteristics. And VHLSS 2004 includes questions about shocks in their lives and production. Just containing the necessary data for analyzing risk coping measures against shocks, VHLSS 2002 and 2004 may be the best data for my investigation among some open-access survey data.

2-1. Saving deposit, poverty, and medical cost of farm households

The economic growth in Vietnam has still favorably continued after short-term drop caused by the Asian Financial Crisis in 1996. The saving rate, which was very low at the beginning of transition from the planned to the market economy called "Doi Moi" or Renovation reforms, has been increasing under the condition of rise in the real interest rate coupled with growing economy and improving macroeconomic stability. But it is reported that the number of saving deposits among farm households has not yet increased so much for such barriers related to banks as high transaction costs, high minimum deposit amount, and tenuous confidence for banking system (Van den Broeck et al., 2007; Izumida, 2003). This lack of Vietnamese financial saving among farm households has been

discussed from the viewpoint of financial institutions so far. However, household's orientation such as time preference may influence the failure of deposit mobilization, too. This paper will present an interpretation of the deposit's shortage from households' point of view based on the analysis of their risk coping measures.

Nowadays the poverty rate in Vietnam has been exceedingly improving, though its change rate in rural area is much less than in urban area, which leaves rural households still in serious poverty (JBIC, 2001). Moreover the poverty in Vietnam was reported to be characterized by high rate of transient poverty moved down from upper consumption classes, which may signify variability of income and consumption (JBIC, 2001). Thus the study about income and consumption shocks in rural households should be necessary to make policy for poverty alleviation in Vietnam.

Reportedly, medical spending is substantial for Vietnamese households (Khe, N.D. et al., 2002). In 1998, seven percent of total consumption in a Vietnamese household was absorbed by medical spending (World Bank, 2001), and one-fifth of population spent in excess of 20 percent of their non-food consumption on health care (Wagstaff and van Doorslaer, 2003). In VHLSS 2004, ten percent of non-food consumption among farm households is taken up by medical spending and 17 percent of the households spent in excess of 20 percent of their non-food consumption on health care, which suggests that catastrophic health shocks often strike Vietnamese farm households (Lieberman & Wagstaff, 2009). Although health insurance was introduced in 1993, it was criticized to have only a modest effect on out-of-pocket payments because its benefit package is limited, not covering the cost

for over-the-counter drugs which takes much in households' out-of-pocket spending (Lieberman & Wagstaff, 2009). In VHLSS 2004, 36 percent of farm households are covered by the health insurance under both mandatory and voluntary schemes[iv]. This paper will take possible effect of the health insurance on medical treatment into account, and try to demonstrate its effect on farm households' economy as of 2004.

2-2. Income and consumption

The target sample of this study is farm households which count 5,736 accounting for 62.5% in all households of VHLSS 2004. Among them, more than a half has another job, in that 1,046 households (18.2%) are engaged in business and 2,100 households (36.6%) are related to wage-works. The average annual income of farm households is about 1,371US$, which is less than that of both business (2,055US$) and wage-working households (1,608US$)[v] on condition that about a third of households have more than two kinds of job. Doing side job may be necessary for not only managing to live but also risk management strategies.

In Vietnamese farm household's budget, revenues from risk coping measures seemed to play an important role, which counted almost the same as that from cultivation without its necessary costs. The revenue of risk coping measures consisted of borrowing, accounting for 50.4 %, followed by selling productive assets (22.7%), withdrawal from saving (11.9%), and selling gold (9.7%)[vi]. Similarly, expenses related to risk management and risk coping measures account for 11.7% of all the expenditure, in which amounts of debt repayment and investments are relatively high[vii]. Observing

household's income and consumption, loan and assets seem to function as principal measures to cope with risks, which take relatively large part in their budget.

2-2-1. Loan

Seemingly loan is the most major risk coping measures in Vietnamese farm households, but actually it is used for raising investment capital or building houses, too. In fact, loan for raising capital is much more frequent than that for consumption smoothing there. As Table 1 indicates, frequency of capital loan is more than 50 % of all, on the other hand, that for consumption smoothing is only 16.6%[viii]. Besides, the value of capital loan is nearly three times as high as that for consumption smoothing on average, which indicates that the total amount of capital loan is approximately nine times as high as that of consumption loan. Thus it should be noted that risk coping loan may take relatively small part among all the loans in both values and frequency in farm households.

Importantly, the interest rate of consumption loan is much lower than that of capital loan in average, except for medical loan. The difference of loan interest rate can be associated with the difference of organizations supplying these loans. Table 2 indicates that annual interest rate of individual creditors' loan is the highest (26.2%), followed by that of the rural development bank (11.7%), and the cheapest loaner is friends and relatives (2.9%). Generally capital loan is mainly provided by the rural development bank and consumption loan is largely given by friends and relatives, by which the extent of interest rate can be explained. The reason why the highest interest rate is imposed on medical loan may be that the risk of its default is so high that a quarter of them are supplied by

individual creditors with the highest interest rate.

