Who is Poor this Year? Understanding Fluctuations in Poverty Status in Three Chinese Villages[1]

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Abstract: We shed light on poverty dynamics by analyzing a census-like survey of three villages of Guizhou province during 2004 to 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. We decompose measures of wealth to reveal the proximate causes of poverty entry or exit, then use logistic regression and multivariate hazard models to look for underlying causes. Agricultural income contributes most to changes in poverty status. Poverty entry and exit are both related to household characteristics, assets, and social capital. Rural-urban migration strongly increases the probability of poverty exit, as do government transfers. The frequent changes in poverty status highlight the importance of improving policy targeting and/or implementing village-wide poverty-alleviation strategies.

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

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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).[2] 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 Chinese rural areas is more severe than in urban areas. Disasters, market volatility and fluctuations in migrant job opportunities among other factors cause farmers' incomes to be generally more vulnerable than those of urban households. Many households briefly manage to exit poverty only to fall back into poverty at the same season 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 poverty after having exited poverty in the recent past. Traditional poverty analysis focuses on poverty rates from a static perspective, yet 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).

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

Two strands of literature that have looked at the dynamics of poverty are particularly relevant to our study.[3] The first is concerned with the chronic or transient nature of poverty, and focuses on identifying the share of poverty that can be considered temporary in nature. Most of that research finds that much of poverty is transient in nature, and that those in persistent poverty are few (Jalan J & Ravalion, 1998，2000; Wang and Li, 2003; McCulloch and Calandrino, 2003; Duclos, et al,2010; Imai and You, 2013). Jalan & Ravalion (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 second body of literature builds on the notion that poverty can be transitory in nature, and explores the characteristics of poverty spells. Central themes are the determinants of the length of a poverty spell, or the determinants of entry into and exit from poverty (Bane & Ellwood, 1983; Stevens, 1994). The present paper is primarily concerned with the latter question.

These lines of research have produced a few results for China. 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. Glauben et al （2011）test the duration dependence of poverty exit, and find that duration of poverty spells

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[3] A large body of literature is also concerned with poverty dynamics, but focuses on issues and methods less relevant to us. This includes, but is not limited to, literature on poverty traps, dynamics of asset accumulation, long-term wealth equilibria, or inter-generational transmission of poverty.

has a strong influence on the probability of exiting poverty in Yunnan province, but not in Zhejiang province. 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; they find poverty duration has a significant impact on poverty exits and entries. Determinants of exit or entry 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). 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 rural Chinese context. We use recent data from a four-wave rural household survey spanning 2004-2011 in three villages of Puding county, a relatively poor county of Guizhou province. Defining poverty as having per-capita expenditures or incomes below a standard poverty line, we trace the poverty paths of households through four waves of data. Our results suggest that changes in poverty status are frequent and that the pool of those who are under the poverty line changes from year to year. We decompose incomes by source and expenditures by type so as to uncover the "proximate" cause of change in poverty status, then attempt to econometrically identify underlying causes of changes in poverty status using logit and multivariate hazard models. We find that agriculture plays a major role in determining poverty status, as do government transfers and opportunities outside of the rural sector. Those results have implications for the design of poverty-alleviating policies and highlight the challenges in generating growth from within in an area of low agricultural potential such as Puding county.

The next section introduces the survey site and data. Section three presents the dynamic analysis of poverty status in the sample (the "what?" question). Section four presents a decomposition analysis of incomes and expenditures by poverty status - the proximate causes of changes in poverty stats (the "how?" question). Section five an econometric analyses of the characteristics and events influencing poverty entries and exits – the underlying causes of changes in poverty stats (the "why?" question). Conclusions follow.

2. Survey data and site

Our data come from three villages in Puding County of Guizhou Province, officially classified as a poor county by the national government. 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. It 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.4 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.

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

We start by calculating both per capita living expenditure (including daily expenditure such as food, clothes, or fuel, but excluding expenditures of durable goods) 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.[5]   Two kinds of poverty lines were chosen to compute 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 slightly 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

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

[5] It is common to use either expenditures or incomes to measure poverty, based on perceived data quality or reliability. Both measures are useful, albeit imperfect, and for this article we performed all analyses using both measures. We provide results using both measures where there are notable differences, otherwise we limit ourselves to presenting expenditure results.

suggested in the literature. For this reason, much of the following analysis will rely on expenditures, which may be a more conservative.

