

Poverty Exit and Entry in Poor Villages in China

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Abstract

Rapid economic growth in China's booming regions has left other areas of the country lagging behind. We shed light on the poverty dynamics of one such region by analyzing a census-like survey of three administrative villages of Guizhou province in 2004, 2006, 2009, and 2011. While the absolute poverty rate is decreasing sharply in the sample, households are highly vulnerable to shocks, and rates of entry or re-entry into poverty are high. Using logistic regression and multivariate a hazard model, we look for the determinants of both poverty exit and entry. We find that poverty entry and exit are both related to household characteristics, assets, and social capital. Rural-urban migration strongly increases the probability of poverty exit, while poverty entry is associated with disease and some major life events. Our results also point to informal networks and government transfers as means of poverty alleviation, and highlight the importance of smart targeting.

Key words: poverty dynamics, hazard model, China, lagging region

1. Introduction

China as a whole has achieved great success in poverty reduction. Nevertheless, according to China's 2011 official poverty line (per capita net income of 2300 Yuan), China's poor population still reached 128 million in 2010, ranking second in the world (behind India).¹ Zhang et al (2013) did an evaluation of poverty prevalence in China using four recent surveys and found a national poverty rate in 2009 was about 10–13 percent using the \$1.00-per-day threshold, and 20 percent using \$1.50-per-day. While the distribution of poverty is relatively scattered, much of it centralized in western regions.

Poverty in rural areas is much more severe than in urban areas. Disasters, market volatility and fluctuations in migrant job opportunities among other factors cause farmers' incomes to be more vulnerable than those of urban households. Many households briefly manage to exit poverty only to fall back into poverty at the same time in each year. As Yu (2011) showed for Gansu Province, poor farmers have a high probability of escaping poverty (crossing the poverty line) from one year to the next. Yet the probability of becoming impoverished again remains high due to income vulnerability. The effects of economic growth on poverty reduction have been less significant since the middle of 1980s (Wang and Zhang, 2006;). Poverty relief has in part been hindered by such vulnerability, with households returning to

¹ Xinhuan news, http://news.xinhuanet.com/politics/2011-12/01/c_111209479.htm

poverty after having exited poverty in the recent past. Traditional poverty analysis focuses on poverty rates from a static perspectives, but it is useful to switch to a dynamic lens. Understanding the factors associated with both movements into and out of poverty can help improve the targeting of poverty policies and promote more equitable growth (Baulch and Hoddinott. 2000).

In recent years, poverty dynamics became a hot research topic in China. Previous such research, mostly published in Mandarin-language journals and books, has focused on three aspects: the differences between transient and persistent poverty, the measures that can combat transient and chronic poverty, and the factors determining exit from and, to a smaller extent, fall into poverty, (Zhang, 2008). This paper falls into the last category.

Most research finds that most poverty is transient in nature, and that those in persistent poverty are few (Jalan J & Ravallion, 1998, 2000; Wang and Li, 2003; McCulloch and Calandrino, 2003; Duclos, et al,2010; Imai and You, 2013). Jalan & Ravallion (2000) analyzed poverty dynamics using survey data from four provinces (Guangdong, Guangxi, Guizhou and Yunan) for 1985 and 1990, and showed that the most common type of poverty is transient. Similarly, research by the Chronic Poverty Research Centre (2005) estimated that between 75% and 80% of the country's poor live in transient poverty. Wang and Zhang (2013) revealed that poverty in rural China was dominated by the chronic component.

The determinants of entry into and exit from poverty include both occasional factors such as weather shocks or loss of employment, and factors hard to overcome in the short run, such as education or dependency ratio. Households with higher education and participating to non-agricultural activities are more likely to exit poverty (Zhang, 2008).

Looking at longer term poverty dynamics, Glauben *et al* (2011) identify the determinants of long-term poverty using a rural household panel data from three Chinese provinces. They test the duration dependence of poverty exit, and find that duration of poverty spells has a strong influence on the probability of exiting poverty in one region, but not in another. Luo (2010) used income decomposition of rural household data in 2007-2008 to show that wage income, including earnings from migration, contributed most to poverty reduction, while fluctuation in household business income is an important contributor to poverty. Yao (2012) applied a Logit model to CHNS data (China health and nutrition survey data) and found that economic growth, human capital and other variables highly influence poverty dynamics. Imai and You (2013) also use CHNS data from 1989-2009 and applied a discrete time multi duration model to analyze both poverty exits and entries, and found poverty duration has a significant impact on poverty exits and entries.

Most of the studies listed above discuss poverty dynamics at the national level; only very few studies discuss the poverty movements in poor regions, where most poor people are located. Most use data prior to 2005. Although there has been much work focused on poverty exits,

poverty entries have been less well researched. The goal of this paper is to help fill those knowledge gaps and shed light on the nature and determinants of poverty dynamics in the Chinese context. We use recent data from a four-wave rural household survey spanning 2004-2011 in three villages of a relatively poor county of Guizhou province. We trace the poverty paths of households through the four waves of data as well as the probabilities of poverty entry and exit over the years. We analyze not only poverty exits, but also poverty entries, and consider the possible determinants separately. We also use both income and expenditure measures of poverty, as each measure has its limitations. We emphasize both fundamental characteristics of households (education levels, ethnicity, etc.) as well as trigger events both exogenous (e.g. disease, natural disasters, public policies...) and endogenous (e.g. migration, marriage...). We run logit and multivariate hazard models to identify the events which trigger changes in poverty status.

The next section introduces the survey site and data. The rest of the paper is organized so as to answer in turn the “What?”, “How?” and “Why?” questions. Section three presents the dynamic analysis of poverty status in the sample (“What?”). Section four presents a decomposition analysis of incomes and expenditures by poverty status (“How?”), and section five an econometric analyses of the determinants poverty entries and exits (“Why?”). Conclusions follow.

2. Survey data and site

The survey site is located in three villages in Puding County of Guizhou Province. Puding County is among the poorer counties of China. It is home to 20 different ethnicities, and minorities represent 20% of its population.

The survey was jointly conducted by the International Food and Policy Research Institute (IFPRI), the Chinese Academy of Agricultural Sciences, and Guizhou University under the “Public expenditure and rural poverty” program from 2004 to 2011. The survey covered household demographics, employment, agricultural production, consumption, income and expenditure, health, infrastructure, and also income from specific preferential policies, such as agricultural subsidies, poverty and disaster relief, medical insurance, etc. Data was collected in each of the following years: 2004, 2006, 2009 and 2011. Each wave has a sample size of around 800 to 900 households, totaling 3433 observations in the panel. Only households with complete panel data for all four waves were selected for the poverty dynamic analysis, 521 households, about 2/3 of the full sample.

