The causes of chronic and transient poverty and the implications for poverty reduction policy in rural China

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The study focuses on two components of total poverty: chronic and transient poverty, and investigates their relative importance in total observed poverty, as well as the determinants of each component. We find that transient poverty accounts for a large proportion of total poverty observed in the poor rural areas of China. By analyzing the determinants of the two types of poverty, we find that household demographic characteristics, such as age of the head of households, family sizes, labour participation ratio, and educational level of the head of the households, are very important to the poverty status of households. These factors matter more to chronic poverty than transient poverty, and have greater impacts on the poverty measured by consumption than that measured by income. Besides the demographic factors of households, other household factors like physical stocks, the composition of income, and the amount of cultivated lands also have significant effects on both chronic and transient poverty. It is also confirmed that change in cash holding and saving and borrowing grain are used by rural households to cope with income variation and smooth their consumption. Attributes of community where the households reside are also important to poverty. With very few exceptions, we do not find that poverty programs have significant impact on poverty reduction at the households' level. We interpret this as the poverty programs benefiting the wealthy more than the poor in a given poor area. The main reason for this could be that the implementation design of these programs fails to target the poor.

Keywords: income risk, chronic poverty, transient poverty, poverty program evaluation

1. Introduction

After more than two decades of tremendous reduction of poverty, China has only a small number of poor people in rural areas.[1] According to official estimates, rural population with incomes below poverty line dropped from 250 million in 1978 to about 30 million in 2002, or from 30 percent to 3 percent as a proportion of total rural population. While the smaller number of rural poor largely depends on the lower official poverty line, substantial alleviation of rural

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[1] Section 5 below gives a brief introduction to Chinese government's poverty reduction efforts.

poverty can also be observed with higher poverty line. The World Bank has set up 1 dollar per day poverty for international comparison, which is often referred to as the international poverty line. Application of the international poverty line in China produces a poor population of 280 million in 1990 and about 85 million in 2002, or 31.3 percent in 1990 and 10.9 percent in 2002,[1] indicating a relatively smaller number of the poor than ever.

The poverty profile changes substantially as the size of the poor in rural China becomes smaller. Unlike the situation in the early 1980s when poverty was prevalent in China's rural area, regardless of the regions' family size, educational level of family members and so on, the remaining poverty at present is known to have the following features. First of all, the existing poverty is regionally concentrated in the western area where quality of the land is so poor that it hardly provides for agricultural production even at the subsistence level. According to World Bank estimates, the country's southwestern provinces account for 41.2 percent of the remaining rural poverty and northwestern provinces 28.4 percent in 1996.[2] Secondly, minority people disproportionately represent the remaining poor. Most of the minority people have remained poor because they are concentrated in the barren, mountainous counties in the western provinces, and their disadvantage with the Chinese language prevent them from sharing in the benefits of China's rapid economic growth. Thirdly, some demographic features compound the remaining poverty. For example, the poor households tend to be those headed by persons with low educational level and those with a large number of family members. Also, a large number of households fail to escape from poverty because of disability or serious disease of main household members, thus limiting the households' labour resources.

Such information on the features of the poor households is essential for understanding poverty and subsequently designing policies for poverty reduction. Spatial concentration of remaining poverty, for instance, is the most important information that compels China's central government to implement a poverty alleviation program targeting regions. While some good information is now available from previous works about features of existing rural poverty, we still lack knowledge in some aspects of rural poverty in China.

One of them is our knowledge of dynamics of poverty: that is, which of two types of poverty—chronic poverty and transitory poverty—is more important in terms of their proportion in the remaining total poverty? The poverty alleviation program has been aiming to reduce rural poverty through raising general income level of entire residents of poor rural areas, especially the poor in the poor rural area. Is this the proper or most effective policy to address the remaining poverty in rural China?

Our knowledge of the dynamics of poverty is crucial in designing a proper and effective policy because two types of poverty seem to have different causes and require different remedies. Transient poverty, for instance, is mainly due to income fluctuation, and some measures that

[1] Figures for 1990 come from World Bank (2001) and those for 2002 are based on author's calculation.
[2] World Bank (2001).

help households smoothen income variations will be most effective in reducing it. The poverty reduction program implemented so far by China's government, which aims to raise long term income levels of the rural poor, may not be the most effective policy if the transient component accounts for the majority of the remaining poverty. Unfortunately, it remains unclear that how relatively important the transient poverty is in the remaining poverty in rural China. This study intends to fill the gap by decomposing the aggregate poverty index into its transient and chronic components and examine which part is more important in the existing poverty situation. By running multivariate regression we also investigate causes of each part of both types of poverty at household level.

Besides tremendous reduction of poverty during more than two decades in the past, the huge poverty alleviation program implemented by the Chinese governments is another factor that has attracted great attention so far. Rural economic reforms initiated during the end of the 1970s realized growth in rural areas that were suppressed by previous economic planning regimes. These reform programs allowed for a dramatic reduction of poverty before 1984. As this potential growth was exhausted and economic reform shifted focus from rural to urban areas, decline in the rural poor began to slow down, even halt since 1985. This is the principal reason why the central government in China decide to launch a comprehensive poverty alleviation program in 1986.

While the simultaneous decline in rural poverty and the allocation of large funding for poverty alleviation have often been cited as evidence that the poverty program have contributed to addressing rural poverty, the program's effectiveness remains controversial. What is the real impact of these programs on poverty? How do these programs contribute to reducing total poverty? How does the improvement in household wellbeing affect the impact of these programs? It seems that these questions have not been answered properly.

Previous studies show that growth rates of income and consumption per capita in counties designated as nationally poor counties are higher than those in the other counties. These studies thus conclude that poverty program contribute to a reduction in rural poverty[1]. The judgement, however, is questionable as the poverty program's contribution to the rise in general level of income or consumption in a nationally poor county does not necessarily lead to a rise in income or consumption of the poor in that county. The program may thus benefit the rich more than the poor in the area, which is the point people often make. Therefore, the right way of assessing the program's impact is to link the program to certain poverty measures instead of wellbeing measures such as the county's income and consumption per capita as a whole.

As examining the determinants of transient and chronic poverty, this study evaluates the program's impact on poverty alleviation by including poverty funds received by counties and

[1] See Park, Wang and Wu (2002), for instance. Also refer to next section for survey of works on evaluation of impacts of poverty program implemented in rural China.

subsidized loan directly received by households as explanatory variables. By linking the poverty funds directly to poverty components, transient and chronic poverty are thus measured at the household level, allowing for a proper assessment of the impact of these different programs on poverty alleviation.

The rest of the paper proceeds as follows. Section 2 provides an overview of previous studies on rural poverty in China, with the aim of explaining the added value of this study. Section 3 introduces the methodology of decomposing aggregate poverty index into transient and chronic poverty, both at household and population levels. Description of data used in the study is also given in the section. Section 4 represents a result of decomposing aggregate poverty into its two components for entire households. The decomposition is made by age and educational level of the heads of households, the family size, and region. Following a decomposition of poverty index for entire households, section 5 makes the same decomposition at the household level and treats the results as explained variables to examine causes of poverty. Section 6 summarizes the main results of the study.

2. A review of previous studies on rural poverty in China

A great deal has been written on the decline of rural poverty in China and government's own poverty alleviation program. For the purpose of the study, which aims to investigate the two types of poverty and its respective causes, the review of previous works given below concentrates on studies of poverty dynamics for rural China. In addition, we also reviews previous works on the assessment of impacts on poverty of poverty programs implemented by the Chinese government, since quantifying the effectiveness of the poverty program represents an important part of the study. We shall begin with a review of literature on the dynamics of poverty for rural households in China.