Moreover zero-interest is much more frequent in consumption loan than in capital loan, which is also due to the fact that more than 80% of informal loan by friends or relatives impose no interest. In the case of medical loan, however, zero-interest is less frequent than in other consumption loans, which may also imply high default risk of sickness households. These low or zero-interest consumption loan from friends or relatives can be called mutual aid or quasi-credit (Udry, 1994; Fafchamps and Lund, 2003), which is one of the most important risk coping measures especially in developing countries. A continuous study of mutual aid against shocks in Vietnamese farm society should be conducted more.

2-2-2. Assets

In VHLSS 2002 and 2004, we can use two types of assets data that inform of their stock and money flow by selling and buying them. This paper will calculate the value of change in stock assets between 2002 and 2004 using inflation rate[ix], and try to analyze it from their productivity and liquidity on the lines of previous studies. According to this arranged data, fixed productive assets account for almost a half of household's assets at their value, while non-productive liquid assets account for nearly a third, and liquid productive assets such as productive facilities or livestock take a little more than 20%[x]. Among them, the stock value of non-productive liquid assets is strongly correlated with household's income and expenditure, but that of productive liquid assets show no correlation with them[xi]. Under high economic growth in Vietnam, sales of non-productive assets may indeed be supported by consumer's high purchase desire. However, it can be presumed from the fact

that many non-productive assets and little financial savings are held under the uncertainty and borrowing constraint that those non-productive assets may possibly be stocked for precautionary motive. Actually the amount of household's expense for non-productive assets in 2004 is also strongly correlated with household's expenditure.

2-3. Shocks

In the context of the permanent income hypothesis, food lack shock should show the decrease of transitory income, while sickness shock may indicate decrease of permanent income or additional medical consumption. Since these two types of shocks would affect risk coping measures through different channels, this paper will, first of all, estimate their impact on income and consumption to understand what they indicate.

The self-reported shocks which are often used for showing transitory income can possibly be influenced by the extent of ex-ante risk management, which may suggest possibility of its endogeneity. To hold exogeneity of transitory income variable, Paxon (1992), Rosenzweig and Binswanger (1993), and Rosenzweig and Wolpin (2000) adopted weather variability. But Udry (1995) collected the data of self-reported natural disaster shocks striking farm households. The self-reported shocks variables could be biased but more comprehensive, because farm household's income ought to be influenced by other various things than weather variability. In this paper, self-reported food lack shock will be employed as an income variability variable under the data constraint. To check its bias, its impact on household's income will be estimated before the analysis of

risk coping measures. In addition, instrumental variable method will be tried by using production

shock variables of natural disaster and price variability as its instrumental variables. Then its

endogeneity will be tested based on the estimation results of the instrumental variable method and

the OLS.

As production shocks, VHLSS 2004 reported that the most serious problem is capital lack which

accounts for 27.0%, and followed by price variability (18.4%), knowledge lack (17.6%), and natural

disasters (16.8%). It should be noted that natural disaster is the least frequent in production shocks.

Although capital lack and knowledge lack seem to have serious impact on production, they can be

biased and may possibly be endogenous, while natural disaster and price variability should be

unbiased and exogenous since those shocks may strike households despite of their characteristics.

Thus these self-reported natural disaster and price variability shock will be employed as

instrumental variables for food lack shock here.

In the same manner, self-reported sickness shock could be biased. Strauss and Thomas (1998)

pointed out that self-reported health status is likely to be influenced by household's income and

education level for their extent of health service utilization. In VHLSS 2004, however, sickness shock

neither correlate with household's expenditure (-0.097)[xii] nor with household's education level (-0.11).

Using both self-reported illness symptoms and objective measurement of physical ability to analyze

the impact of sickness shock, Gertler and Gruber (2002) explained that the self-reported illness tend

to be better at grasping minor illnesses. Thus, in this paper, like food lack shock, the impact of

sickness shock on household's income and consumption will be estimated to understand what it shows and to check its bias. In addition, its impact analysis on risk coping measures will be tried by dividing samples into quintile of consumption for robust checking of its bias[xiii].

Other than household's shocks, there are commune shocks in commune data of VHLSS 2004, in which 60 percent of communes reported the shocks including epizooty accounting for 44%, floods (22%), typhoon (13%), and drought (10%)[xiv]. However these common shocks have no correlation with household's shock and their variables have no significant effects on impact estimation of risk coping measures. Thus commune-reported common shocks won't be taken into account here. Although income shock generally tends to be regarded as common shock, its common part cannot be confirmed in this data (Deaton, 1997; Morduch, 2002).