The villages are situated on Karstic lands with poor soils. Per capita land area in 2009 was only 0.76 mu (about 0.05 hectare). In addition to agricultural income, the major income sources are odd jobs and migrant work. 40% of households have family members working outside the villages. The number of migrants per household increased from 0.45 in 2004 to 0.87 in 2011.

Conversely, the share of households engaged in odd jobs decreased from 50% in 2004 to 28.7% in 2011. In comparison, only 4% to 6% of households include a member who has formal work.

Per capita income increased rapidly between our waves of data, from 1403 Yuan in 2004 to 3239 Yuan in 2011, an annual growth rate of over 10 percent.² It should also be noted that government transfer income increased quickly from 47 Yuan in 2004 to 559 Yuan in 2011, and its share in total income rose from 3.36 percent to 17.25 percent, respectively. Over the same period, poverty incidence was decreased dramatically (the numbers vary depending on which poverty line is used, and will be discussed later). Along with income growth, income disparity expanded in the three villages. The Gini coefficient rose from 0.41 in 2004 to 0.56 after 2009. The detailed sample description is listed in Table 1.

Table 1. Sample Statistics

Index	2004	2006	2009	2011
Number of rural household	795	817	862	900
Population (person)	3380	3418	3698	4034
Household size (person)	4.5	4.34	4.45	4.57
Labor share (%)	65.15	62.26	62.39	63.49
Share of ethnic minority (%)	33.79	35.61	36.18	38.25
Number of migrant out per household (%)	0.45	0.73	0.73	0.87
Share of household with migrant worker (%)	36.73	39.29	43.39	41.89
Share of household with odd job (%)	49.31	37.7	31.55	28.78
Share of Household with formal job (%)	6.54	6.49	6.03	4.33
Share of Non-agricultural household (%)	2.52	5.51	3.6	17.89
Per capita agricultural land (mu)	0.9		0.76	
Per capita Net income	1403	1859	2420	3239
Government transfer revenue (Yuan)	47	84	317	559
Share of government income (%)	3.36	4.52	13.09	17.25
Poverty incidence(% , 2004 national official poverty line of 668 Yuan)	27.63	11.05	5.99	4.57
Gini coefficient	0.41	0.52	0.56	0.55

² Unless stated otherwise, all monetary values in the paper are reported in 2004 constant levels.

Source: survey data

3. Paths in and out of poverty (What?)

We start by calculating both per capita living expenditure (including daily expenditure such as food, clothes, or fuel, and excluding durable goods expenditure) and per capita net income for each wave using household survey data, and converting them into 2004 values using the Guizhou provincial consumer price index. Both measures are used to calculate poverty rates, to achieve a more balanced picture of poverty.³ Two kinds of poverty lines were chosen to analyze the poverty status in the three villages: the Chinese official poverty line of 668 RMB per year per capita in 2004, and the international poverty line of 1\$ per day, at purchasing power parity (PPP), about 1314 RMB per year and per capita. The headcount poverty ratios are higher when computed using per capita income than using per capita expenditure. The two measures of poverty status are in agreement for about two thirds of the sample. The main reason may be that incomes are underreported, as is commonly suggested in the literature.

Both results show that the poverty headcount ratio decreased very fast over the 2004-11 period. According per capita expenditure, the poverty headcount ratio declined from 27.63% in 2004 to 5.44% in 2011 using 2004 Chinese official poverty line. The poverty headcount ratio is

³ Most academic work uses either expenditures or incomes to measure poverty, usually based on the authors' preferences or opinions about data quality or reliability. We prefer to think both measures are useful in their own way, albeit imperfect.

much higher using the dollar-a-day international poverty line, but the decreasing trend remains, with a reduction of poverty from 61.94% in 2004 to 24.97% in 2011.

We use the same two poverty lines to compute poverty gaps in the sample. The Foster-Greer-Thorbecke (FGT) poverty gap (Foster *et al*, 1984) is computed using the following formula:

$$PG = \frac{\sum_{i=1}^N (L - I_i) / L}{N}$$

Where L is the poverty line, I_i a household's income, and N the number of households in the sample. It measures the average amount by which the incomes (or expenditures) of households fall short of the poverty line as a percentage of that line. The shortfall is thus counted as zero for those above the poverty line. The FGT provides another measure of the severity of poverty at the village level. The result is consistent with the poverty headcounts: at the village level, the severity of poverty was dramatically reduced (no matter which poverty line and measure are being used).

Overall Table 2 brings good news, since fewer and fewer households are poor. However, thinking in terms of averages may lead one to misinterpret the situation as one where households in the sample are all gradually lifted out of poverty, until eventually all are non-poor. A closer look, however, shows that the truth is more complex. The paths out of poverty are far from linear, and many households cross the poverty line several times throughout the sample.

Table 2. Poverty headcount Ratio and poverty gap (%)

Poverty line	2004	2006	2009	2011	2004	2006	2009	2011
<i>Headcount poverty ratio</i>	Per capita expenditure				Per capita income			
National poverty line(668 yuan,)	27.63	11.05	5.99	4.57	27.93	28.79	17.46	10.56
International poverty line (1 \$ per day)	61.94	34.68	23.87	21.87	62.46	52.02	40.46	29.21
<i>Poverty gap</i>								
national poverty line(668 yuan)	8.55	2.42	1.66	1.78	9.65	12.52	7.26	4.05
International poverty line (1 \$ per day)	23.43	11.12	7.05	6.55	27.54	26.87	17.82	12.01

Note: expenditure/income data is calculated using 2004 constant price, 1 \$ per day is calculated using PPP price and about 1314 yuan at 2004 constant price. Source: Own computations based on survey data.

We choose the 1\$ per day poverty line and household expenditures to analyze poverty dynamics at the household level (but using a different poverty line or measures of income would yield qualitatively similar results). We determine each household's poverty status for our four years of data and trace the household's movement in and out of poverty in Figure 1. The figure provides household poverty transition probabilities from each period to the next, along with the associated household counts. It demonstrates the fluctuating nature of poverty status in our sample. In each period, a significant share of those who were poor are able to move out of poverty. This is the movement we suspect when looking at the averages above. However, the figure also shows that a non-negligible share of the non-poor slip into poverty. Over the full sample, about 30% of all the occurrences of change in poverty status are falls from non-poor status to poor status (157 counts out of 516). In other words, for every two households that exit poverty, another enters into it.