People have been paying close attention to the dynamics of poverty, because the poor (identified in this study by one-year accounting period data) is a very mixed and heterogeneous group. Some of the poor may be just transitorily poor due to temporary reasons like income variation, while others are persistently poor because of long-term low incomes. To make a distinction between the transitory poor and persistent poor is certainly important, not only in understanding the nature of poverty, but also in designing an effective poverty reduction policy.

Several methods have been proposed in measuring poverty dynamically, but it is beyond the scope of this study to review all these methods.[1] We choose the method proposed by Rodgers and Rodgers (1993) for this study's purposes. Perhaps the most appealing feature of this approach is that, based on the concept of permanent income and using FGT index, a poverty index proposed by Foster, Greer and Thorbecke (1984), the method defines transient and chronic components of

[1] For short but very excellent surveys of the measures of poverty dynamics, refer to Bane and Ellword (1986) and Rodgers and Rodgers (1993).

aggregate poverty in a continuous manner and captures the severity of poverty.[1]

Little research has been done to examine the dynamic nature of poverty in rural China, due largely to the unavailability of data. Using panel data at the household level from four provinces in southern China-Guangdong, Guangxi, Guizhou, and Yunnan-Jalan and Ravallion (1998b) decompose the aggregate poverty index into chronic and transient poverty and find that the percentage of the transient component in total poverty is 49.39 percent on average (sample mean), but varies with family size, educational level of the head of household, and so on. Their method for decomposing the total poverty index into its transient and chronic components is very similar to that proposed by Rodgers and Rodgers (1993). Using the same data set, Jalan and Ravallion (2000) investigate the causes of poverty by regressing each of the transient and chronic measures constructed at household level on a same set of demographic characteristics for sample households and geographic features of communities where the sample households reside. The most important message conveyed by the study is that the two types of poverty are caused by different factors, thus requiring different policies for reducing them. Moreover, the study demonstrates that the cause of transient poverty is much more difficult to explain via model estimates compared to chronic poverty.

Our study resembles Jalan and Ravallion (1998b) in the sense that it looks at the dynamic feature of rural poverty in China, and our study is similar in the method of decomposition as well. Our study is also broadly similar to Jalan and Ravallion (2000), in our purpose to examine the causes of both transient poverty and chronic poverty, and in the econometric technique used for estimation.

However, our study differs from these two works in several aspects. The first difference is in data sets used: data in Jalan and Ravallion's works come from regular annual household survey, which consists of 5,854 sample households from four provinces in southwest China and covers the six years from 1985 to 1990. The sample households come from both wealthy and poor counties of the four provinces. The data set used in our study, on the other hand, is from the Poverty Monitoring Survey (PMS) of about 60,000 households, from which about 16,000 households are identified as continuous and represent a panel data set. Since all the sample households in the PMS come from the poorest counties in China, analysis based on the data set captures the poverty situation for the entire poor rural area in China.

Another difference between our study and Jalan and Ravallion is in the use of welfare measures. The two works by Jalan and Ravallion conduct poverty analysis based on consumption. It is fairly right in employing consumption as a welfare measure in its analysis of poverty, because of a general recognition of superiority of consumption over income as welfare measure. In spite of this general rule however, inclusion of income as a welfare measure in poverty analysis certainly improves our understanding of poverty. We give two examples to prove this point. First, due to savings and borrowing behaviours of households, the poverty measured by consumption

[1] See Rodgers and Rodgers (1993) or the next section of this paper for details of the method.

differs from that measured by income. A comparison of consumption-based poverty and income-based poverty thus allows us to draw some information on the extent to which households smooth their consumption in the face of income variations. Second, since consumption-based poverty measures differ from income-based poverty, it is highly likely that certain factors may impact on income-based poverty but not on consumption-based poverty. This is especially important in evaluating impacts of poverty reduction programs.

Ravallion and Chen (2005), performing an impact assessment of World Bank's Southwest Poverty Reduction Project (SWPRP), finds that the impact is much greater on the income-based poverty index than the consumption-based one, because households in beneficiary villages save large portions of short-term gain from the project. Also, as presented in Section 4 of this paper, we find a big difference between poverty index based on consumption measures and those based on income measures.

Turning to studies on the impact of government-led poverty reduction programs for rural China, we note that several works have been done so far, but these have left the assessment of true impacts untouched.

The poverty program has been characterized by regional targeting from the beginning;[1] that is, the program was carried out by first designating some counties as nationally poor counties,[2] and then channelling entire poverty funds into these counties. There have already been three rounds of designations of nationally poor counties: in 1986, 1993, and 2001. The number of counties identified as nationally poor counties increased from 258 in the first designation to 592 in the second, but this was left unchanged in the third.[3]

As mentioned in Section 1, the poverty alleviation program in China started in the mid-1980s, and its key feature was regional targeting. That is, the program is implemented through initially designating some counties as nationally poor counties, and then providing the total poverty funds for the designated counties.[4] So far, three rounds of designation have already taken place: in 1986, 1993, and 2001. In each designation, nationally poor counties are selected based mainly on net income per capita of the counties, with some political factors also taken into account. Revolutionary base areas (*laoqu*), counties with a large number of ethnic minorities as residents, and remote areas have received favourable treatment.[5] In the second round of designation, the number of nationally designated poor counties increased to 592, while the number was unchanged

[1] For detailed explanation see, for instance, World Bank (2001), Park, Wang and Wu (2002), Zhang, Huang and Rozelle (2003), and Yue and Li (2004).

[2] Only the designated counties quality for receiving poverty funds provided by the central government.

[3] For detailed explanation of three rounds of designation and their accuracy see Park, Wang and Wu (2002) and Yue and Li (2004).

[4] It is assumed that the poor living outside the national poor counties receive no attention from the poverty reduction program. This has been criticized in several research studies, such as Riskin (1994) and Would Bank (2001) for instance.

[5] For details of targeting accuracy in three round designation, refer to Park Wand and Wu, (2002) and Yue and Li (2004).

in the third designation.

There have been three subprograms through which the poverty funds provided by central government are distributed to nationally poor counties: subsidized loans, Food-for-Work, and development funds. The three subprograms were administered by different government agencies and have different functions. Subsidized loans are administered by the Leading Group's Poor Area Development Office and Agricultural Development Bank, and aim to provide loans to township enterprises as well as households.

On the other hand, the Food-for-Work Project is organized by the State Planning Commission, with the aim of providing funding for infrastructure such as roads, water reservoirs, land improvement, and so on. Finally, development funds are supported by the Ministry of Finance and provided under the general purpose of development and income distribution. Subsidized loans are the biggest among the three subprograms in terms of scale of the poverty funds allocated, which account for more than half of the total poverty funds provided by the central government. The amount provided through the Food-for-Work Program have been constantly larger than the amount for development.

Current statistics provide information on the amount of poverty funds for each subprogram by nationally poor county. However, little has been known about how the poverty funds are distributed beyond the county level. Is the poor in nationally poor counties more likely to get access to poverty funds than the wealthy? Do the projects supported by poverty funds benefit the poor more than the non-poor? Such information is essential to establish an accurate impact evaluation of poverty alleviation programs but the lack of current statistics presents a main obstacle to the conduct of program impact assessments. The only exception to this situation is the subsidized loans program: PMS information is available regarding which household receives subsidized loans and how much they received during the survey period.

The poor targeting of poverty funds is first observed at the county level. In investigating the determinants of allocation of poverty funds among nationally poor counties, Park, Wang and Wu (2002) find that the development funds are only negatively related to income level of counties for the period from 1994 to 1996. For the period of 1988 though 2001, Yue and Li (2004) find that, taking whole designated poor counties together, there is a strong negative link between per capita funds obtained and net income per capita for total poverty funds and each of its three components. The negative link, however, does not carry over into each province. In most provinces, there is no negative relation between per capita funds obtained and net income per capita among the designated poor counties, and even a positive relation is observed in a few provinces. This means that in most provinces, the poverty funds are distributed without consideration of the counties' income level.