3. Models

3-1. Impact of shocks on income and consumption

First of all, the impact of food lack and sickness shock on household's income and consumption should be estimated as a premise of analyzing risk coping measures against the shocks. If these shocks' variables have linear impact on households' income or consumption significantly, they can be verified as proxy variables of income and consumption shock. The estimation model is following that in Gertler and Gruber (2002):

(1) $\quad \Delta I_{ij}/\Delta C_{ij}/\Delta ME_{ij}/\Delta C_{ij} - \Delta ME_{ij} = \alpha_{ij} + \beta d_{ij} + \gamma X_{ij} + \delta Z_{ij} + u_{ij}$

Which is a regression of the change in income ($\triangle I_{ij}$) or consumption ($\triangle C_{ij}$) or medical spending ($\triangle$

ME_{ij}) or consumption excluding medical spending ($\triangle C_{ij} - \triangle ME_{ij}$) between 2002 and 2004 for individual i in community j against season and area dummies (d_{ij}), series of household's characteristics (X_{ij}), shocks striking household (Z_{ij}), a constant variable (α_{ij}), and a random error (u_{ij}). These independent variables are all of 2004 because shock variables can be given only in VHLSS 2004. In this model, full set of community dummies is included to control for community's aggregate effects. Household's characteristics (X_{ij}) include gender of a household's head, the number of the elderly in a household, total education level of a household, value of household's assets related to residence, square meters of household's land related to production, interaction term between community dummy and the square meters of household's land, wage working dummy, vocational training dummy, and health insurance dummy. As shock variables (Z_{ij}), other than food lack and sickness shock, a dummy variable of self-reported production shock is included. The detail of these variables and their descriptive statistics are shown in Table 3 and Table 4, respectively. And the result of this estimation of equation (1) is shown in Table 5.

As Table 5 shows, food lack shock has negative impact on households' income significantly which is decreased by 1,002,915 Viet Nam Dong (VND is used as its abbreviation in the rest of the article) (63.7 US$) per one point rise of shock's seriousness. Since food lack shock also decreases households' consumption by 499,032 VND (31.7US$), almost half of income shock can be reflected in consumption on average. So the rest half of the income shock should be covered by risk coping measures.

Meanwhile, sickness shock does not have significant impact on household's income, which can be presumed that absence of work or decrease of productivity due to bread earner's sickness may possibly be covered by other labor force. Medical cost is increased by 326,544 VND (20.7US$) per one point rise of shock's seriousness, and consumption excluding medical cost is decreased by 238,195 VND (15.1US$). Increase of medical cost may partly reflect the reduction of consumption excluding medical cost. Sickness shock here can be regarded as additional consumption shock.

Although the amount of impact seems to be much more in income shock than in sickness shock, the insuring extent may be much larger in income shock, actually half of which seems to be covered by some risk coping measures. This difference of insuring extent may suggest that income shock could be easier to cope with than sickness shock by getting low interest rate loan or mutual aids as pointed out in 2-2-1. Sickness shock could be more serious under the unfavorable credit market and mutual aids.

3-2. Risk coping strategies

On the assumption that food lack shock and sickness shock have linear relation to income and consumption respectively, risk coping measures against these two types of shocks will be analyzed. The estimation model is based on Udry (1995), which is as follows:

$$(2) \quad S_{ij} = \alpha_{ij} + d_{ij}\beta + X_{ij}\gamma + Z_{ij}\delta + u_{ij},$$

where S_{ij} is per capita net value of assets or loan or gold or financial assets of household (i) in community (j) in 2004. The net value denotes income earned from these resorts minus expense for

them, for example, selling assets minus buying assets in the year of 2004. In addition, impact on

income and expense due to the risk coping measures will be separately analyzed, for instance, impact

on selling and buying assets will be estimated respectively, to confirm the interpretation of net value

estimation result, especially in negative coefficients. Moreover how stock assets are used will also be

examined using the change of stock value between 2002 and 2004. Categorizing inventory of

household's stock assets in both VHLSS 2002 and 2004 by productivity and liquidity, difference of

disposed stock assets against different shocks are tried to be investigated. Generally productive

assets tend to be kept even in shocks because their disposal necessarily leads to income decrease in

the long run. Against income shock which can be coped with little by little for daily meal,

non-productive liquid assets are preferred to be used, which was empirically pointed out by Udry

(1995) in Nigeria and Jalan and Ravallion (2001) in rural China. On the contrary, sickness shock

often needs sizable lump-sum money, so productive assets tend to be disposed inevitably, which was

reported by Yagura (2005) in Cambodia and Takasaki et al. (2004) in Amazon rain forests.