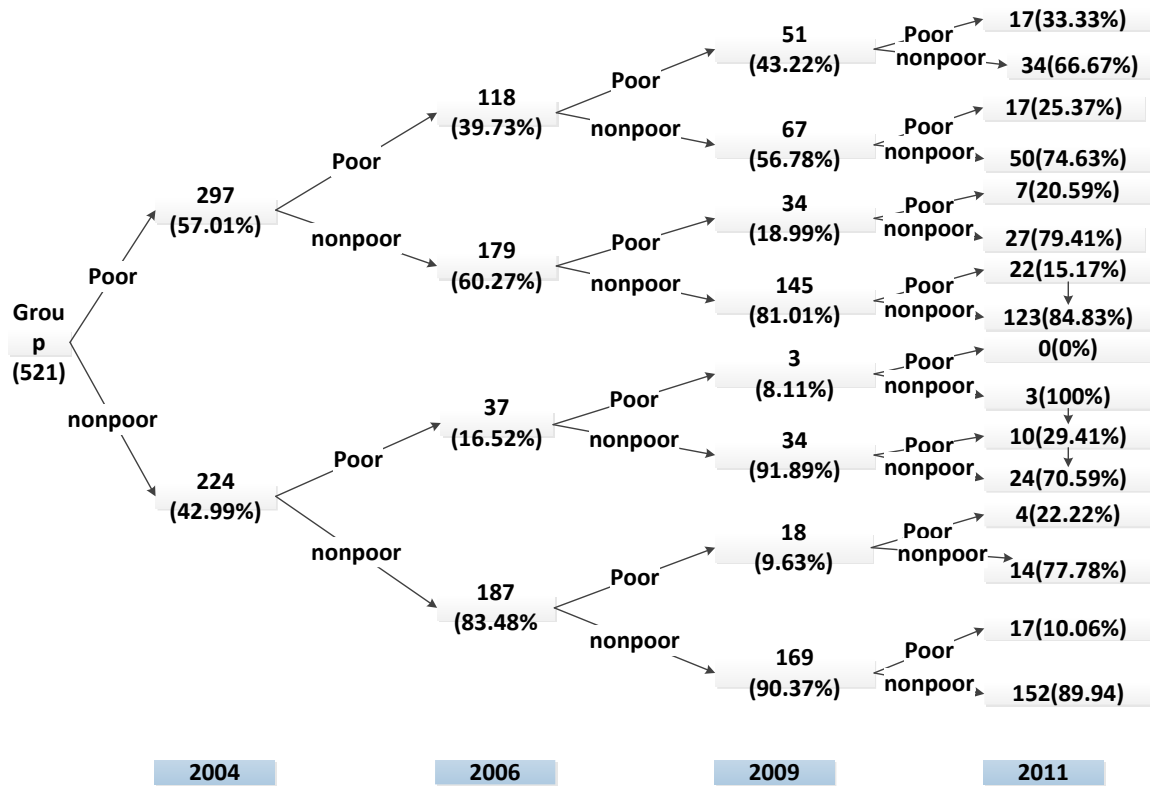


Figure 1. *Households Poverty transition probability (% , poverty line of 1\$ per day using per capita expenditure)*

We further explore these poverty dynamics by counting how many times each household experienced poverty in our 4-wave dataset. Table 3 classifies households according to number of times in poverty, using both income and expenditure measures and both national poverty line and international poverty line. In what follows, we will refer to households who experienced poverty once or twice as “transient” poor, and the households who were classified as poor three times or four times as “chronic” poor. Those whose living expenditure were always above the poverty line are defined as non-poor.

Using per capita expenditures and the national poverty line, 66.0% households were never poor and none are chronically poor. Using the international dollar-a-day poverty line, however, only 27.3% of the population were never poor, while 33.3% were poor once, 22.3% twice, 12.9% were poor three times, and 4.2% remained in poverty during all four waves of the survey. These results show that in this region usually regarded as poor, most of the poverty is in fact of temporary nature. The transient poor represent 55.6% of the sample, which is in line with previous results (Jalan and Ravallion, 1998, 2000; Glauben et al, 2012), while 17.2% households were chronically poor, experiencing poverty more than 3 times out of four waves of survey.

Households appear more vulnerable if we calculate poverty using per capita income, with only 15.2% of households never poor, and almost 30% of households poor three times or more. Still, more than half of the sample is in transient poverty.

Table 3. Poverty time distribution during four wave survey (% of sample)

Category	Non-poor	Transient poverty		Chronic Poverty		
Poverty times in sample	0	1	2	3	4	Total
Per capita expenditures:						
National poverty line(668 RMB)	66.0	24.7	8.6	0.7	0.0	100.0
Dollar-a-day (1314 RBM)	27.3	33.3	22.3	12.9	4.2	100.0
Per capita income:						
National poverty line(668 RMB)	44.2	38.2	13.1	4.0	0.6	100.0
Dollar-a-day(1314 RBM)	15.2	29.6	27.0	21.8	6.5	100.0

Source: Own computations based on survey data.

We compute likelihoods of exiting or entering poverty for each data year in the period 2004-20011. The probabilities of exiting and entering poverty are respectively defined as follows:

$$\begin{cases} P(\text{exit}_t) = \frac{N_{\text{exited},t}}{N_{\text{poor},t-1}} \\ P(\text{entry}_t) = \frac{N_{\text{entered},t}}{N_{\text{non-poor},t-1}} \end{cases}$$

where $P()$ denotes the probability of an event, N the number of households and t subscripts the period (McKernan and Ratcliffe, 2002). The number of households who entered or exited poverty were calculated according to the changes in poverty status across two waves. The results, shown in Table 4, were obtained using the dollar-a-day poverty line and both household expenditures and incomes. Both metrics indicate that the total number of poor households decreases over the period, reflecting the poverty rate numbers presented in Table 2. However, the number of households who entered poverty in each period is surprisingly high.

According to household expenditures, the number of households who enter into poverty increased steadily from year to year. While 37 households became poor between 2004 and 2006, almost double that (66) became poor between 2009 to 2011. The opposite happens with poverty exits, which a decrease from 179 between the first two waves to 78 between the last two. In the year 2011, the number of those who entered and exited poverty are quite close (66 and 78 households, respectively), yielding a net change in poverty of only 12

households (or roughly 2% of the sample). It is tempting to think that the number of those who exit poverty decreases with time because those who crossed the line earlier were “easier” to lift out of poverty than those who follow, such that over time it is becoming “harder” to lift the remaining poor across the line. But that, again, assumes a mistakenly linear view of poverty exit. In fact, the identities of those who are in the poor and non-poor groups are fluctuating. In likelihood terms, the chances of the poor to exit poverty appear to be increasing over time, from 60.27% to 73.58%. Meanwhile, the non-poor have a relatively steady chance of becoming poor, hovering around 15% though the whole period.