The poor targeting of poverty funds is more serious below the county level. Do the poverty funds really reach the poor? Or have most of the funds trickled down to the non-poor? PMS provides information on the amount of subsidized loans received by the sample households, which can be used to answer the question for subsidized loans. Of the 1,059 total sample

households, 2.1 percent are reported to have received subsidized loans in 2000. Of this percentage, 424 households are the poor which account for 40.0 percent of total households reported to have gotten the loan. The poor here is identified by the World Bank's poverty line of 874 Yuan, using income as a welfare measure. This figure is reduced to 190 households if the official poverty line of 625 Yuan is applied: this means that only 17.9 percent of the total households have a chance to access the subsidized loans. Therefore it is evident that poor households have less of an opportunity to access the subsidized loans than the wealthy.

Refined analysis makes the evidence clearer. By estimating Tobit model, Yue and Li (2004) find that, whether households can obtain the loan and how much they receive when having the chance of obtaining the loan are not related to income level of households. The result is obtained by including income per capita of counties where the households are located. Estimated coefficient for the per capita county income is significantly negative, suggesting that households residing in lower income counties are more likely to have access to the subsidized loans than households located in relatively higher income counties. However, within a county the poor households do not have more of a chance to get the loan than the wealthy. This reduced opportunity for poor households to access the loan subsidy is attributable to several factors,[1] one of which is that the subsidized loans still require repayment, and it is always a higher repayment risk for the bank if it provides a loan to the poor than to the wealthy.[2]

Using county level data and employing two methods, growth regression and propensity-score matching, Park, Wang and Wu (2002) find that growth rates of income per capita in designated nationally poor counties are higher than those in non-nationally poor counties by 2.28 percent per annum during 1985-1992 and by 0.91 percent during 1992-1995. Using household level data and a consumption-growth model estimation,[3] Jalan and Ravallion (1998a) conclude that rates of consumption growth of households living in nationally poor counties would be lower if the counties they reside in are not designated as nationally poor counties. The program has succeeded in preventing the decline of household consumption in program-targeted counties, which would have happened if the counties are not targeted by the program, but it would not be enough to raise the rates of consumption growth above those of households living in other counties due to the unfavourable initial conditions in nationally poor counties. Using county level data from Sichuan province, Zhang, Huang and Rozelle (2003) find that the poverty program contributes to the growth of average income of designated poor counties as a whole relative to poor but not nationally designated counties. And they go further to claim that the poverty program

[1] Please refer to World Bank (2001) for a more detailed discussion.

[2] It is worth noting that not all the subsidized loans are directed to households. Part of the subsidized loans is lent to township and village enterprises (TVE). The proportion of loans directed to households is a bit more than half for each year from 1998 through 2001, based on PMS. This is the period that the central government decided to shift the loans from TVE to households. During 1989-1997, the subsidized loans have mainly been concentrated on TVE. However, the poverty reduction impact of TVE supported by low interest subsidized loans has been proven to be minimal. See World Bank (2001) for more information.

[3] The data on household is the same as those used in Jalan and Ravallion (1998a) and Jalan and Ravallion (2000).

contributes poverty reduction, as they think the growth of average income of designated poor counties due to implementation of poverty program will help reduce poverty in these counties.

All the evidence provided by the three studies above can be misleaded in assessing the true impact of poverty reduction programs. The reason is simple: they do not link the program directly to poverty measures such as poverty incidence poverty, but to general levels of income and consumption instead. The poverty program's contribution to increases in the general level of income or consumption per capita in designated nationally poor counties is not equivalent to the contribution of the program to poverty alleviation, as the program may benefit the rich more than the poor within designated poor counties, a point that people always argue on the grounds that the poor is at a disadvantage in access to poverty funds.

Perhaps the best work that has been done for impact assessment of poverty programs in rural China is Ravallion and Chen (2005), which evaluates the effectiveness of the World Bank's Southwest Poverty Reduction Project (SWPRP). The SWPRP was implemented in three southwest provinces-Guangxi, Guizhou and Yunnan-from 1995 to 2001. The data used in the study come from project monitoring surveys which collect data not only on households in project villages, but also on households in non-project villages, which serve as counterfactual to project villages in propensity score-matching analysis. By comparing the propensity score-matching estimates of poverty incidences between project villages and non-project villages, the study finds that, while impact estimates are quite sensitive to the choice of outcome indicators, poverty line and matching methods, the impact is much greater at a lower poverty line and much larger in income than consumption as welfare measures. The reason given for the greater impact on the income-based outcome indicator rather than the consumption-based one is that the uncertainty about the project's impact makes it hard for participants to infer the gain to permanent income participants thus saved a large proportion of the short-term gain.

Ideally, the project impact evaluation should be made by comparing propensity score matching estimates of poverty incidence between the treated group and the control group, as noted in Ravallion and Chen (2005). This has not been done for China with the exception of Ravallion and Chen (2005), mainly due to data unavailability. This study is equally unable to implement the ideal method, again due to unavailability of data, as we only have data on the treated group but none on the control group. Instead, in this study we link poverty measures at the household level to poverty funds per capita of nationally poor counties where the households reside and the subsidized loans that households receive directly, to see whether the poverty funds matter to households' poverty status or not. Our method makes the evaluation of program impact clearer by linking poverty funds directly to poverty measures.

3. Methodology and data sources

The procedure for examining poverty determinants involves two steps. The first is measuring

aggregate poverty and its chronic and transient components. Based on the measures, the study then investigates their causes through estimating econometrical models.[1] For the rest of this section, we first give a brief explanation of poverty measures and some econometric issues in estimating the determinants of poverty, and then explain the data used in the study.

Measures of aggregate poverty and the transient and chronic components used in the study were explored originally by Rodgers and Rodgers (1993). In their work, aggregate poverty index, denoted by A_p (T), and its chronic component denoted by C_p (T), are defined first for entire households, and the transient component of aggregate poverty, denoted by T_p (T), is then defined as the difference between the total poverty index and its chronic component, i.e. T_p (T) = A_p (T) - C_p (T).

Rodgers and Rodgers (1993) have only defined total poverty index and its chronic and transient components for the total population, but it is clear that the definition is applicable to each individual in the total population. As a formula of poverty index, the squared poverty gap (SPG) proposed by Foster, Greer Thorbecke (1984) is used in the studies of Rodgers and Rodgers, and Jalan and Ravallion. The squared poverty gap index (rather than the headcount index and poverty gap index) is used in this study because of its advantage of giving more weight to those whose income are far below the poverty line.

It would be convenient to define the poverty gap before defining poverty indexes. The poverty gap of individual i at the time t normalized by poverty line is defined as $g_{it} = (1 - \frac{y_{it}}{z})$ when $y_{it} < z$ and $g_{it} = 0$ if $y_{it} \geq z$. y_{ij} here represents an indicator of well-being, which is either income or consumption. z refers to the poverty line. Based on the poverty gap the total poverty index of individual i over time can be defined in the following equation:

$$A(iT) = \frac{1}{T}\sum_{t=1}^{T} g_{it}^2 \tag{1}$$

where T is the number of time periods observed. Similarly, the chronic poverty index is defined in the following equation based on permanent income of individual i:

$$C(iT)\begin{cases} = \left[1 - \frac{\hat{y}_i}{z}\right]^2 & if \quad \hat{y}_i < z \\ = 0 & if \quad \hat{y}_{it} \geqslant z \end{cases} \tag{2}$$

where $\hat{y}_i$ denotes permanent income of individual i which, in practice, is usually estimated as mean income of the individual over time, $\bar{y}_i = \frac{1}{T}\sum_{t=1}^{T} y_{it}$. Transient poverty is then defined as the difference between the total poverty index and its chronic component as follows:

$$T(iT) = A(iT) - C(iT) \tag{3}$$

[1] Jalan and Ravallion (2000) employed this approach to investigate the determinants of both transient and chronic poverty using data from four provinces in China.