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 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.

To measure poverty depth, we compute poverty gaps in the sample, using the same poverty lines as references. The Foster-Greer-Thorbecke (FGT) poverty gap (Foster et al, 1984) is computed using the following formula:

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

Where L is the poverty line, Y_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 FTG 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).

Complexity behind the averages

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.

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 changes in poverty status are falls into poverty rather than exits from poverty (157 counts of poverty entries against 359 counts of poverty exits). In other words, for every two households that exit poverty, another falls into it.

We further explore these poverty dynamics by counting how many times each household experienced poverty in our 4-wave dataset. Table 3 by number of times in poverty. Using the national poverty line, 66.0% households were never poor and none are poor throughout the whole sample. 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. Another way to illustrate the dynamic nature of poverty status is to count the number of times a household changed poverty status throughout this sample (bottom panel of the table). Most of our sample crossed the dollar-a-day poverty line at least once over the period, 16.7% crossed it twice, and 7.1% crossed the poverty line three times in four waves of data.   These results suggest that in this region usually regarded as poor, most of the poverty is in fact of temporary nature, in line with previous results (Jalan and Ravallion, 1998, 2000; Glauben et

al, 2012). With only four observations per household, we are limited as to what we can say about the frequency and length of poverty spells. However, the large numbers of poverty-line-switchers in our sample suggests that re-entry into poverty may be an issue.

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:

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\begin{cases}
P(exit_t) = \dfrac{N_{exited,t}}{N_{poor,t-1}} \\
P(entry_t) = \dfrac{N_{entered,t}}{N_{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 household expenditures. Both metrics indicate that the total number of poor households decreases over the period, reflecting the poverty rate numbers presented in Table 4. 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 and 2011. The opposite happens with poverty exits, which 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.

Before we dig further into our analysis of poverty status dynamics, we make sure that the changes in poverty status are not simply the result of small shifts in total expenditures right around the poverty line. It could be that a large share of households at our study site have incomes that hover around the poverty line, sometimes right under it, sometimes right above. Figure 2 shows this is not the case. It plots the percentage change in per capita expenditures for those whose status changed between any two waves of data. Over half of those whose poverty status changed from poor to non-poor saw their per capita expenditures more than double. Over half of those whose poverty status changed from non-poor to poor saw their expenditures reduced by half or more.

The pool of poor households in our sample thus has a high turnover, suggesting vulnerability is high. The remainder of this paper further sheds light on the factors that explain movements in and out of poverty, first by decomposition of incomes and expenditures, then by econometrically estimating the determinants of entry or exit.

4. Decomposing incomes of poverty entrants and escapees. (the "How?" question)

To understand what lies behind the poverty dynamics we see in our data, this section takes a closer look at the income patterns of the households that enter and exit poverty.[6] In particular, we try to find whether income diversification played a role in poverty exit. We first decompose the total incomes into categories, to understand which component contributes most to the change in poverty status. By decomposing income totals, we can identify the specific sources of income whose change drove the switch in poverty status. The changes income sources of poverty entrants and poverty escapees, averaged over 2004-2011, are shown in Table 5. We use poverty status as computed by their total per capita (living) expenditures, but a similar picture is obtained if we use incomes to determine poverty status.

The top panel reports decompositions for those who exited poverty, and the bottom panel those who entered it, comparing respectively to those who stayed poor and those who stayed non-poor. 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).

Reflecting overall growth in the region, mean incomes have been growing overall. Expectedly, total incomes of those who exited poverty increased most, by an average of 1162, which is more than the poverty line itself (1134 RMB). Incomes of those whose status did not change (stayed poor or stayed non-poor) increased as well. Conversely, incomes of those who fell into poverty dropped by 590 RMB on average.