If we measure poverty using incomes, the number of those who enter poverty from one wave to the next is not only higher than as measured by expenditures, it is also rather stable between 72 and 83. The number of those who exit poverty between two waves is also stable, in the 129-138 range. The likelihood of exiting poverty rises over time (43.43% to 65.98%) while that of entering into poverty diminishes (36.16% to 22.02%). Every year, over half of the poverty exits are offset by poverty entries.

Although the income and expenditure measures differ somewhat in their magnitudes, they are consistent in suggesting that the pool of poor households in our sample has a high turnover, and that vulnerability is high. The remainder of this paper further sheds light on the factors that underlie movements in and out of poverty, first by decomposition of incomes and expenditures, then by econometrically estimating the determinants of entry or exit.

Table 4. Likelihood of poverty entering and exiting poverty over time (1\$ per day poverty line)

Wave	Sample size	Number of poor	Number of non-poor	Net					
				Number who entered poverty	Number who exited poverty	change in number of poor	Poverty rate	Likeliho od of entering poverty	Likeliho od of exiting poverty
Per capita expenditure									
2004	521	297	224				57.01		
2006	521	155	366	37	179	-142	29.75	16.52	60.27
2009	521	106	415	52	101	-49	20.35	14.21	65.16
2011	521	94	427	66	78	-12	18.04	15.90	73.58
Per capita income									
2004	521	297	224				57.01		
2006	521	249	272	81	129	-48	47.79	36.16	43.43
2009	521	194	327	83	138	-55	37.24	30.51	55.42
2011	521	138	383	72	128	-56	26.49	22.02	65.98

Source: Own computations based on survey data. Note: identical values for both 2004 rows are coincidental.

4. Decomposing incomes and expenditures of poverty entrants and escapees. (How?)

To understand what is behind the two-way poverty dynamics we see in our data, this section takes a closer look at the expenditure and income patterns of the households that enter and exit poverty. We create two samples using the original household-year data, according to poverty status in period $t-1$. Those who exited poverty between $t-1$ and t are grouped with others who were also poor at $t-1$ but remained poor in t ; those who entered poverty in period t are grouped with others who were non-poor in $t-1$. The same household-year observation may thus be part

of both samples. We first decompose the total incomes and expenditures into components, to understand what drives the change in poverty status. We then review other household characteristics, as well as major events which may be related to change in poverty status.

Poverty status is computed using total incomes and total (living) expenditures. By decomposing those totals, we can identify the changes in income and expenditure patterns which underlie the change in poverty status. The changes in expenditure items and income sources of poverty entrants and poverty escapees, averaged over 2004-2011, are shown in Table 5. The components of living expenditures include food, clothing, fuel, family services, medical bills (net of insurance reimbursements), education and electricity, telephone and transportation. Income sources are agriculture, local non agriculture (including local odd job income and self-employment income), migrant remittances, gifts, and government transfers. To get a complete picture, we report both “direct decompositions” (e.g. expenditure decomposition of those whose *expenditures* crossed the poverty line) and “cross decompositions” (e.g. expenditure decomposition of those whose *income* crossed the poverty line). This yields four decompositions for those exiting poverty, and four more for those entering it. Note that the samples for poverty exit and entry are different: the top of the table features all households who were in poverty at a given period $t-1$ (and then exited or not in period t), while the bottom of the table features those who were non-poor at any given period $t-1$ (and then fell into poverty or not at period t).

The top panel reports decompositions for those who exited “expenditure-poverty” on the left

(poverty status measured using expenditures), and those who exited “income-poverty” on the right. All decompositions are consistent in showing that total incomes and expenditures of those exiting poverty increase more than those who stayed poor. The bottom panel reports decompositions for those who entered poverty, whose incomes and expenditures drop significantly no matter what the criterion. Those who stayed non-poor, in comparison, saw their incomes and expenditures grow, reflecting the overall growth of the region.

Expenditure decompositions consistently show that poverty exit (entry) is strongly associated with a large increase (decrease) in food consumption, across all decompositions (respectively 618RMB, 343RMB for exits, and -636RMB, -209RMB for entries). Food represents a high share of the household consumption basket, such that food expenditure decisions are a household’s primary means to splurge or save.

The expenditure decompositions also point to the importance of education expenditures. Spending on education increased more for those who exited poverty (whether measured by expenditure or income) compared to those who stayed poor, and decreased for those who entered poverty (both left and right of the table). This suggests that households also adjust education spending with their poverty status.

Three of the four expenditure decompositions associate the change in poverty status with a large change in medical expenditures. Exiting poverty comes with a 279RMB increase in medical expenditures, while entering it is associated to a 597RMB decrease in medical

expenditures. This relationship may be causal (households exiting/entering poverty can/cannot afford medical bills), but it may also be an artifact of measuring poverty by using expenditures (households may increase medical expenditures because they become sick, not because they exited poverty). The cross-decompositions help us shed light on this. The medical expenditures of income-poverty escapees barely increased (4 RMB), and those of the income-poverty entrants decreased by 117RMB, roughly the same amount as those who stayed poor (114RMB). This suggests that the large increase in medical expenditures of the expenditure-poverty escapees is perhaps largely a definitional artifact of measuring poverty through expenditures. Nevertheless, whether this relationship is causal or coincidental, it testifies to the fact that medical expenditures are highly fluctuating and large enough to make a difference in a household's dollar-a-day poverty status.

We decompose incomes into six categories. While the changes in expenditures are largely driven by food, no income category seems to be consistently dominant in terms of explaining the changes in total income. Agricultural and non-agricultural incomes appear to fluctuate most with poverty status. Local odd jobs vary slightly less in magnitude overall, but remain a sizeable component of total income change. The contribution of migrant remittances deserves to be underscored: it is the dominant category (-289RMB) for those who entered poverty on the expenditure side. It should be noted that government transfer income increased significantly during 2004-2011 for all groups and by all measures, following the deployment of preferential policies during the period.