It is clear from the two equations above that the measure of transient poverty is constructed to reflect the variation in household income during the years observed, while the measure of chronic poverty is compiled based on income averages over time.

The aggregate poverty index and its chronic component for total population can be defined as the sum of the aggregate index and chronic part over individuals:

$$A(T) = \frac{1}{n}\sum_{i=1}^{n} A(iT) \tag{4}$$

$$C(T) = \frac{1}{n}\sum_{i=1}^{n} C(iT) \tag{5}$$

where n refers to the number of individuals of a total population. As in the case of defining transient poverty for individuals, the transient poverty for the entire population is then measured as the difference between aggregate poverty and its chronic component. That is,

$$T(T) = A(T) - C(T) \tag{6}$$

Turning to the strategy of examining the determinants of two poverty types, the right approach to do this is to estimate the Tobit model, as poverty indexes are censored at zero. That is, there is no negative value in poverty measures by definition. The maximum likelihood estimate of the Tobit model, however, has been known as being inconsistent and inefficient in the presence of heteroskedasticity and non-normality of error terms by Arabmazr and Schmidt (1981, 1982). This study uses Least Absolute Deviation estimator for the censored data (LAD estimator) proposed by Powell (1984).

In order to observe dynamic patterns of poverty and examine determinants of its two components, information on income, consumption, and some geographical features at household level over time is required. In other words, panel data are absolutely needed to be conducted this study. One of the data sets that can meet this requirement, to our knowledge, is one obtained from Poverty Monitoring Survey (PMS). The survey, aiming to monitor the changes in incidence of poverty and its geographical distribution, has been conducted by National Bureaus of Statistics (NBS) since 1997 and collected comprehensive data on households, villages and counties in the 592 nationally designated counties. The survey contains five questionnaires, of which one is for county, one for village, and three for household and individual. The county questionnaire contains questions about various sources of poverty reduction funds and their spending, while the village questionnaire is designed to collect some information of each village on geographical feature, infrastructure, population, and labour force. The three household questionnaires cover the characteristics of each individual such as sex, age, current employment status, education and the information on households' income, consumption, assets, debts, and so on.

About 16 thousands households are identified as continuous for entire period of 1997 through 2001 under investigation and form panel data set that is used in our study.

4. An overview of aggregate poverty index and its chronic and transitory components

Although finding causes of chronic and transient poverty is the main purpose of this work, it is useful to give an overall picture of aggregate poverty composition here. In calculating aggregate poverty index and its transitory and chronic components, we use both income and consumption as measures of welfare, for the reasons described in Section 2. Two poverty lines are applied: China's official poverty line and the poverty line set up by World Bank. The Chinese official poverty line is 625 Yuan in 2000 prices,[1] but it is widely believed to be underestimated.[2] Table 1 presents the results. Several patterns can be seen from this table.

Table 1
Aggregate poverty and its chronic and transitory components between 1997 and 2001

Indicators of well-being and poverty lines	Aggregate poverty index	Chronic poverty	Transitory poverty	Share of transitory poverty (%)
Consumption, per capita per annum				
625 Yuan	0.0199	0.0073	0.0126	63.40
874 Yuan	0.0568	0.0328	0.0240	42.27
Income, per capita per annum				
625 Yuan	0.0660	0.0057	0.0603	91.34
874 Yuan	0.0697	0.0161	0.0535	76.86

Source: Authors' calculation.

Note: 1. The 625 Yuan per capita per annum is China's official poverty line, and 874 Yuan per capita per annum is the World Bank's poverty line ($1/per day).

2. Estimates of poverty indices in the table are calculated based on a normalized poverty gap. The indices based on non-normalized poverty gap are available from authors on request.

First, with the given poverty line the aggregate poverty index and its components based on consumption are well above those based on income, thus implying that households save part of their income. It should be noted, however, that this may not be the whole story. If the poverty line applied is low enough, poverty measures based on consumption can be lower than those based on income due to negative savings. That is, households could fund their consumption from savings in the face of a temporary drop in income. This point will be confirmed below.

Second, the proportion of transient poverty in the aggregate poverty index based on the income measure is much higher than that based on consumption, regardless of poverty line, and the proportion declines as the poverty line goes up, regardless of whether income or consumption

[1] Yuan is the unit of Chinese currency.

[2] The reason that the Chinese government adopts an underestimated poverty line is to make a balance between the magnitude of poverty in the rural area and the limited amount of funds for poverty reduction. The application of a much lower poverty line can identify the poorest in the rural area, and poverty funding can be made more effective by targeting limited funds toward the poorest.

is used as the measure of welfare. This implies that chronic poverty as a share of total poverty goes up with the poverty line.

Finally, all the poverty measures rise with poverty line, except for transient poverty based on income. (The reason for the decrease in transient poverty with an increasing poverty line will be provided below.) The extent of the rise in poverty indexes with the poverty line is significantly different between poverty measures based on consumption and that based on income. Chronic poverty on the basis of consumption, for instance, increases by 4.5 times when poverty line rises from 625 Yuan to 874 Yuan, while that based on income goes up by 2.8 times. This suggests a substantial difference in sensitivity of the two types of poverty to changes in the poverty line.

In order to explore further how sensitive the poverty indices are as the poverty line rises, we calculate aggregate poverty and its transient and chronic component by 10 intervals of the poverty line within a range from 300 Yuan to 1,500 Yuan. One problem with doing this, however, is that the total poverty index and its transient component based on income measure decrease as the poverty line goes up before poverty lines exceed a certain level. The decease in poverty indices with poverty lines is caused by the existence of negative income in our sample.[1] The increase would not happen if there are no negative values of welfare measure used, as the poverty index used is a strictly increasing function of the poverty line. One way to avoid this is to use a non-normalized poverty gap instead of normalized poverty gap; that is, use $z\text{-}y_{it}$ rather than $1\text{-}y_{it}/z$. Figures 1 to 3 represent estimates of aggregate poverty and its chronic and transient components using a non-normalized poverty gap.[2]

A clear picture of sensitivities of poverty measures to poverty lines emerge from these figures. The consumption-based aggregate poverty is below the income-based one for a lower poverty line but above for a higher poverty line. The two lines cross at the poverty line of about 990 Yuan. The same pattern is also observed for the chronic part of poverty even though this is not clear from Figure 2. The point at which the two lines cross for chronic poverty indices is about 580 Yuan, much lower than that for total poverty. Consumption-based chronic poverty exceeding the income-based one for very low poverty lines provides clear evidence of the smoothing behaviour of rural households. For transient poverty, as shown in Figure 3, poverty indices based on both consumption and income decline as the poverty line goes up. However,

[1] The number of households with negative value of income per capita is 103 for 1997, 93 for 1998, 72 for 1999, 72 for 2000 and 162 for 2001. The number of households with negative value of time mean of income per capita over 1997 through 2001 is 9. There is no any household with negative value of consumption per capita.

[2] For Figure 1-4 we only show poverty indices using non-normalized poverty gap, while for the Table 1-5 we follow the conventional way of presenting the poverty indices and calculate the indices by using normalized poverty gap, as normalized poverty gaps are generally used in the literature. We also make these tables by using non-normalized poverty gap, which are available from authors on request. It's useful to note that share of transient component in total poverty, as shown in Table 1-Table 5 and Figure 4, remains unchanged regardless of whether the normalized or non-normalized poverty gap is used. This is also true of estimate of contribution of each population group to poverty index in decomposing the poverty index by population group when the contribution is expressed in proportion, as we do in Table 2-5.

the index based on income is constantly higher than that based on consumption for given poverty line. The transient component of total poverty, as seen in Figure 4, decreases strictly with the poverty line, again regardless of whether a normalized or non-normalized poverty gap is used. For given poverty lines the proportion is constantly higher if income is used, except for very low poverty lines.