In the same manner of equation (1), d_{ij} is season and area dummies, X_{ij} is series of household's

characteristics, Z_{ij} is shocks striking households, α_{ij} is a constant, and u_{ij} is a random error for

household (i) in community (j). The full set of community dummies is included, similarly. The detail

of independent variables is the same as those of equation (1) referring to Table 3. The descriptive

statistics is shown in Table 6.

4. Results

4-1. Risk coping measures

As a result of the estimation, it can be found that the risk coping measures are different between food lack shock and sickness shock, namely income shock and additional consumption shock. In the case of sickness shock, productive fixed assets tend to be disposed, while in food lack shock, non-productive liquid assets seem to be used. The estimation result is shown in Table 7, which illustrates that such round sum money as 119,638VND (7.6US$) per one point rise of shock's seriousness are raised by net selling of assets to cope with sickness shock. Observing in detail, productive assets are sold 10.3% more and all assets are bought 10% less at their value[xv].

Meanwhile households suffering food lack shock cannot raise any money from risk coping measures to smooth consumption here. They tend to decrease net loan by 73,562VND (4.7US$) per one point rise of shock's seriousness, in which the value of borrowing and paying debt is down by 23.7% and 15.9% respectively. It could be interpreted that returning debt might be more inevitable than borrowing. As value base, loan does not seem to be a popular risk coping measure for food lack shock although mutual aids may possibly used as a stopgap means. Other measures such as assets, monetary saving, and gold does not seem to be used in food lack shock, for example assets are less sold and less bought significantly here.

Neither monetary saving nor gold seems to be utilized for coping risks at all in Vietnamese farm households. Control variables show that the households with more housing assets and vocational

training tend to make use of them. The fact that more than 90 percent of farm households reported that they have neither monetary saving nor gold suggests that these kinds of saving have yet to be prevalent in Vietnamese farm society or possibly not correctly reported in the survey.

As analyzing change of stock assets by their characteristics, it is found to be different in disposing assets' productivity and liquidity between households with sickness and food lack shock, which is shown in Table 8. It suggests that sickness households dispose more their productive fixed assets by 835,805 VND (54.7US$)[xvi] per one point rise of shock's seriousness, which supports the estimation result shown in Table 7. On the contrary, households with food lack shock tend to dispose more their non-productive liquid assets by 419,921 VND (27.5 US$). Concretely, perennial crops gardens and aqua-cultural farms are often disposed as productive fixed assets, and bicycles, radios/cassettes, and furniture are frequently disposed as non-productive liquid assets. Since these non-productive liquid assets can be easily sold under the relatively complete second-hand market, it can be interpreted that these assets are regarded as a precautionary savings for income shocks in Vietnamese farm households.

The endogeneity test of food lack shock by using estimation result of OLS and instrumental variable method is shown in Table 9. Wu-hausman test suggests that exogeneity of food lack shock cannot be rejected in all estimates, confirming that OLS estimates are unbiased, efficient and consistent.

4-2. Additional labor

Since the value of domestic remittance is almost the same as that of selling productive assets in

VHLSS 2004, diversification of labor supply may be regarded as risk management strategies ex ante.

However additional labor as a risk coping measure cannot be found in both food lack and sickness

shocks. Table 10 shows the estimation result of impact on household's labor change between 2002

and 2004 against two types of shocks by equation (1). All indexes of labor supply are not significant,

which can be interpreted as not only no additional labor for coping with shocks but also keeping

workforce even in the sickness shock. Examining control variables' estimates, only households with

high-educated workforce increase their labor supply in all indexes. It can be presumed that

agricultural work could be covered by other household members or mutual aid to keep its labor force,

however, additional work could be hardly found unless other members are educated well. Who

suffered sickness in a household cannot be identified in VHLSS 2004, so the mechanism of labor

substitute in a household is expected to be studied in other place.

4-3. Insurance

The estimation results in terms of health insurance lead us to assume its effects not only on decrease

of household's medical costs but also increase of their consumption. As shown in the first column of

Table 11 which demonstrates the effects of the interaction term between health insurance and

sickness shock on income, consumption, and medical costs, if a household member is covered by

health insurance, household's medical costs tend to decrease even under the sickness shock by

204,928VND (13.4US$) per one point rise of shock's seriousness. Medical spending in 2004 is also

significantly reduced in insured sickness households. The second column of Table 11 suggests that

households covered by health insurance could enjoy consumption rise. They significantly increase consumption without medical cost more than consumption itself through reduction of medical spending.

Insured households with sickness shock use no risk coping measures, implying that they may be well insured. Table 12 shows a significant part of insured household's behavior related to risk coping, in which assets and gold are significantly bought more and productive assets are tend to be sold. It could be interpreted that insured households can expand their consumption through reduction of medical risk (Wagstaff and Pradhan, 2005), and at the same time, they can increase their stock assets that could be used for coping shocks, namely for precautionary motive.