Table 5. The average changes in expenditure item and income source of poverty exiting/entering (yuan)

	Poverty status measured by per capita expenditures			Poverty status measured by per capita incomes		
	exiting poverty	stay poor	Mean	exiting poverty	stay poor	Mean
Exiting poverty						
<i>Change in total living expenditure</i>	1338	97	816	676	252	457
Change in food consumption	618	65	386	343	106	221
Change in clothing expenditure	52	4	32	38	13	25
Change in fuel expenditure	46	-1	26	23	8	15
Change in family service expenditure	12	-1	7	22	7	14
Change in medical expenditure	279	-16	155	4	31	18
Change in electricity expenditure	55	14	38	64	27	45
Change in telephone expenditure	52	4	32	46	5	25
Change in education expenditure	152	7	91	78	23	50
Change in transportation expenditure	69	21	49	50	31	41
<i>Change in total net income</i>	1162	245	777	2625	-1	1269
Change in agricultural income	314	18	190	682	5	333
Change in local non agricultural income	359	82	242	869	-38	400
Change in local odd job income	255	107	193	618	-32	282
Change in migrant remittance	135	17	85	396	-12	185
Change in gift income	76	13	50	164	-2	79
Change in government income	187	130	163	432	97	259
Entering poverty						
	entering poverty	stay non poor	Mean	entering poverty	stay non poor	Mean
<i>Change in total living expenditure</i>	-1558	197	-113	-447	220	23
Change in food consumption	-636	120	-14	-209	165	55
Change in clothing expenditure	-33	10	3	-10	8	3
Change in fuel expenditure	-47	-1	-9	-39	8	-6
Change in family service expenditure	-24	-5	-9	-15	-21	-19
Change in medical expenditure	-597	-81	-172	-117	-114	-115
Change in electricity expenditure	2	52	44	4	53	38
Change in telephone expenditure	4	43	36	32	48	43
Change in education expenditure	-142	28	-2	-59	49	17
Change in transportation expenditure	-85	26	7	-35	22	6
<i>Change in total net income</i>	-590	605	394	-2707	924	-148
Change in agricultural income	-251	135	67	-648	139	-93
Change in local non agricultural income	-79	380	299	-820	575	163
Change in local odd job income	24	318	266	-374	438	198
Change in migrant remittance	-289	21	-34	-442	-31	-152
Change in gift income	-82	-52	-58	-224	-58	-107
Change in government income	182	270	255	11	258	185

Source: Own computations based on survey data.

5. Econometric analysis of the determinants of poverty entry and exit. (Why?)

Based on the changes of expenditure items and income sources described in the previous section, we look for the determinant factors of poverty exits and entries with emphasis on three aspects: household characteristics, trigger events, and government transfers. The generic model specification for poverty exit can be written as follows:

$$P(exit_t|poor_{t-1}) = f(HH, D_{hh}, D_{event}, \Delta_{gov}, V_i, T_t) \quad (1)$$

and the model for entry as follows:

$$P(entry_t|non - poor_{t-1}) = f(HH, D_{hh}, D_{event}, \Delta_{gov}, V_i, T_t) \quad (2)$$

Where HH are household characteristics, D_{hh} and D_{event} are dummies for changes in household characteristics and occurrences of trigger events between $t-1$ and t , Δ_{gov} the level change in governmental income transfers between $t-1$ and t , and V_i and T_t are village and year dummies. In both entry and exit models, the sample is restricted to household-year observations with the same poverty status at the previous period $t-1$, so that poverty entrants are compared to those who stayed non-poor, and poverty escapees are compared to those who stayed poor. All variables relate to changes as compared to the previous period.

The choice of variables is guided by statistical analysis, presented in Table 6 and Table 7. Considering that the events associated with poverty exits and poverty entries differ, we provide

summary statistics separately for poverty exits and poverty entry. In both tables, we include household head education, age, and dummies for household head being a farmer (who relies only on agriculture for income), household members being village officials (or “cadres”), minority status, as well as having “*guanxi*” (friends or relatives in government, a recurrent concept in Chinese culture). Trigger events are included as dummies (later used in regression analysis) denoting change between wave *t* and wave *t*-1. We consider changes in household characteristics, changes in labor force and employment, changes in assets, major life events, and natural disasters.

Table 6 compares the means of variables of interest for those who exited poverty as compared to those who stayed poor, and the pooled sample. Standard deviations are omitted in the interest of space. Income-poverty and expenditure-poverty give remarkably similar results for most variables. Those who exited poverty are on average more educated and are more likely to be of the Han ethnicity (the majority in China). They are also more often village cadres, and have more relations in government. Household head age and farmer status give mixed results. The households who exited poverty were also more likely to experience certain events, such as an increase in migrant labor (35 percent vs 22 percent on the left, 38% vs. 21% on the right), or an increase transportation assets (6% vs. 2% and 10% vs. 2%, respectively). Differences in other events are either small or inconsistent between the income and the expenditure measures of poverty. Notably, households exiting poverty saw income from government sources increase.

Table 6. Descriptive Analysis the determinants of Poverty Exits

	Per capita expenditure			Per capita income		
	Exiting poverty	stay poor	All	Exiting poverty	stay poor	All
Household head's Education (1=primary school; 2=middle school; 3=college/university and higher)	1.44	1.35	1.41	1.46	1.40	1.43
Age of household head(year)	47.43	46.40	47.00	47.66	47.41	47.53
Farm dummy(1=yes, 0=no)	0.60	0.57	0.59	0.53	0.63	0.58
Village cadre(1=yes, 0=no)	0.03	0.00	0.02	0.01	0.01	0.01
Ethnicity (1=Han,0=other)	0.66	0.38	0.54	0.66	0.51	0.58
<i>guanxi</i> (1=yes, 0=no)	0.16	0.12	0.14	0.18	0.12	0.15
Increase in odd job labor(1=yes, 0=no)	0.19	0.20	0.20	0.27	0.17	0.22
increase in self-employment labor(1=yes, 0=no)	0.00	0.00	0.00	0.00	0.00	0.00
Increase in migrant out labor(1=yes, 0=no)	0.35	0.22	0.29	0.38	0.21	0.29
Increase in high education level labor(1=yes, 0=no)	0.01	0.00	0.01	0.01	0.00	0.01
Change in marriage status of household head from single to married(1=yes, 0=no)	0.02	0.03	0.02	0.02	0.02	0.02
Increase in transportation tool(1=yes, 0=no)	0.06	0.02	0.04	0.10	0.02	0.06
Increase in agricultural machine(1=yes, 0=no)	0.03	0.02	0.02	0.05	0.01	0.03
Increase in cattle(1=yes, 0=no)	0.31	0.38	0.34	0.22	0.33	0.28
Male member wedding(1=yes, 0=no)	0.06	0.08	0.07	0.06	0.07	0.07
Female member wedding(1=yes, 0=no)	0.04	0.02	0.03	0.02	0.03	0.03
Child birth ceremony(1=yes, 0=no)	0.03	0.04	0.04	0.04	0.03	0.04
Building new house(1=yes, 0=no)	0.09	0.04	0.07	0.10	0.09	0.09
change in government transfer income(yuan)	187.38	130.39	163.42	432.24	96.68	258.97

Source: Own computations based on survey data.