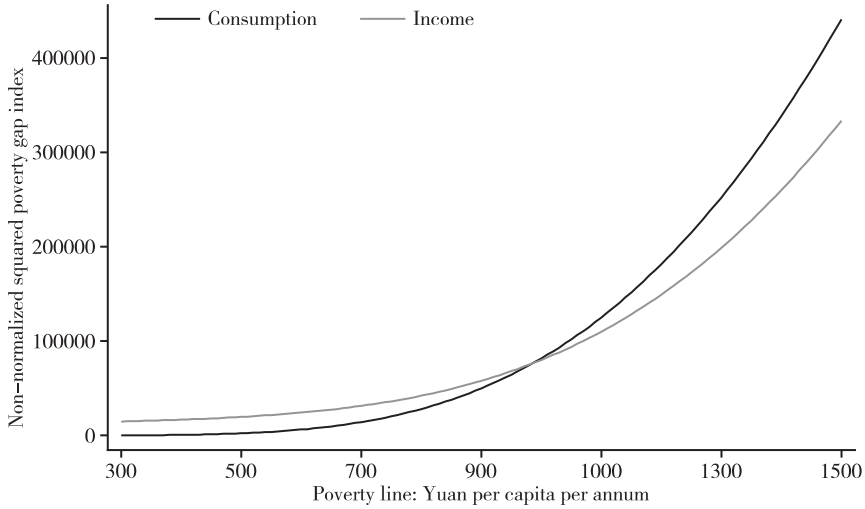

Figure 1. Comparison of total poverty indexes between consumption and income measure
Source: Authors' calculation.

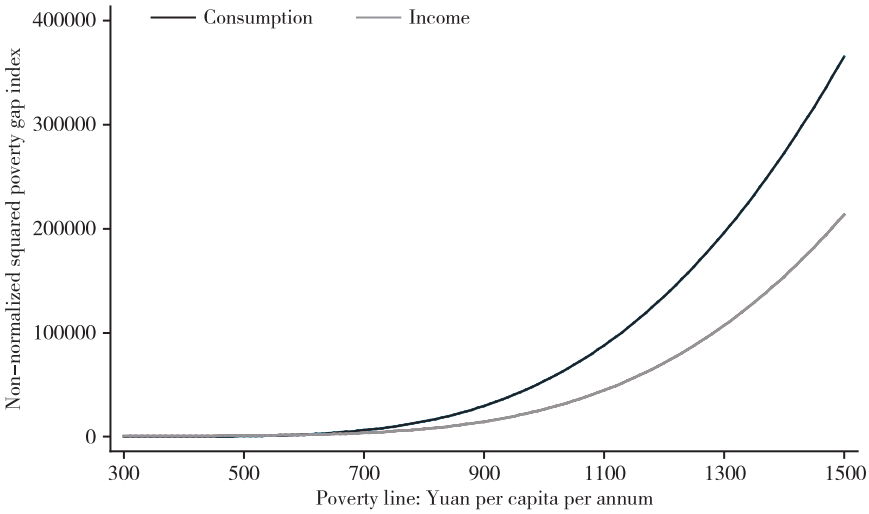

Figure 2. Comparison of chronic poverty indexes between consumption and income measure
Source: Authors' calculation.

Before proceeding further, it is worth noting that transient and chronic composition of total aggregate poverty estimated in the study is roughly consistent with that obtained by Jalan and

Ravallion (1998b), but an exact comparison between the two works is impossible due to differing samples, poverty lines used, and so on.

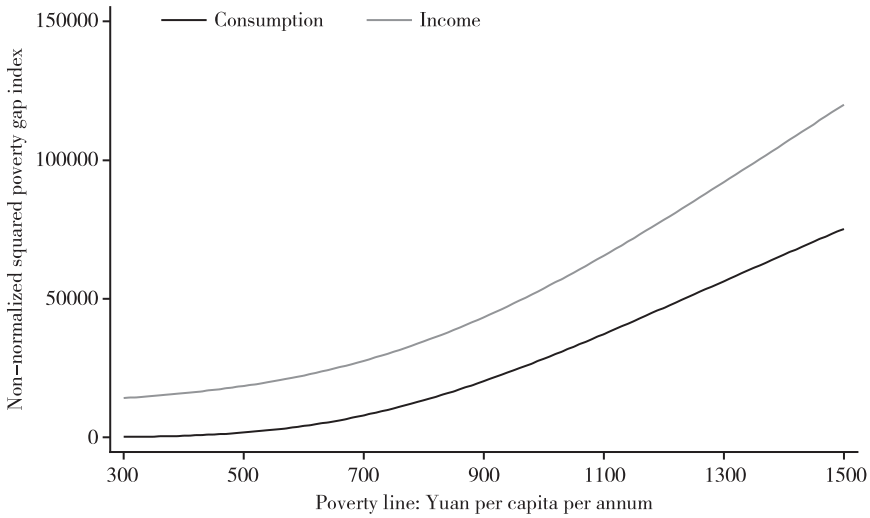

Figure 3. Comparison of transitory poverty indexes between consumption and income measure
Source: Authors' calculation.

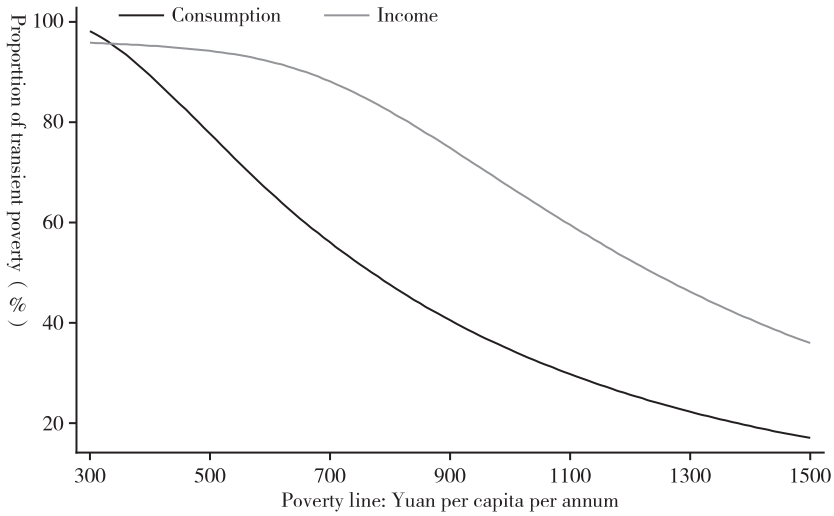

Figure 4. Proportion of transient poverty in total poverty By consumption and income measure
Source: Authors' calculation.

Either aggregate poverty or its chronic and transitory poverty might vary, depending on demographic features of households such as age, educational level of the heads of households, and the household size. Table 2-4 provide these information accordingly. In addition, in Table 5 we present the same information by region as well. By making use of decomposability of poverty

measures by population group, these tables also show the contribution of each group to total poverty measure. Table 2-5 are calculated with 874 Yuan per capita per year as the poverty line and consumption as the well-being indicator.