5. Concluding remarks

This paper finds that income shock of food lack in Vietnamese farm households may be coped with by disposing such non-productive liquid assets as consumption goods under borrowing constraint and partial mutual aid, which suggests their higher discount rate for the future than real interest rate or possible return of productive assets (Deaton, 1991; Dercon, 2002). From this risk coping measure and the strong correlation between household's income and its liquid assets' value, it can be considered that consumption goods are accumulated for precautionary motive. Actually we can find a lot of second-hand shops in Vietnam as anecdotal evidence. Besides, lack of financial institutions in rural area, distrust of currency, and high economic growth may encourage this impatient precautionary saving.

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Meanwhile sickness shock which can be regarded as additional consumption shock here should be coped with by selling productive fixed assets, which can be attributed to necessity to pay lump-sum money at once for medical costs and unfavorable condition of both loan interest rate and mutual aid for sickness shock. Sickness households often try to get it through by loan initially (Khe et al., 2002), but some of them result in losing their fixed assets for heavy debt consequently due to an extended or repeated sickness (Thi Thuan et al., 2006)[xvii]. Therefore sickness shock can be more catastrophic than income shock because loss of productive fixed assets should cause serious damage on household's economy in the long run. Since effect of health insurance is empirically verified on sickness shock in this paper, expanding of its coverage may be expected to avoid this catastrophe. Given that repeated "every-day illness" may cause serious damage, over-the-counter drug cost which takes the greater part of household's medical spending should be covered by the insurance, even for a certain amount of the cost.

Reportedly kinds of assets for precautionary motive have been recently changing in Vietnam (Fischer and Hager, 2005) since keeping live stock gets to be difficult because of the condition of reduction of common grazing land which is due to the population growth, intensified agricultural production, and individualized land use rights. Compared to live stock, consumer goods should be less risky against relatively high inflation rate and possible prevalence of epizooty, in addition they may satisfy household's demand enjoying economic growth after being suppressed for a long period of time in aftermath of the civil war. However, it can be implied from the fact that capital lack is regarded as

the most serious problem in production that financial saving should be required for the productive

capital. Thus to mobilize financial saving for improving productivity among farm households,

household's time preference should be taken into account in considering financial service such as

interest rate.

Footnotes

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[i] This statistics is calculated by the author based on Vietnam Household Living Standard Survey

(VHLSS) 2004.

[ii] The term of risk coping measures indicates ex-post measures coping with shocks based on the usage of

the term in Alderman and Paxson (1992), and Sadoulet and de Janvry (1995). Meanwhile ex-ante

arrangements to reduce the riskiness are defined as risk management mechanism by them.

[iii] The GSO of Vietnam planned this VHLSS as a long successive survey through 2010 in every two years.

And only both VHLSS 2002 and 2004 can be generally accessed via GSO now. Please refer to *VHLSS,*

2002 and 2004 Basic Information and contact Tung, P.D. and N. Phong (nphong@gso.gov.vn) for their

detailed information.

[iv] Initially Vietnamese health insurance covered civil servants, formal sector workers, big private

companies' employees (all private companies are included later), retired government officials, war

veterans, members of Parliament, Community Party officials, war heroes, and other "people of merit".

After a while, children under the age of six are included. From 2003, the poor and the ethnic minority

living in remote area were added. These are the targets of compulsory insurance scheme. On the other

hand, voluntary scheme aimed at full time students (Lieberman and Wagstaff (2009)).

[v] This calculation is based on World Development Indicator online in which official exchange rate in 2004

is 15,746 Vietnam Dong per US$. Average annual expenditure is US$1,044 in agricultural households,

US$1,462 in business households, and US$1,255 in wage-working households.

[vi] In this section of questionnaire, there is not the data of revenue from selling all assets but only

productive assets.

[vii] Debt repayment and investments account for 29.5% and 17.9% of the expenditure related to self insurance, respectively.

[viii] Loan for capital includes production capital (45.3%) and capital investment (8.5%). Loan for consumption smoothing comprises general consumption (7.1%), buying food between crops (1.2%), wedding/funeral (1.4%), and medical treatment (7.0%).

[ix] According to the World Development Indicator, the consumer price index in 2002 and 2004 is 103 and 115 respectively setting a standard in 2000 as 100.

[x] The share of assets value by productivity and liquidity in detail is following; fixed productive assets account for 44.3% in 2002 and 47.1% in 2004, non-productive liquid assets account for 32.8% in 2002 and 28.3% in 2004, and liquid productive assets take 21.7% in 2002 and 22.2% in 2004.

[xi] The correlation coefficient of nonproductive assets is 0.53 to income and 0.6 to expenditure and that of productive liquid assets is 0.18 to income and 0.1 to expenditure. The fixed productive assets show just weak correlation.