Table 7 compares variable means for those who entered poverty as opposed to their counterparts who stayed non-poor. Regardless of whether we measure poverty using incomes or expenditures, the results show that those who fell into poverty are on average less educated, have less *guanxi*, are less likely to be of Han ethnicity, and more likely to be farmers. The results also point to certain trigger events which households entering poverty are more likely

to have experienced: an increase in members suffering of a chronic disease (but not simply any disease), a loss of transportation means or agricultural machinery. While both groups saw an increase in government transfer incomes, the increase was much smaller for households who entered poverty. The remaining results are less clear-cut. We turn to regression analysis to identify significant relationships.

We perform regression analyses using logit models with a poverty exit or entry dummy on the left-hand-side. Observations are household-years, and the explained variable indicates whether or not a household's poverty-status changed in a given year t , following the models specified in equations (1) and (2). In addition to the logit specification, we also apply a discrete-time multivariate hazard model to the same specification. The hazard rate is the probability of exiting poverty at time t ($T_i = t$) given that the individual exits poverty at time t or later ($T_i \geq t$). The hazard model controls for the duration of poverty spells and the left-censored nature of the data (we do not know poverty status in the year prior to the first round) (McKernan and Ratcliffe, 2002). Bane and Ellwood (1986) and Stevens (1994) were among the first to apply this method to poverty analysis. Glauben et al. (2012) and Imai and You (2013) also use a hazard model to analyze poverty exit in a rural area of China.

Table 7. *Descriptive Analysis the determinants of Poverty Entries*

	Per capita expenditure			Per capita income		
	Entering poverty	Stay non-poor	All	Entering poverty	Stay non-poor	All
Household head's Education (1=primary school; 2=middle school; 3=college/university and higher)	1.39	1.55	1.52	1.46	1.55	1.52
Age of household head (year)	50.06	48.91	49.11	48.97	49.11	49.07
Farm dummy(1=yes, 0=no)	0.66	0.54	0.56	0.62	0.54	0.56
Village cadre(1=yes, 0=no)	0.02	0.03	0.03	0.03	0.04	0.04
ethnicity(1=Han,0=other)	0.63	0.81	0.78	0.71	0.83	0.79
<i>Guanxi</i>	0.09	0.18	0.17	0.12	0.19	0.17
decrease of odd job labor	0.16	0.23	0.22	0.28	0.21	0.23
decrease of self-employment labor(1=yes, household head from married to single(1=yes, 0=no)	0.46	0.38	0.39	0.32	0.42	0.39
increase of disease member(1=yes, 0=no)	0.24	0.21	0.22	0.30	0.23	0.25
increase of (1=yes, 0=no) chronic(1=yes, decrease of transportation tool(1=yes, 0=no)	0.61	0.27	0.33	0.38	0.41	0.40
decrease of agricultural machine(1=yes, decrease of cattle(1=yes, 0=no)	0.45	0.17	0.22	0.30	0.20	0.23
male wedding(1=yes, 0=no)	0.26	0.22	0.23	0.35	0.23	0.27
female wedding(1=yes, 0=no)	0.27	0.24	0.25	0.32	0.26	0.28
child birth(1=yes, 0=no)	0.15	0.14	0.14	0.14	0.15	0.15
family member death(1=yes, 0=no)	0.08	0.08	0.08	0.07	0.08	0.08
building new house(1=yes, 0=no)	0.02	0.05	0.04	0.04	0.06	0.05
Big disaster (1=yes, 0=no)	0.07	0.07	0.07	0.09	0.07	0.08
livestock death(1=yes, 0=no)	0.09	0.08	0.08	0.07	0.07	0.07
children go to university(1=yes, 0=no)	0.14	0.11	0.12	0.10	0.11	0.11
change in government transfer income(yuan)	0.51	0.46	0.47	0.40	0.47	0.45
	0.16	0.11	0.12	0.10	0.11	0.10
	0.03	0.04	0.04	0.04	0.04	0.04
	181.79	270.45	254.7	10.77	258.25	185.17

Source: Own computations based on survey data.

Results of both logit and hazard models are shown in Table 8 for poverty exit and Table 9 for entry. In each table, we report models based on expenditure measures and on income measures.

The logit specifications report marginal effects, as is customary. For the hazard models, we report regression coefficients. Models are overall consistent in their results across

specifications, despite a few differences in significance.

The determinants of poverty exits (Table 8). The first result standing out is the importance of basic household characteristics which are difficult to change in the short run. Consistent with previous literature, our results highlight the importance of education (Zhang, 2008; Li *et al.*, 2012). A household head with college education is more likely to exit poverty in all but one specification. According to the logit models, college education increases the probability of exiting poverty between 12% and 23%. Middle school education is significant in one of the specifications, and associated with a 4% increase in the probability of exiting poverty. We also find that “social capital” characteristics are particularly significant. Dummies for village cadres, for Han ethnicity and for “guanxi” relationships in government are all positively correlated with poverty exit and strongly significant in almost all specifications. The farm dummy yields mixed but significant results, which may call for further research.

Our results also echo existing literature with respect to migration. Migrant labor is associated with poverty exit, with very strong significance in every specification. The pool of rural Chinese who choose to migrate to the cities for work is ever-growing. It is known that the remittances sent home by former household members are an important share of household income in rural China, and are particularly crucial in a lagging region lacking alternative resources and opportunities. However, our specification does not include the amount of remittances received nor even the number of migrants working in the city, but simply a dummy variable for whether the number of members who migrated increased since the last survey.

The fact that this dummy increases the probability of poverty exit by 12% to 40% is testimony to how quickly and effectively migrants influence the livelihoods of those who stayed behind. In contrast, the odd-jobs variable is only significant in one of the specifications (and another dummy for private business was dropped from the regressions altogether).

Third, an increase of a household's asset base (transportation means, agricultural machinery) is positively associated to an exit from poverty in the specifications based on income. This suggests that the region does offer some local opportunities, since households are able to convert assets into income, perhaps through improved productivity and efficiency. Cattle, however, yields no significant impact.

The impacts of “big events” on poverty exit are limited and mixed. Most event variables appear insignificant in specifications other than the logit using income-poverty as a dependent variable. The head of household getting married decreases the probability of poverty exit on the income side, which may be reflecting a shift of labor away from income-generating activities (perhaps to care for the household, or to prepare the wedding). A wedding in the family (male or female) has a similar effect, perhaps in relation to the loss of labor force when a member leaves the household. The dummy for building a new house is positively related to poverty exit in expenditure specifications, but negatively related in another. Building a house involves costs and takes time away from income-generating activities, but households usually receive gifts at the house-warming, often build houses as a sign of increased wealth, and in the last year of the survey it may have been subsidized by the government.