Table 2

Aggregate poverty index and its components by age of the head of household between 1997 and 2001

Age of the head of household in 2000	Aggregate poverty index	Chronic poverty	Transitory poverty	Share of transitory poverty (%)	Distribution of population by group (%)
			Poverty indexes		
16-25	0.0666	0.0380	0.0286	42.9	0.5
26-30	0.0625	0.0385	0.0240	38.3	4.6
31-35	0.0560	0.0325	0.0235	41.9	11.8
36-40	0.0513	0.0312	0.0200	39.1	16.7
41-45	0.0529	0.0302	0.0226	42.8	18.7
46-50	0.0544	0.0309	0.0236	43.3	18.9
51-55	0.0569	0.0315	0.0254	44.6	13.0
56-60	0.0668	0.0380	0.0288	43.1	7.8
60-	0.0697	0.0393	0.0305	43.7	8.0
			The contribution of each age group to total poverty indexes (%)		
16-25	0.6	0.6	0.6		
26-30	5.1	5.5	4.6		
31-35	11.6	11.7	11.5		
36-40	15.1	15.9	13.9		
41-45	17.4	17.3	17.6		
46-50	18.1	17.8	18.5		
51-55	13.0	12.5	13.7		
56-60	9.2	9.1	9.4		
60-	9.8	9.6	10.1		
Aggregate	100.0	100.0	100.0		

Source: Authors' calculation.

Note: 1. The same to the notes of Table 1;

2. This table is calculated with 874 per capita per year as poverty line and consumption as well-being indicator.

It is clear from Table 2 that the poverty measure forms a U-shape with age of the heads of households, irrespective of total aggregate poverty and its components. However, the age interval for which the poverty measure reaches its lowest point is a little different between the two components of aggregate poverty. Transient poverty is lowest for households with heads aged 36-

40, while chronic poverty reaches its lowest point for households with heads aged from 40 to 45. It is not hard to understand why poverty is lowest for households with heads aged around 40. This is not only because these heads of households are still physically able to work, but also because they have accumulated some physical assets. It should also be noted that, while the households with heads aged around 40 have the lowest poverty incidence, such households account for most part of remaining poverty, mainly due to the large proportion of these households in total population.

Table 3 presents a profile of aggregate poverty and its two components according to the educational attainment of the heads of households. The aggregate poverty measure, as shown in the table, drops as the heads of households attain higher educational levels, with chronic and transitory poverty dropping subsequently. This suggests the significant effect of education on poverty reduction. Moreover, it seems that the educational attainment of heads of household has a much stronger impact on chronic poverty than on transitory poverty, thus leading to an increase in proportion of transitory components to aggregate poverty as heads of household acquire higher education. Poverty experienced by households headed by those with only primary education accounts for nearly half of the remaining poverty. This is due to the large number of such households in the total population.

Table 3
Aggregate poverty index and its components by education of the head of household between 1997 and 2001

The educational attainment of the head of household	Aggregate poverty index	Chronic poverty	Transitory poverty	Share of transitory poverty (%)	Distribution of population by group (%)
		Poverty indexes			
Illiteracy and semi-illiteracy	0.0939	0.0625	0.0314	33.4	9.8
Primary school	0.0599	0.0342	0.0257	42.9	41.4
Middle school	0.0481	0.0264	0.0217	45.1	36.6
Higher school	0.0403	0.0210	0.0194	48.0	12.1
College and above	0.0333	0.0171	0.0162	48.6	0.1
		The contribution of each group to total poverty indexes (%)			
Illiteracy and semi-illiteracy	16.3	18.8	12.8		
Primary school	43.9	43.6	44.3		
Middle school	31.2	29.8	33.1		
Higher school	8.6	7.8	9.7		
College and above	0.1	0.1	0.1		
Aggregate	100.0	100.0	100.0		

Source: Authors' calculation.

Note: The same to the notes of Table 2.

Table 4 presents aggregate poverty and its chronic component by household size. It is clear from the table that chronic poverty has a strong positive correlation with the size of households, while transient poverty is lower for households with three members than for others. This confirms a long-standing belief that a large family is more prone to fall into poverty.

Table 4

Aggregate poverty index and its components by size of the household between 1997 and 2007

The number of household	Aggregate poverty index	Chronic poverty	Transitory poverty	Share of transitory poverty (%)	Distribution of population by group (%)
			Poverty indexes		
1	0.0295	0.0071	0.0224	75.9	0.2
2	0.0340	0.0142	0.0199	58.4	3.0
3	0.0343	0.0150	0.0193	56.4	12.2
4	0.0425	0.0210	0.0214	50.5	32.0
5	0.0591	0.0345	0.0246	41.6	27.4
6	0.0779	0.0484	0.0295	37.9	14.5
7	0.0925	0.0657	0.0268	29.0	6.6
8	0.1035	0.0698	0.0336	32.5	4.2
			The contribution of each group to total poverty indexes (%)		
1	0.1	0.0	0.1		
2	1.8	1.3	2.4		
3	7.4	5.6	9.8		
4	23.9	20.5	28.5		
5	28.5	28.9	28.0		
6	20.0	21.5	17.9		
7	10.7	13.2	7.3		
8	7.7	9.0	5.9		
Aggregate	100.0	100.0	100.0		

Source: Authors' calculation.

Note: The same to the notes of Table 1 and Table 2.

Table 5 gives information on poverty measures by region. The geo-political grouping of the three regions is used to subdivide all samples: the Eastern, the Middle and the Western. The regional pattern of poverty is consistent with what one has come to expect: poverty is less severe in the East because of its more advanced development, while the proportion of transitory component in aggregate poverty is much higher in the Eastern than in the other two regions. The magnitude of poverty in the West, the poorest area in China, is slightly higher than in the Middle, simply because per capita income in the former is lower than in the latter. The composition of aggregate poverty is much similar between the two regions. From the decomposition by

population group it is evident that poverty observed in the Western and the Middle regions accounts for almost all the poverty of the total sample.

Table 5
Aggregate poverty index and its components by region for period of 1997 through 2001

Region	Aggregate poverty index	Chronic poverty	Transitory poverty	Share of transitory poverty (%)	Distribution of population by group (%)
			Poverty indexes		
The Eastern	0.0221	0.0078	0.0142	64.6	6.1
The Middle	0.0560	0.0325	0.0235	42.0	42.5
The Western	0.0614	0.0358	0.0256	41.7	51.4
			The contribution of each region to total poverty indexes (%)		
The Eastern	2.3	1.4	3.6		
The Middle	42.0	42.3	41.6		
The Western	55.7	56.3	54.8		
Aggregate	100.0	100.0	100.0		

Source: Authors' calculation.

Note: The same to the notes of Table 1 and Table 2.

5. The determinants of transitory and chronic poverty in rural China

The objective of this section is to estimate the determinants of two types of poverty, chronic poverty and transient poverty. Factors that we consider to be important to poverty fall into four categories. Appendix Table gives details on how these variables are constructed and what expected signs of their estimates are.

The first group of explanatory variables contains the demographic characteristics of households, such as the age of the household head, the number of a household's members, the educational attainment of the household head, and labour participation ratio. These variables might have different effects on both chronic poverty and transient poverty. Higher educational attainment of the heads of the households, for instance, might have a significant impact on reduction of chronic poverty, but may have no or less effect on reduction of transitory poverty.

The second set of variables concerns other characteristics of households. We consider six factors here, based on both economic theory and data availability. The first one is physical stock accumulated by households for production. The family with more physical stock should be likely to be non-poor. The second one is amount of land cultivated by households. Since cultivated land is not usually a source of higher income for rural families due to the agricultural sector's intrinsically lower productivity, the land should not be positively related to income level of households. This means that the amount of land will not contribute to poverty alleviation as measured by income. However, there is wide consensus about the security function of land in a

rural area, especially in the poor rural area. If this is true, the amount of land in per capita terms should be important to poverty measured by consumption.

The third one is related to composition of income sources for rural households. Composition of income sources is an important determinant of household income levels in rural China. Income of rural households in China comes from four sources: wage income, income from household operations, income from assets, and transfer income. Of the four sources, the first two not only make up the main part of rural households' income, but each source as a share in total income is also important. Wage income is a source of higher income for rural households, and a household is usually rich if one or more of its members has a chance to access this source of income. Conversely, income from households' operations-which mainly consists of several agricultural production activities such crop growing, fishing and so on-is usually very low. Therefore, a household is usually poor if it relies heavily on this source of income. To capture the possible influence of such composition of income sources on the poverty status of households, income from households' operations as a share of total income is incorporated into the independent variables. Households with a high share of operation income in total are expected to be poor.