We decompose total income into seven categories, including agricultural, local non-agricultural business earnings, wage earnings, earnings from odd jobs, migrant

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[6] Decomposing expenditure patterns is also a highly informative exercise; we chose to focus on incomes in this article.

remittances, gifts, and government transfers.[7] Certain patterns appear in the Table 5. Agricultural and non-agricultural business incomes appear to fluctuate most with poverty status. Local odd job incomes 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 into poverty. Government transfer income increased significantly during 2004-2011 for all groups, following the deployment of preferential policies during the period. Local business and wage incomes contribute less to changes in poverty status, which also reflects the fact that such opportunities are limited in the zone.

The lack of a clearly dominant category in the overall averages of Table 5, in either exit or entry decompositions, suggests that the economy of our study villages relies on a diversity of income sources.   However, at the household level, our data shows that for most households, it is change in a single income source that primarily drives the change in poverty. Table 6 gives the details of which income sources constitute the highest and second-highest contributors to income change (positive for poverty exits, negative for poverty entries).   For most households, agricultural income is the largest contributor to change in poverty status, both for poverty exit and entry.

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

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:

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7 We refer to salary earnings under formal contracts as "wage" work. "Odd jobs" refer to informal low-skilled short term labor, such as construction workers hired on a daily basis.

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

and the model for entry as follows:

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

Where HH_t are household characteristics, Y_{t-1} income in the previous year, 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 7and Table 8. Considering that the samples and the events associated with poverty exits and poverty entries differ, we provide summary statistics separately for poverty exits and poverty entries. 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 7 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. 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 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 8 compares variable means for those who entered poverty as opposed to their counterparts who stayed non-poor. 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. All regressions control for income in the previous year. The hazard rate is the probability of exiting poverty at time t (Ti = t) given that the individual exits poverty at time t or later (Ti ≥ 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.

Results of logit and hazard models are shown in Table 9 for poverty exit and Table 10 for entry. In each table, we report models based on expenditure measures of poverty. 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 9). 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 model, college education increases the probability of exiting poverty by about 25%. Middle school education appear positive but not significant. 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.

Our results also echo existing literature with respect to migration. Migrant labor is associated with poverty exit, with very strong significance. A new migrant increases the probability of exiting poverty by 12.9%. 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% is testimony to how quickly and effectively migrants

influence the livelihoods of those who stayed behind. In contrast, the odd-jobs variable is insignificant, and the dummy for private business was dropped from the regressions altogether.

Increases in a household's asset base (transportation means, agricultural machinery, cattle) are not associated with any significant impact.

The impacts of "big events" on poverty exit are limited, with event variables appearing insignificant. The dummy for building a new house is positively related to poverty exit. Building a house involves costs and takes time away from income-generating activities, and households often build houses as a sign of increased wealth.

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.

Determinants of poverty entries (Table 10). The poverty entry specifications also highlight several household characteristics as strongly significant. Household head education has a strong negative relation to poverty entry. A college education perfectly predicts the household will stay out of poverty, which is why the category was dropped from the logit. Gustafsson (2009) found higher rates of poverty entry in ethnic minorities, but we do not find this effect significant. The all-important *guanxi* relations are negatively related to poverty entry.

Changes in employment give mixed results. A decrease in odd-job labor significantly decreases the chance of falling into poverty. This may be an indication of households compensating for job loss with thrift, or that odd jobs are abandoned for more stable sources of income. Reduction in self-employment labor significantly increases the chance of falling into poverty, but only in the logit specification.

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 – but not that of disease in general.   This is possibly because chronic disease durably limits the ability to generate income.

Loss of transportation assets is very strongly related to falls into poverty regardless of the specification, with a 13% increase in the probability of becoming poor. However, loss of agricultural machinery is not, nor the decrease or death of cattle.

Most major life events do not seem to have an influence on the probability of falling into poverty. The exception is marital status: changing from married to single is related to poverty entry. This suggests that single household heads are more vulnerable to poverty.[8]

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.

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[8] Note that this is not likely reflecting funeral costs: we are using expenditures to determine poverty status, and funerals tend to *increase* expenditures.

6. Conclusions and implications

We traced the poverty dynamics in three villages of Guizhou province using a four wave household survey data spanning 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. While our methodology does not allow us to estimate causal relationships, it does shed light on the processes and events associated with fluctuations in poverty status, which can help inform poverty alleviation policy.