Finally, government also plays a decisive role in poverty reduction. The government implemented a series of preferential policies between 2004 and 2011, which is why most households have seen their transfer incomes increase over the period. The change in government transfers is significantly related to poverty exit in all specifications, with each 100RMB increasing the probability of poverty exit by 1-3 percent.

Determinants of poverty entries (Table 9). The poverty entry specifications also highlight several household characteristics as strongly significant. Household head education has a strong negative relation to poverty entry in both logit specifications, with middle school decreasing the probability of falling into poverty by about 4%. A head of household relying only on agriculture is positively associated with entry into poverty in both logit specifications, which points to the vulnerability of farming livelihoods in the region. Being a village cadre and of the Han ethnicity is negatively related to a fall into poverty, though only in one specification. Gustafsson (2009) also found higher rates of entry in ethnic minorities. The all-important *guanxi* relations are negatively related to poverty entry in all but one specification. Changes in employment give mixed results. On the one hand, a decrease in odd-job labor significantly increases the chance of falling into poverty according to income measures, on the other it significantly decreases them according to expenditure measures. This may be an indication of households compensating for job loss with thrift. Reduction in self-employment labor does not appear significant in the logit. It is infrequent enough that the variable was

dropped in the hazard model specifications. Return of migrants to their village was dropped for the same reason.

Loss of transportation assets is very strongly related to falls into poverty regardless of the specification, with up to 60% increase in the probability of becoming poor. However, loss of agricultural machinery is not. Decrease or death of cattle, another form of agricultural asset, is associated with poverty entry in one specification.

Some major life events do seem to have an influence on the probability of falling into poverty. Marital status changing from married to single is related to poverty entry in the expenditure specifications. This suggests that single household heads are more vulnerable to poverty. The logit specifications also suggest that a male wedding increases the probability of entering poverty on the expenditure side, but decreases it for a female on the income side. Traditionally in the villages where our data comes from, the bride's family receives a large sum of money from the groom's family as a bride price. Our results are likely reflecting this custom, and suggest that the sums involved are large enough to make the difference between being poor and non-poor, at least in the short run.⁴

Disease is thought to be one of the main causes of fall into poverty. Our results suggest that the incidence of chronic disease has a significant impact on entry into poverty on the expenditure side, suggesting it imposes a financial burden on households. Paradoxically, one

⁴ In the long-run, the groom's family is compensated for this expenditure as the bride is expected to care for her husband's family.

specification suggests that an increase in the number of diseased members decreases the probability of entering into poverty, which may reflect some informal safety net effects we are not capturing in the data.

Finally, government transfer income also has highly significant negative effects on poverty entries. As mentioned before, government transfer income increased continuously during 2004-2011 due to a series preferential policies. Government transfers became an important income source, especially for low income households, reaching almost 20% of their total income. Our results suggest that government transfer income played an important role in smoothing incomes and expenditures and reducing the probability of entering poverty again.

Table 8: Determinants of household poverty exit coefficient estimates from Logit and Hazard Model

	Logit		Logit		Hazard		Hazard	
	per capita expenditure		per capita income		per capita expenditure		per capita income	
	dy/dx	Z-value	dy/dx	Z-value	coefficient	z-value	coefficient	z-value
Household head's Education type=2	0.0495**	(2.35)	-0.0115	(-0.6465)	0.1078	(1.28)	-0.0029	(-0.0352)
Household head's Education type=3	0.2370***	(3.16)	0.1223*	(1.66)	0.3721*	(1.84)	0.3217	(1.08)
Age of household head	-0.0005	(-0.5191)	0.0008	(1.07)	-0.0007	(-0.2043)	0.0038	(1.06)
Farm dummy(1=yes, 0=no)	0.0365*	(1.66)	-0.0859***	(-4.4590)	0.0564	(0.68)	-0.2256***	(-2.6688)
Village cadre(1=yes, 0=no)	0.3327***	(6.02)	0.2102**	(2.56)	0.4379***	(4.23)	0.4399	(1.29)
Ethnicity(1=Han, 0=other)	0.2624***	(7.44)	0.1810***	(6.08)	0.4605***	(3.58)	0.3347**	(2.32)
Guanxi	0.1168***	(4.03)	0.0831***	(3.44)	0.2004**	(2.11)	0.1816*	(1.83)
Increase of odd job labor	-0.0242	(-0.9296)	0.0734***	(3.45)	-0.0566	(-0.5672)	0.1195	(1.32)
Increase of migrant labor	0.1274***	(5.88)	0.1870***	(10.61)	0.2035***	(2.62)	0.4056***	(5.34)
Increase in high education level labor	-0.0041	(-0.0235)	0.0868	(0.67)	0.0603	(0.17)	0.1437	(0.27)
household head from single to	0.0664	(0.75)	-0.2089***	(-2.6199)	0.0643	(0.31)	-0.222	(-0.7557)
Increase in transportation tool	0.1099	(1.51)	0.2581***	(4.93)	-0.045	(-0.3697)	0.2097*	(1.91)
Increase in agricultural machinery	0.0837	(1.19)	0.2156***	(3.94)	0.1566	(0.75)	0.3634***	(2.81)
Increase in cattle	-0.004	(-0.1675)	-0.0235	(-1.0822)	-0.0213	(-0.2196)	-0.0702	(-0.5984)
male wedding	-0.0615	(-1.4693)	-0.0835**	(-2.3621)	-0.1387	(-0.8347)	-0.2293	(-1.3803)
female wedding	0.055	(0.92)	-0.1156**	(-2.3542)	0.1101	(0.79)	-0.2804	(-0.9567)
child birth	-0.08	(-1.4369)	0.0238	(0.54)	-0.1516	(-0.9361)	0.0494	(0.28)
building new house	0.1530***	(3.48)	-0.0547*	(-1.8801)	0.1820*	(1.69)	-0.1271	(-1.0569)
change of government transfer	0.0001**	(2.55)	0.0003***	(11.07)	0.0001**	(2.06)	0.0001***	(3.55)
Log likelihood/Log pseudo	-1230.60		-1531.91		-8197.65		-9012.48	

Note: ***, ** and * denote 1%, 5% and 10% significant levels. Source: own computations. Village and year dummies not reported in the interest of space (significant).