[xii] Using the expenditure minus medical expense, the correlation coefficient of them is -0.16. The correlation between sickness shock and flow value of assets is also low (0.04).

[xiii] Actually the estimation results are all insignificant. So it cannot be considered that the self-reported sickness shock variable is biased by economic level.

[xiv] The epizooty here may indicate avian flu prevailing throughout Vietnam in 2004. For such collective shocks, relief aid is often sent, for example, about 70% of communes have received aids in the case of epizooty.

[xv] Due to the data constraint, income from selling assets excludes revenue from non-productive assets.

[xvi] This conversion from VND into US$ is based on the official exchange rate in 2002 reported by the World Development Indicator, 15,280 VND = 1US$, since these change of assets value are calculated according to the standard in 2002.

[xvii] Thi Thuan et al (2006) suggested that catastrophic health spending was usually resulted from a series of illness or repeated "every-day illness" based on the data of northwestern Vietnam.

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Tables

reason of loan	Frequency (%)	mean interest rate per year	Frequency of 0-interest loan (%)	mean loan value (thousand VND)
Table 1. loan interest rate & loan value by its reason				
wedding/funeral	52 (1.4)	3.31	31 (59.6)	3,861
buying food between crops	43 (1.2)	5.58	27 (62.8)	1,921
improving sanitation	6 (0.2)	7.20	1 (16.7)	8,500
house purchase	434 (11.8)	7.20	176 (40.6)	9,592
improving water supplies	14 (0.4)	7.43	4 (28.6)	2,732
general consumption	260 (7.1)	7.77	130 (50.0)	3,733
buying durable goods	164 (4.5)	8.24	69 (42.1)	5,522
study	116 (3.2)	8.88	38 (32.8)	4,541
capital investment	314 (8.5)	9.02	62 (19.8)	9,816
debt repayment	199 (5.4)	10.18	52 (26.1)	5,464
production capital	1669 (45.3)	10.76	214 (12.8)	9,430
medical treatment	257 (7.0)	12.59	116 (45.1)	3,936
others	154 (4.2)	9.62	55 (35.7)	9,849
average mean		9.67		5,754
Total	3684 (100)		976 (26.5)	
made by the author based on VHLSS2004				

loan organization	Frequency (%)	mean interest rate per year	Frequency of 0-interest loan	mean loan value (thousand VND)
Table 2. loan interest rate & loan value by its organization				
social policy bank	388 (10.5)	6.07	6 (1.6)	4,251
agri & rural dev. bank	1461 (39.7)	11.69	21 (1.4)	10,472
other banks	82 (2.2)	11.31	3 (3.7)	22,370
employment support fund	54 (1.5)	4.94	1 (1.9)	6,394
credit organization	121 (3.3)	12.55	5 (4.1)	9,189
socio-political organization	174 (4.7)	9.29	9 (5.2)	2,902
individual creditor	331 (9.0)	26.16	48 (14.5)	5,986
friends, relatives	955 (25.9)	2.95	802 (84.0)	6,504
others	118 (3.2)	3.30	81 (68.6)	3,777
average mean		9.81		7,983
total	3684 (100)		976 (36.5)	
made by the author based on VHLSS2004				

Table 3. detail of variables									
Dependent variables: △income, △consumption, △medical spending, △(consumption－medical spending) are all the change between those in 2002 and in 2004.									
(The value in 2004 is converted to that in 2002 using inflation rate based on the World Development Indicator.)									
〈season and area dummy〉									
season dummy	The survey of VHLSS 2004 is executed in May～June and September or December.								
	If household is surveyed in May～June: 1/ in September or December: 0								
urban dummy	If household live in urban area: 1 / in rural area: 0								
〈household's characteristics〉									
wage dummy	If household head is engaged in wage work: 1 / no: 0								
gender dummy	If household head is male: 1 / femail: 0								
number of elderly person in a household	the number of male over 60 and female over 55								
vocational training dummy	If household head have gotten vocational training: 1 / no: 0								
education level of workers in a household	total education level of workers in a household								
value of assets related to residence (log)									
square meter of holding land related to production (log)									
insurance dummy	If a household member except for students and under six years old is								
	covered by health insurance: 1/ no:0								
	(almost all students and children under six years old are compulsory to be covered)								
〈shock variables〉									
shock of food lack	If household suffered food lack shock the most sereously: 3, no food lack shock: 0								
	accroding to the extent of their seriousness, 1～3 is labeled								
shock of sickness	If hosuehold suffered sickness shock the most seriously: 3, no sickness shock : 0								
	accroding to the extent of their seriousness, 1～3 is labeled								
shock of production (dummy)	If household suffered production shock: 1, no: 0								