The rest of the six characteristics of households include change in cash holding and savings, grains borrowed from neighbour, and remittance from members of households who outmigrate for employment. These factors are included as independent variables with the intention of capturing measures used by households for consumption smoothing, which is observed in the previous section. The first two are measures that households can readily take when their current incomes are not enough to support basic daily needs, as long as there are some cash and savings available or it is possible for them to borrow. The third one will have an uncertain effect compared with the first two. While the remittance from migrant members are expected to respond to the shortage of money occurring in their rural homes, this may not be enough if migrant members are unable to find jobs in the city, or the employers fail to pay their migrant workers, a situation often observed in migrant labour markets. It should be noted that each of the three variables is expected to be more related to poverty measured by consumption than that by income.

The third group of variables is incorporated to capture the effects of community features on poverty. Undoubtedly, both the economic conditions and geographical features of a community are very important to the poverty status of households that reside inside the community. The problem here is the difficulty of including all the attributes of the community into analysis, due mainly to the inability of statistics to captures all the factors. Our strategy for overcoming this difficulty is to include net income per capita and the average annual growth rate of each county, in addition to two explicitly incorporated factors of villages where the households reside. One is the enterprise dummy variable, taking the value of 1 if there is any enterprise in the village where the households reside, and 0 if there is none. This variable is expected to have a negative sign of estimate, meaning that poverty situation in villages with enterprises will be less serious than villages without enterprise. The other one is a geographic dummy variable, taking the value of 1 if the village is in mountainous area and 0 if otherwise. This variable would have a positive sign

of estimate which means that households residing in mountainous area are more likely to fall into poverty.

The fourth set of variables is designed to evaluate the impact of poverty reduction programs on poverty alleviation, which is one of main purposes of the paper. In doing so, however, some description of how the program has been implemented so far is required for interpreting the empirical results we will find later.

In the light of data availability, two types of data on poverty funds are used in the study to capture effectiveness of the poverty alleviation program. One is the amount of poverty funds allocated for each of the three subprograms by county for the period 1998 to 2001.[1] Per capita poverty funds for each subprogram are incorporated as explanatory variables in the following estimations. However, the statistical problem arising here is that these variables are endogenous because, as mentioned above, poverty funds are distributed with close relation to the poverty status, and these are dependent variables in the estimations made below. To address this, lag values of the poverty funds are used. A publication released by Agricultural Development Bank of China (ADBC, 1997) provides information about the amount of each of the three types of poverty funds by county from 1994 to 1996, and this data is used in the estimation below.

Another type of poverty fund is subsidized loans directed to households. Including this type of fund into model estimation allows us to make an assessment of whether the loan can help households escape poverty. The endogenous concern should not be a factor here because the poor is not observed to have more opportunities to access the loan. [2]

The econometric method to estimate models is the Least Absolute Deviation estimator for the censored data (LAD estimator) proposed by Powell (1984), [3] rather than the traditional Tobit estimator, for the reasons expressed in Section 3. The practical problem that often occurs when this estimation method is applied to poverty is that—as discussed in Jalan and Ravallion (2000)—the repeated estimations stop when the selected observations are not enough. The shortage of observations arise when the dependent variable of poverty index is heavily censored, which means that most households have zero poverty (unobserved data in Tobit model), usually due to the application of a lower poverty line. This is the case when the official Chinese poverty line—625 Yuan per capita per annum in 2000 prices—is applied. One possible way of dealing with the problem is to apply a higher poverty line and/or to estimate the mode at a higher quantile. Taking this into account, we estimate the models with data generated using a poverty line of 874 Yuan and at 75th quantile.

Table 6 gives parameter estimates for both chronic and transient poverty. The estimations have

[1] As mentioned before, the PMS from which the data used in the paper had been conducted from 1997 to 2001. The data on poverty funds for the first year is not collected properly, thus leaving the data only available for other four years.

[2] For determinants of subsidized loan among the households, see Yue and Li (2004) or discussion made below when explaining the estimated results.

[3] Deaton (1997) provides a Stata's procedure to implement the censored LAD estimation, which is used in this study.

been made for each of the two types of poverty measured by income and consumption indicators separately, in order to check whether the factors considered have similar impacts on poverty measured by income and consumption, respectively.

Table 6
Parameter estimates of the determinants chronic and transient poverty for period of 1997 through 2001

Explanatory variables \ Welfare measure	Consumption		Income	
	Chronic	Transient	Chronic	Transient
Age of head of households	-0.00487	-0.00197	-0.00070	-0.00090
	(7.23)**	(9.03)**	(0.97)	(2.52)*
Age squared	0.00004	0.00002	0.00000	0.00001
	(6.52)**	(9.37)**	(0.31)	(2.99)**
Family size	0.03144	0.00612	0.01686	0.00396
	(36.38)**	(24.10)**	(20.21)**	(9.70)**
Labor participation ratio	-0.00474	0.01153	-0.05007	-0.02223
	(0.86)	(6.99)**	(8.12)**	(8.21)**
Dummy of primary school	-0.01308	-0.00303	-0.01229	0.00059
	(3.95)**	(2.69)**	(3.87)**	(0.33)
Dummy of middle school	-0.03640	-0.00808	-0.01879	-0.00247
	(9.70)**	(6.71)**	(5.27)**	(1.28)
Dummy of high school	-0.06347	-0.01181	-0.02797	-0.00629
	(12.97)**	(8.21)**	(5.87)**	(2.69)**
Dummy of college and above	-0.09162	-0.02566	-0.04686	-0.01816
	(2.64)**	(2.56)*	(2.56)*	(1.03)
Physical stock per capita	-0.00867	-0.00238	-0.00758	-0.00172
	(16.42)**	(13.29)**	(12.65)**	(5.95)**
Proportion of income from household operation in the total income	0.00100	0.00012	0.00101	0.00046
	(15.35)**	(6.27)**	(12.80)**	(13.93)**
Cultivated land per capita	-0.04249	-0.00310	-0.01048	0.01411
	(17.45)**	(4.07)**	(4.19)**	(11.22)**
Time mean of change in cash holding and savings	-0.00003	-0.00000	-0.00007	-0.00000
	(12.52)**	(2.77)**	(13.20)**	(2.47)*
Time mean of grain borrowed per capita	-0.01444	-0.00118	0.00098	0.00155
	(27.65)**	(8.55)**	(1.77)	(6.69)**
Variation of remittance income over time	-0.00111	-0.00042	0.00228	0.00054
	(0.75)	(0.98)	(1.51)	(0.75)
Enterprise dummy	-0.02224	-0.00248	-0.01681	-0.00305
	(8.02)**	(3.46)**	(5.26)**	(2.43)*
Mountainous dummy	-0.00036	0.00033	-0.02465	-0.00037
	(0.14)	(0.45)	(7.96)**	(0.29)
Per capita net income of counties in 1997	-0.00012	-0.00001	-0.00035	-0.00012
	(22.90)**	(9.63)**	(29.15)**	(40.40)**

Explanatory variables \ Welfare measure	Consumption		Income	
Annual growth rate of per capita income of counties from 1997 to 2001	-0.00084	-0.00047	-0.00555	-0.00237
	(4.67)**	(7.94)**	(22.20)**	(22.38)**
Time mean of subsidized loan at households level	-0.00014	0.00044	0.00146	0.00117
	(0.15)	(1.56)	(1.69)	(2.65)**
Time mean of per capita subsidized loan of counties	0.01905	0.00047	-0.00271	-0.00176
	(9.68)**	(0.81)	(1.04)	(1.79)
Time mean of per capita Food-for work funds of counties	0.01644	-0.00062	0.01186	0.00539
	(10.97)**	(1.33)	(6.35)**	(6.70)**
Time mean of per capita development funds of counties	-0.00215	-0.00002	0.00209	-0.00262
	(1.96)*	(0.07)	(1.75)	(4.66)**
Constant	0.24926	0.09649	0.41365	0.19562
	(12.16)**	(15.73)**	(14.70)**	(18.44)**
Pseudo R^2	0.1749	0.1022	0.0993	0.1000
Observations	6953	15468	3186	12542

Note: Absolute value of t statistics in parentheses; * significant at 5%, ** significant at 1%.