We show that even in the poorest regions of China, poverty is predominantly not chronic, but rather transient. Changes in poverty status are frequent. On the one hand this is encouraging, as many households get opportunities to rise out of poverty – 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.

This result has important implications for poverty-alleviation policies. Government transfers are often targeted to those households that need them, yet high frequency movements into and out of poverty mean that the poor are a fluctuating group. Ignoring this variability poses the risk of policy-targeting which resembles a game of "whack-a-mole", in which policies target a group of households which happened to appear poor in a given year, simultaneously letting other groups fall into poverty. To palliate this issue, anti-poverty policies must either have fast and efficient re-targeting schemes, or treat village-wide issues rather than focus on individual households. Improving the agro-economic environment may be a better strategy for such poor regions.

Decomposing incomes reveals that agriculture, odd jobs, remittances and government transfers all participate to poverty alleviation, but their vulnerability also adds to the burden of poverty. Among those, it is most often agriculture that is, at the household level, the income source which drives change in poverty status.

Some household characteristics appear to be strongly related to poverty exit and entry. Among those, some of the most significant in regression analysis are also among the most difficult to change, such as ethnicity or *guanxi* relations. But others offer some flexibility, and can suggest some policy levers. Education and government transfer income both appear significant, emphasizing the role government can play in poverty alleviation. In a region with limited natural resources and prospects for agricultural growth, investing in higher education may constitute a more realistic long-term development strategy. We also 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 buffer household's agricultural incomes.

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 promotion of local business activities, also significantly associated with poverty prevention, holds more potential for durable local growth.

Tables and Figures

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

Source: survey data

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

Poverty line	2004	2006	2009	2011	2004	2006	2009	2011
Headcount poverty ratio	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
Poverty gap								
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.

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

Category	Non-poor	Number of times in 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

	Number of times changed poverty status					
	0	1	2	3	-	
National poverty line(668 RMB)	68.5	23.2	6.7	1.5	-	100.0
Dollar-a-day (1314 RBM)	32.4	43.8	16.7	7.1	-	100.0

Source: Own computations based on survey data.

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	Number who entered poverty	Number who exited poverty	Net 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

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

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

	Poverty status measured by per capita expenditures		
Exiting poverty	**exiting poverty**	**stay poor**	**Mean**
Change in total net income	*1162*	*245*	*777*
Change in agricultural income	314	18	190
Change in local non agricultural business income	68	5	41
Change in local wage incomes	-44	-58	-50
Change in local odd job income	255	107	193
Change in migrant remittance	135	17	85
Change in gift income	76	13	50
Change in government income	187	130	163
Entering poverty	**entering poverty**	**stay non poor**	**Mean**
Change in total net income	*-590*	*605*	*394*
Change in agricultural income	-251	135	67
Change in local non agricultural business income	-98	111	34
Change in local wage income	-34	18	7
Change in local odd job income	24	318	266
Change in migrant remittance	-289	21	-34
Change in gift income	-82	-52	-58
Change in government income	182	270	255

Source: Own computations based on survey data.

Table 6: Income sources with highest change in amplitude for household who entered and exited poverty (in percentage of households)

Which source of income change most (second most) for households who exited poverty							
	Agriculture	Wages	Business	Odd Jobs	Remittances	Gifts	Government
Highest amplitude	31%	1%	4%	24%	14%	6%	19%
Second highest	32%	3%	6%	8%	13%	10%	29%
Which source of income change most (second most) for households who entered poverty?							
	Agriculture	Wages	Business	Odd Jobs	Remittances	Gifts	Government
Highest amplitude (negative)	37%	8%	6%	16%	17%	11%	5%
Secong highest	32%	8%	6%	14%	17%	13%	10%