Table 4. disctiptive statistics of Vietnamese firm householdse in quation (1)					
Variable	Obs	Mean	Std. Dev.	Min	Max
dependent variables					
Change of Income 2002−2004 (1,000VND)	2203	3584.127	13614.2	−162246	109892.5
Change of Consumption 2002−2004 (1,000VND)	2203	2443.448	7883.656	−38896	59471.59
Change of Medical cost 2002−2004 (1,000VND)	2203	144.3376	1832.823	−12788.3	34779.92
Change of consumption−Medical cost 2002−2004	2203	2299.11	7593.899	−38178.5	65175.09
independet variables					
〈season and area dummies〉					
season dummy	2203	0.509	0.500	0	1
Urban dummy	2203	0.099	0.298	0	1
〈household's characteristics〉					
gender dummy	2203	0.834	0.372	0	1
wage dummy	2203	0.367	0.482	0	1
number of elderly person in household	2203	0.401	0.693	0	3
vocational training dummy	2203	0.071	0.257	0	1
education level of workers in household	2203	8.557	5.032	0	36
value of assets related to residence (log)	2203	10.459	1.710	0	14.509
square meter of holding land related to production (log)	2203	8.256	1.611	0	12.845
medical insurance dummy	2203	0.355	0.479	0	1
〈shock variables〉					
shock of food lack	2203	0.332	0.903	0	3
shock of sick	2203	0.520	1.091	0	3
shock of production (dummy)	2200	0.403	0.491	0	1
Notes: Calculated by the author based on VHLSS 2002 and 2004 .					

Table 6. Discriptive statistics of equation (2)					
variable	Obs	Mean	Std. Dev.	Min	Max
dependent variables					
<per capita flowing value of household in 2004 (1,000VND)>					
net assets (selling - buying assets)	5736	−13.326	3435.625	−15789.5	101696.700
net borrowing (borrowing-paying debt)	5736	482.032	2193.737	−18947.4	58666.670
net monetary deposit (withdrawal - saving)	5736	73.844	2310.468	−50000	85714.290
net gold (selling-buying gold)	5736	−19.262	1422.043	−38000	23750.000
<change of stock value of household's assets in 2002～2004 (1,000VND)>					
productive fixed assets	2203	−3865.271	41102.800	−566522	596565.200
productive liquid assets	2203	−1658.828	30239.890	−1275227	195794.300
non-productive liquid assets	2203	−1081.960	7001.998	−121677	46701.740
independent variables					
<season and area dummies>					
season dummy	5736	0.505	0.500	0	1.000
urban dummy	5736	0.095	0.293	0	1.000
<household's characteristics>					
gender dummy	5736	0.830	0.375	0	1.000
wage dummy	5736	0.366	0.482	0	1.000
number of elderly person in household	5736	0.399	0.688	0	4.000
vocational training dummy	5736	0.078	0.268	0	1.000
education level of workers in household	5736	8.350	4.896	0	36.000
value of assets related to residence (log)	5736	10.467	1.761	0	16.118
square meter of holding land related to produc	5736	8.278	1.531	0	12.845
medical insurance dummy	5736	0.362	0.481	0	1.000
<shock variables>					
shock of food lack	5736	0.352	0.926	0	3.000
shock of sick	5736	0.509	1.076	0	3.000
shock of production (dummy)	5730	0.391	0.488	0	1.000
Notes: Calculated by author from VHLSS 2002 and 2004. Independent bariables are from VHLSS 2004.					

Table 7. Impact of shocks on risk coping measures				
	food lack shock		sickness shock	
	(1)	(2)	(3)	(4)
net selling assets	−10.649		119.638**	
(selling assets − buying assets)	(−0.33)		(2.13)	
selling productive assets (log)		−0.316***		0.103*
		(−4.29)		(1.85)
buying assets (log)		−0.261***		−0.1***
		(−7.01)		(−3.67)
net borrowing	−73.562***		4.897	
(borrowing − debt payment)	(−3.53)		(0.25)	
borrowing (log)		−0.237***		−0.052***
		(−9.61)		(−2.60)
paying debt (log)		−0.159***		−0.015
		(−4.40)		(−0.53)
net monetary saving #	−9.446		−18.227	
(withdrawal − saving)	(−0.60)		(−0.78)	
withdrawal (log)		0.001		−0.135**
		(0.01)		(−2.23)
saving (log)		−2.192***		−0.035
		(−2.71)		(−0.35)
net selling gold	−0.044		2.546	
(selling gold − buying gold)	(−0.00)		(0.2)	
selling gold (log)		−0.191**		0.014
		(−2.36)		(0.25)
buying gold (log)		−0.288***		−0.091
		(−3.36)		(−1.68)

Notes: Columns (1) and (3) are OLS estimates with robust t−values in parenthesis and columns (2) and (4) are Tobit estimates with t−value in parenthesis. Independent variables include full set of community dummies (63 communities) and the interaction term between community dummy and the square meter of productive land other than listed variables in Table 3. N = 5730

 ***, **, * indicates significance at 1%, 5%, 10% level, respectively.

: The estimation of net monetary saving does not pass the F−test, so these estimates are shown for reference.