Table 9: Determinants of household poverty entry coefficient estimates from Logit and Hazard Model

	Logit model		Logit model		Hazard model		Hazard model	
	per capita expenditure		per capita income		per capita expenditure		per capita income	
	dy/dx	z-value	dy/dx	z-value	Coefficient	z-value	Coefficient	z-value
Household head's Education type=2	-0.0441***	(-2.8429)	-0.0488**	(-2.4362)	-0.2184	(-1.1953)	-0.1573	(-1.1277)
Household head's Education type=3	.	.	-0.0282	(-0.5160)	-33.6630***	(-99.7187)	-0.1184	(-0.2957)
Age of household head	-0.0003	(-0.4880)	-0.0004	(-0.4493)	-0.0012	(-0.1843)	-0.002	(-0.3678)
Farm dummy(1=yes, 0=no)	0.0472***	-2.9213	0.0565***	-2.761	0.2645	(1.34)	0.1837	(1.27)
Village cadre(1=yes, 0=no)	-0.0012	(-0.0289)	-0.0874**	(-2.1716)	-0.0175	(-0.0297)	-0.3299	(-0.8221)
ethnicity(1=Han,0=other)	-0.0882***	(-2.8762)	0.0084	-0.2475	-0.4143*	(-1.6618)	0.0523	(0.24)
<i>Guanxi</i>	-0.1159***	(-4.8010)	-0.0945***	(-3.4813)	-0.6730*	(-1.9544)	-0.3349	(-1.5352)
decrease of odd job labor	-0.0851***	(-4.0499)	0.1086***	-4.7756	-0.4720*	(-1.7583)	0.3519**	(2.37)
decrease of self-employment labor	2.1565	-0.0241	-0.0008	(-0.0111)	24.2472	.	0.085	(0.11)
household head from married to single	0.1345***	-3.5735	-0.0007	(-0.0150)	0.6191**	(1.98)	-0.0192	(-0.0679)
increase of disease member	0.0029	-0.9022	-0.0080**	(-2.0258)	0.0199	(0.53)	-0.0252	(-0.8141)
increase of chronic disease member	0.0259***	-4.2822	-0.0114	(-1.3244)	0.1207*	(1.87)	-0.0482	(-0.8025)
decrease of transportation tool	0.1271***	-4.1537	0.1892***	-5.2951	0.6224**	(2.35)	0.6198**	(2.49)
decrease of agricultural machine	0.0152	-0.5688	-0.0364	(-1.1496)	0.115	(0.38)	-0.131	(-0.5564)
decrease of cattle	0.0516**	-2.4497	0.0299	-1.1058	0.2889	(1.18)	0.1036	(0.56)
male wedding	0.0493*	-1.7858	-0.0278	(-0.7711)	0.2357	(0.76)	-0.0868	(-0.3342)
female wedding	-0.0322	(-0.7590)	-0.1455***	(-3.1287)	-0.1885	(-0.3405)	-0.503	(-1.4294)
child birth	0.0341	-1.2114	0.036	-0.9741	0.1891	(0.57)	0.1212	(0.42)
family member died	0.0014	-0.0502	-0.0135	(-0.3537)	0.0109	(0.04)	-0.0216	(-0.0749)
building new house	0.0535**	-2.4489	0.0183	-0.5929	0.3067	(1.28)	0.0647	(0.31)
disaster	0.0162	-0.8609	0.0491**	-2.0235	0.0715	(0.33)	0.1621	(0.97)
livestock died	0.0572**	-2.5738	0.0186	-0.548	0.3371	(1.40)	0.0746	(0.30)
children go to university	-0.01	(-0.2629)	0.0286	-0.675	-0.0497	(-0.0883)	0.1167	(0.43)
change in government transfer income	-0.0000***	(-2.6842)	-0.0001***	(-5.7994)	-0.0001**	(-1.9815)	-0.0002***	(-3.5172)
Log likelihood/Log pseudo likelihood	-1153.22		-1299.50		-3357.83		-4656.06	

Note: ***, ** and * denote 1%, 5% and 10% significant levels. Source: own computations. Village and year dummies not reported in the interest of space (significant).

6. Conclusions and implications

We traced the poverty dynamics in three villages of Guizhou province using a four wave household survey data during 2004-2011 and discussed the determinants of poverty exits and entries. Our work stands out from the existing literature in that we use local data from a poor region rather than national averages, that this data is recent, and that we focus both on poverty exit and poverty entry. In addition, we examine both the expenditure and income data, which allows us to provide more robust results and give a more balanced picture.

We show that even in the poorest regions of China, poverty is predominantly not chronic, but rather transient. Changes in poverty status are frequent, both exits from poverty, and falls into it. On the one hand this is encouraging, as many households get opportunities to rise out of poverty, and in fact the poverty rate has been declining steadily. On the other hand, the considerable number of people entering into poverty every year highlights the high vulnerability in the region. Beyond the need to lift people out of poverty, it is important to think about how to keep them out, by reducing vulnerability and strengthening resilience.

Decomposing expenditure measures showed that food consumption, education and medical expenditures are the main items on which expenditures are reduced by households who entered poverty. Policies, price incentives and insurance mechanisms targeting these items are most likely to make a notable difference in the way households experience poverty. Decomposing incomes reveals no such clear pattern, suggesting that all income

sources are fairly unstable in the region. Agriculture, odd jobs, businesses or remittance incomes all participate to poverty alleviation, but their vulnerability also adds to the burden of poverty.

Some household characteristics appear to be strongly related to poverty exit and entry. Among those, some of the most difficult to change are also among the most significant in regression analysis, such as ethnicity or *guanxi* relations. But others offer some flexibility, such as education, assets, or government transfer income. The improvement of education appears to be an effective way to reduce poverty which can be a target for government policy. Our decomposition analysis shows that household education expenditures fluctuate widely when households enter or exit poverty, which further underscores the need for solutions focused on education.

Our results help identify other potential policy levers. We find that disease remains a poverty-maker, in particular chronic disease. The New Cooperative Medical Scheme, a public insurance program launched in 2005 and under continuous upgrading, has the potential to greatly reduce this burden. Agricultural insurance schemes may be able to help buffer households against agricultural asset losses, which our results suggest are also related to poverty entries.

Migration is among the strongest determinants of poverty exit, not just for the migrants themselves, but as we see in our data, for their families left behind in the village as well. The migration flows from China's poor rural regions to the cities, already massive in scale, are likely to continue into the future. Training of migrant labor, enhancing the integration of rural and urban areas, providing social security for migrants may all help alleviate

poverty. However, this result also points to a lack of local opportunities. Migration out of the sector is not a rural development strategy in itself. The building or strengthening of assets, also significantly associated with poverty dynamics, holds more potential for durable local growth.

While these results help identify areas of particular importance for poverty reduction, they also underscore the issue of policy targeting. High frequency movements into and out of poverty mean that the poor are a fluctuating group. Government transfers have contributed significantly to poverty reduction in our data. Their smart targeting, or frequent re-targeting, may be key to achieving more effective and more durable poverty alleviation.

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