Table 7. Descriptive Analysis the determinants of Poverty Exits

	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
Age of household head(year)	47.43	46.40	47.00
Farm dummy(1=yes, 0=no)	0.60	0.57	0.59
Village cadre(1=yes, 0=no)	0.03	0.00	0.02
Ethnicity (1=Han,0=other)	0.66	0.38	0.54
guanxi(1=yes, 0=no)	0.16	0.12	0.14
Increase in odd job labor(1=yes, 0=no)	0.19	0.20	0.20
increase in self-employment labor(1=yes, 0=no)	0.00	0.00	0.00
Increase in migrant out labor(1=yes, 0=no)	0.35	0.22	0.29
Increase in high education level labor(1=yes, 0=no)	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
Increase in transportation tool(1=yes, 0=no)	0.06	0.02	0.04
Increase in agricultural machine(1=yes, 0=no)	0.03	0.02	0.02
Increase in cattle(1=yes, 0=no)	0.31	0.38	0.34
Male member wedding(1=yes, 0=no)	0.06	0.08	0.07
Female member wedding(1=yes, 0=no)	0.04	0.02	0.03
Child birth ceremony(1=yes, 0=no)	0.03	0.04	0.04
Building new house(1=yes, 0=no)	0.09	0.04	0.07
change in government transfer income(yuan)	187.38	130.39	163.42

Source: Own computations based on Puding survey data.

Table 8. *Descriptive Analysis the determinants of Poverty Entries*

	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
Age of household head (year)	50.06	48.91	49.11
Farm dummy(1=yes, 0=no)	0.66	0.54	0.56
Village cadre(1=yes, 0=no)	0.02	0.03	0.03
ethnicity(1=Han,0=other)	0.63	0.81	0.78
Guanxi	0.09	0.18	0.17
decrease of odd job labor	0.16	0.23	0.22
decrease of self-employment labor(1=yes, 0=no)	0.46	0.38	0.39
household head from married to single(1=yes, 0=no)	0.24	0.21	0.22
increase of disease member(1=yes, 0=no)	0.61	0.27	0.33
increase of (1=yes, 0=no) chronic(1=yes, 0=no) disease	0.45	0.17	0.22
decrease of transportation tool(1=yes, 0=no)	0.26	0.22	0.23
decrease of agricultural machine(1=yes, 0=no)	0.27	0.24	0.25
decrease of cattle(1=yes, 0=no)	0.15	0.14	0.14
male wedding(1=yes, 0=no)	0.08	0.08	0.08
female wedding(1=yes, 0=no)	0.02	0.05	0.04
child birth(1=yes, 0=no)	0.07	0.07	0.07
family member death(1=yes, 0=no)	0.09	0.08	0.08
building new house(1=yes, 0=no)	0.14	0.11	0.12
Big disaster (1=yes, 0=no)	0.51	0.46	0.47
livestock death(1=yes, 0=no)	0.16	0.11	0.12
children go to university(1=yes, 0=no)	0.03	0.04	0.04
change in government transfer income(yuan)	181.79	270.45	254.77

Source: Own computations based on Puding survey data.

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

VARIABLES	Logit model		Hazard model	
	dx/dy	se	Coefficient	se
HH head Education = 2	0.029	(0.048)	0.078	(0.083)
HH head Education = 3	0.246**	(0.121)	0.340*	(0.184)
Age of household head	-0.001	(0.002)	-0.001	(0.003)
Farm dummy(1=yes, 0=no) = 1	0.042	(0.047)	0.065	(0.081)
Village cadre(1=yes, 0=no) = 1	0.333***	(0.074)	0.434***	(0.110)
Ethnicity(1=Han,0=other) = 1	0.238***	(0.075)	0.401***	(0.128)
Guanxi	0.115*	(0.062)	0.198**	(0.096)
Increase of odd job labor	-0.018	(0.056)	-0.053	(0.099)
Increase of migrant labor	0.129***	(0.049)	0.221***	(0.078)
Increase in high education level laborers	-0.076	(0.298)	0.030	(0.388)
Household head from single to married	0.037	(0.198)	0.024	(0.230)
Increase in transportation tool	0.074	(0.155)	-0.133	(0.130)
Increase in agricultural machinery	0.038	(0.162)	0.065	(0.206)
Increase in cattle	0.001	(0.050)	-0.016	(0.095)
Male wedding	-0.092	(0.093)	-0.200	(0.162)
Female wending	0.056	(0.111)	0.127	(0.140)
Child birth	-0.058	(0.088)	-0.123	(0.160)
Building new house	0.167**	(0.082)	0.222**	(0.104)
Change of government transfer income	0.006	(0.004)	0.007*	(0.004)
Income in previous year	0.000***	(0.000)	0.001***	(0.000)
Village = 2	-0.047	(0.083)	0.001	(0.136)
Village = 3	0.088	(0.074)	0.171	(0.118)
Year = 2009	0.021	(0.057)	-23.789***	(0.094)
Year = 2011	0.198***	(0.065)	-47.240	(0.000)
Observations	552		552	
Pseudo R-square	0.173		0.116	
Log-(pseudo)-Likelyhood	-1197		-3354	