From Table 6, it can be clearly seen that the estimated coefficient for the age of the heads of households is negative, while for squared age is positive, except for chronic poverty based on welfare measures of income. This indicates that poverty measures are U-shaped with the age of the head of household, and is consistent with what we obtained in Table 2.

The number of family members has positive and statistically significant estimates for each of the four estimations. This result confirms the common belief that large numbers of family members is one of the most important causes of poverty in rural China. The estimates of labour participation ratios are a bit surprising, however. This variable has negative and significant signs for both chronic and transient poverty in terms of income measure, but has opposite signs for poverty measured by consumption, even though it is insignificant in chronic estimation. This implies that labour participation may help reduce poverty in terms of income, but does not help to alleviate the poverty defined in the consumption term, and even increases them.

With very few exceptions, education helps reduce poverty regardless of the poverty type, and no matter even if either income or consumption is used as a welfare indicator. It is also clear from a comparison of its estimates in different estimations that education also matters much more to poverty defined by consumption measures than by income measures. Sadly, education has not received enough attention in the current poverty alleviation program, despite its strongest and constant effect on poverty alleviation. Poverty funds devoted to education and health care combined account for only 4.1 percent of total poverty funds used in 1998, 3.4 percent in 1999, and 3.5 percent in 2000.

Physical stock and composition of total household income have expected impacts on poverty. Again, their impacts are greater for poverty measured in consumption than in income. Estimate

of cultivated land per capita is negative for chronic poverty measured by income and for both chronic and transient poverty measured by consumption, but is positive for transient poverty defined by income. This might suggest that cultivated land only provides security of basic needs for rural households. Two of three variables that are incorporated as measures of smoothing consumption-grains borrowed and change in cash holding and savings-have expected signs. The remittance from migrant family members has the expected sign but far from significant, suggesting that it is an uncertain source of income for the rural households.

Three of four community variables-dummy for enterprise, net income per capita of county, and its growth rate-have expected signs of, and highly significant estimates. This suggests that the poverty status of households largely depends on the income level of communities where they live. Estimates of dummy for mountain areas are not easily explained.

Moving on to estimation results for poverty policy variables, if the poverty funds really help to reduce poverty, then the estimates should be negative and statistically significant. This, however, only happens to development funds in transient poverty estimation with poverty measured by income. In most cases, the poverty funds have no clear relation to both chronic and transient poverty, and even have positive and significant estimates. Such estimates are not what we expected for poverty reduction funds in the poverty estimations. How then should the results be explained? First of all, the positive sign of estimates should not be interpreted as the poverty funds causing poverty, but rather should be interpreted as the poverty program benefiting the wealthy more than the poor in designated poor counties, a belief that is accepted by most people. The main reason why the poverty programs do not benefit the poor is the poor targeting of poverty programs.

6. Conclusions

The study focuses on two components of total poverty, chronic and transient poverty, and makes an investigation of their relative importance in total observed poverty, as well as the determinants of each component. We found that transient poverty accounts for a large proportion of total poverty observed in the poor rural areas of China. By analyzing the determinants of the two types of poverty, we find demographic characteristics of households, such as age of the head of households, family size, labour participation ratio and the educational level of the head of the households, are very important to the poverty status of households. These factors matter more to chronic poverty than transient poverty, and have greater impacts on poverty measured by consumption than that measured by income. Apart from the demographic factors of households, other households' factors, like physical stocks, income composition and the amount of cultivated lands, also have significant effects on poverty. It is also confirmed that changes in cash holding and saving, and borrowing grain are used by rural households to smoothen their consumption. Attributes of community where the households reside are also important to poverty assessment.

With very few exceptions, we did not find that poverty alleviation programs have significant

impact on poverty reduction at the household level. We interpret this as the poverty program benefiting the wealthy more than the poor in the poor area. Poor targeting of the poverty program could be main factor responsible for this ineffectiveness.

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Appendix

Explanatory variables, way of creating, and their expected signs

Name of variables	Expected sign	Way of creating variables and explanation
Age	+	Age and age2 is incorporated to capture the life-cycle effect. The sign of age is expected positive and age2 negative.
Age2	-	
Family size	-	Number represents the number of household. Its estimates should be negative as there is negative correlation between the size of family and income per capita. Furthermore, the size of family has been considered as a cause of poverty.
Labor participation ratio	-	Defined as ratio of the numbers who are working to the size of family. Lack of working family members has been considered main factor in causing poverty, and chronic poverty in particular. If this is true, sign of the variable should be negative. That is, a family with more laborers should easily escape poverty.
Dummy of primary school	-	Educational dummy for those heads of households who graduated from primary school. Five educational categories are used in this study: illiteracy and semi-illiteracy, primary school, middle school, high school, and college and above. The educational level left out is illiteracy and semi-illiteracy, the lowest attainment in five educational groups. Therefore, expected sign of estimate for the dummy is negative.
Dummy of middle school	-	Educational dummy for middle school.
Dummy of high school	-	Educational dummy for high school.
Dummy of college and above	-	Educational dummy for college and above.
Proportion of income from household operation in the total income	+	Defined as share of income from households operation to total income. Because income from households operation is a source of lower income, the estimates should be positive.
Physical stock per capita	-	Time mean of physical capital per capita. Its sign is expected negative.
Cultivated land per capita	?	Cultivated land per capita of households.

Name of variables	Expected sign	Way of creating variables and explanation
Time mean of grain borrowed per capita	-	Standard deviation of grain borrowed over time. It would have function of smoothing consumption. Therefore the sign of its estimate should be negative.
Time mean of change in cash holding and savings	-	Defined as absolute value of difference in amount of cash and savings that households hold in the end and the beginning of year. It is time mean too. Variation of the cash holding and savings can be used as a consumption-smoothing instrument. Its sign should be negative, especially in regression of transitory poverty.
Variation of remittance income over time	-	Logarithmic value of time mean of remittance from family members who migrate into and work in the city. Its expected sign of estimates is negative.
Enterprise dummy	-	Dummy for enterprise in the villages where the households reside. It is 1 if there is an enterprise in the village, and 0 otherwise. Its sign is expected negative.
Mountainous dummy	+	Dummy for mountain area. It is 1 if the village where the households reside is mountain area, and 0 otherwise. Its sign should be positive.
Per capita net income of counties in 1997	-	Net income per capita of counties. Expected sign of the estimate is minus.
Annual growth rate of per capita income of counties from 1997 to 2001	-	Annual growth rate of net income per capita of counties from 1997 to 2001. The estimates should be negative.
Time mean of subsidized loans at households level	-	Time mean of amount of the subsidized loans that households obtained. The subsidized loans aim to alleviate poverty. Its sign should be negative if it has significant impact on poverty.
Time mean of per capita subsidized loans of counties	-	Time mean of subsidized loans per capita of nationally designated counties invested from 1994 to 1996.
Time mean of per capita development funds of counties	-	Time mean of development funds per capita of nationally designated counties invested from 1994 to 1996.
Time mean of per capita Food-for work funds of counties	-	Time mean of food-for-work per capita of nationally designated counties invested from 1994 to 1996.

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