Table 8. Impact of shocks on household's stock assets between 2002−2004		
	food lack shock	sickness shock
productive fixed assets	369.23	835.805*
	(0.5)	(1.70)
productive liquid assets	388.992	621.717
	(0.55)	(1.32)
unproductive liquid assets	419.921***	11.368
	(2.72)	(0.08)

Notes:These are OLS estimates with robust t−value in parenthesis. Independent variables include full set of community dumies (63 communities) and the interaction term between community dummy and the square meter of productive land other than listed variables in Table 3. ***, * indicates significance at 1%, 10% level.

Table 9. Estimation result of Instrumental variable method for impact of shocks on risk coping measures in 2004				
	food lack shock	sickness shock	Wu–Hausman F test	Durbin–Wu–Hausman chi-sq test
net selling assets	80.19	110.763*	0.0465	0.048
(selling assets − buying assets)	(0.22)	(1.70)	F(1,5589) P–value=0.829	Chi-sq(1) P–value=0.827
net borrowing	143.233	−16.284	0.652	0.669
(borrowing − debt payment)	(0.46)	(−0.44)	F(1,5589) P–value=0.419	Chi-sq(1) P–value=0.413
net monetary saving	−10.729	−18.102	0.00002	0.00002
(withdrawal − saving)	(−0.05)	(−0.60)	F(1,5589) P–value= 0.996	Chi-sq(1) P–value=0.996
net selling gold	1.007	2.443	0.00004	0.00004
(selling gold − buying gold)	(0.01)	(0.13)	F(1,5589) P–value=0.995	Chi-sq(1) P–value=0.995

Notes: these are instrumental variable estimates with robust t-value in parenthesis and Wu–Hausman test for exzogeneity of food lack shock. * indicates significance at 10% level.

Table 11. Impact of health insurance and interaction term between insurance and sickness shock on change of income, consumption, and medical spending		
	Insurance dummy × sickness shock	Insurance dummy
△Income in 2002–2004	−429.777	1979.001***
	(−0.96)	(3.05)
△consumption in 2002–2004	359.181	827.365**
	(−1.16)	(2.04)
△medical spending in 2002–2004	−204.928*	−21.662
	(−1.75)	(−0.23)
△consumption − medical spending in 2002–2004	−154.254	849.027**
	(−0.52)	(2.20)
medical spending in 2004	−201.554*	−66.258
	(−1.71)	(−0.67)

Notes: ***, **, * indicates significance at 1%, 5%, 10% level, respectively.
Independent variables are same as Table 3. N=2200

Table 12. Iimpact of health insurance on assets and gold in 2004		
	Insurance dummy	
	OLS estimates	Tobit estimates
net selling assets	−88.475	
(selling assets − buying assets)	(−0.94)	
selling productive assets (log)		0.34***
		(2.57)
buying assets (log)		0.13**
		(2.16)
net selling gold	−42.156	
(selling gold − buying gold)	(−0.94)	
selling gold (log)		−0.034
		(−0.25)
buying gold (log)		0.217**
		(2.09)

Notes: ***, ** indicates significance at 1%, 5% level, respectively.
Independent variables are same as Table 3. N=5730

Table 5. Impact of two types of shocks on income and consumption in 2002-2004								
	△Income in 2002-2004		△consumption in 2002-2004		△medical spending in 2002-2004		△(consumption-medical spending) in 2002-2004	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
food lack shock	−1002.915	−3.68***	−499.032	−3.15***	−38.875	−0.99	−460.156	−3.03***
sickness shock	−167.823	−0.7	88.349	0.56	326.544	4.92***	−238.195	−1.65*
Notes: ***, * indicates significance at 1% and 10% level, respectively. Independent variables include full set of community dummies (63 communities) and the interaction term between community dummy and the square meter of productive land other than listed variables in Table 3. N=2200								

Table 10. Impact of two types of shocks on labor in a household in 2002-2004								
	△work hours in a month		△The number of workers		△the number of income source		△ wage income	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
food lack shock	0.663	0.1	0.033	1.03	0.031	0.92	−32.284	−0.29
sickness shock	1.149	0.24	0.021	0.86	0.002	0.08	29.298	0.31
Notes: ***, * indicates significance at 1%, 10% level, respectively. Independent variables include full set of community dummies (63 communities) and the interaction term between community dummy and the square meter of productive land other than listed variables in Table 3. N=2200								