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

VARIABLES	Logit model		Hazard model	
	dx/dy	se	Coefficient	se
HH head Education = 2	-0.044	(0.034)	-0.219	(0.183)
HH head Education = 3	(Dropped)		-28.619***	(0.352)
Age of household head	-0.000	(0.001)	-0.001	(0.007)
Farm dummy(1=yes, 0=no) = 1	0.044	(0.035)	0.249	(0.200)
Village cadre(1=yes, 0=no) = 1	0.004	(0.103)	0.028	(0.582)
Ethnicity(1=Han,0=other) = 1	-0.082	(0.057)	-0.385	(0.261)
Guanxi	-0.113**	(0.055)	-0.659*	(0.345)
Decrease of odd job labor	-0.084*	(0.046)	-0.467*	(0.267)
Decrease of self-employment labor	2.129***	(0.166)	21.076	(0.000)
Household head from married to single	0.133*	(0.070)	0.615**	(0.305)
Increase of diseased members	0.003	(0.007)	0.021	(0.038)
Increase of chronic disease member	0.026*	(0.014)	0.120*	(0.064)
Decrease of transportation tool	0.132**	(0.054)	0.647**	(0.265)
Decrease of agricultural machine	0.013	(0.058)	0.106	(0.307)
Decrease of cattle	0.055	(0.047)	0.302	(0.242)
Male wedding	0.051	(0.059)	0.253	(0.315)
Female wending	-0.032	(0.094)	-0.181	(0.555)
Child birth	0.032	(0.066)	0.175	(0.333)
Family member died	0.005	(0.056)	0.037	(0.306)
Building new house	0.058	(0.045)	0.330	(0.240)
Disaster	0.011	(0.040)	0.045	(0.217)
Livestock died	0.058	(0.046)	0.341	(0.239)
Children go to university	-0.011	(0.099)	-0.053	(0.565)
Change of government transfer income	-0.003*	(0.002)	-0.013**	(0.006)
Income in previous year	-0.000	(0.000)	-0.000	(0.000)
Village = 2	-0.031	(0.071)	-0.134	(0.314)
Village = 3	-0.107*	(0.061)	-0.526*	(0.283)
Year = 2009	0.111***	(0.042)	-22.841***	(0.212)
Year = 2011	-0.358***	(0.017)	-67.636	(0.000)
Observations	709		733	
Pseudo R-square	0.117		0.116	
Log-(pseudo)-Likelyhood	-1148		-3354	

Note: ***,** and * denote 1%,5% and 10% significant levels.   Source: own computations. Village and year dummies not reported in the interest of space (significant).
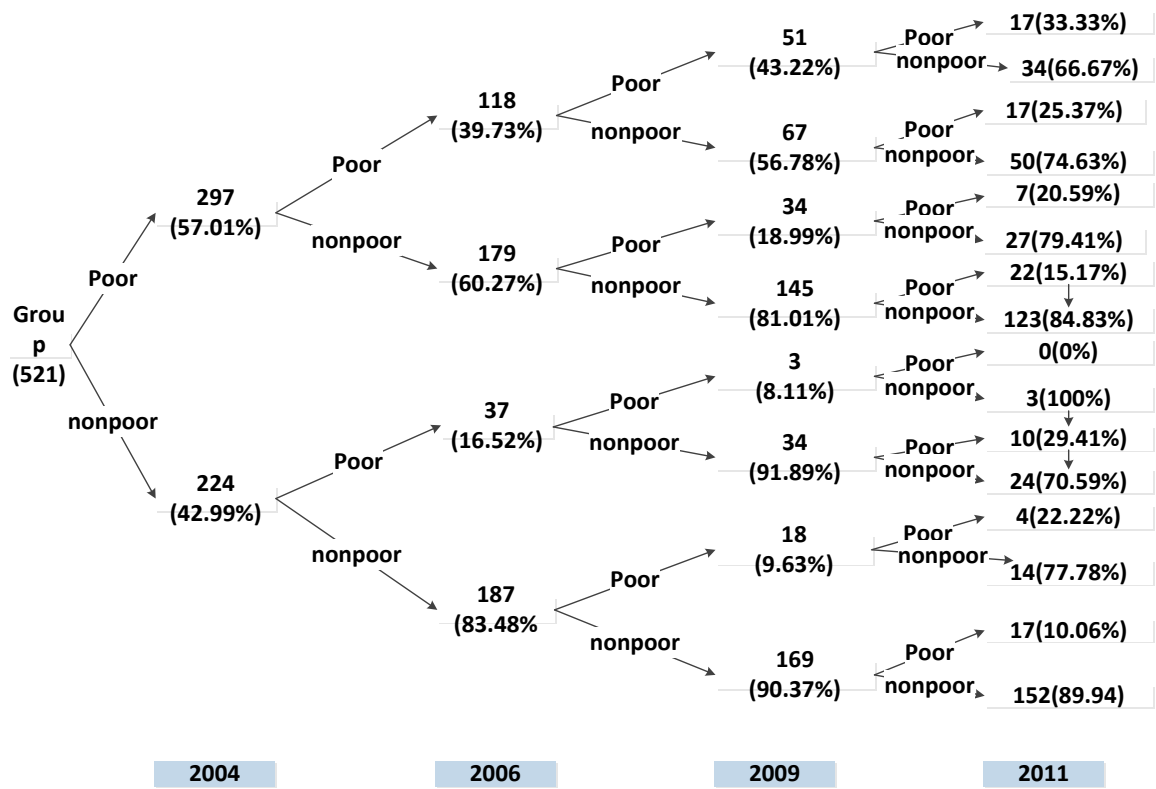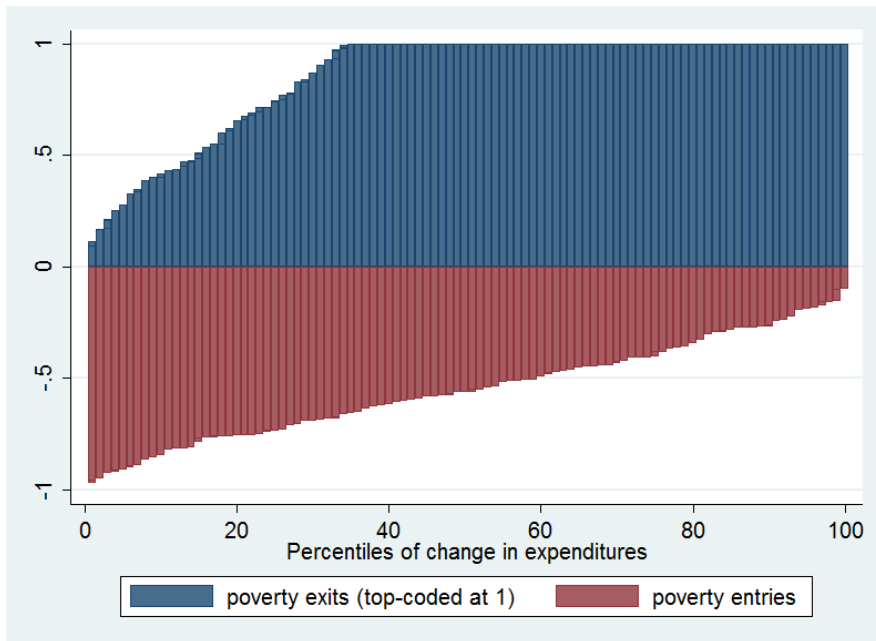
Figure 1. *Households Poverty transition probability (%, poverty line of 1$ per day using per capita expenditure)*

Figure 2: Percentage change in per capita expenditures for households who changed poverty status between two waves

Note: For symmetry, percentage increase in expenditures was top-coded at 1 (100% increase) for those who exited poverty. Percentiles computed separately within each group of poverty entrants/escapees. Households with multiple exits/entries features multiple times.

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