Village Inequality in Western China

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China’s rapid economic growth has dramatically brought down the number of poor people over the past several decades. However, in the past several years, the pace of poverty reduction has halted. The total number of absolute poor has stayed stagnant around 28 million, if not increasing (China Development Report, 2004). Why have the gains of economic growth not trickled down to the poor as expected? Rising inequality may play a part in explaining the recent disappointing performance on poverty reduction. Rapid growth does not guarantee that the poor can share the boat if the distribution becomes more skewed (Ravallion and Chen, 2004). The existence of a large number of absolute poor and rising inequality are a breeding ground for social instability. In a close community, people may not feel much deprived if their neighbors are equally poor. However, rising inequality within a small and closed community is more likely to increase the level of anxiety and hatred. Therefore, it is imperative to study the patterns and correlates of inequality within a community, in particular in rural villages, as most people still live there.

There has been a large body of literature on inequality in China (Rozelle, 1994; Kahn and Riskin, 1998; Gustafson and Li, 1998; Wan 1998; Kanbur and Zhang, 1999; Li et al., 2000; RCRE, 2001; Zhang, 2001; 2002; Morduch and Sicular, 2002; Zhou and Wan, 2003; Huang et al., 2003, 2005; Wang and Wen, 2005). Many of these studies use aggregate data while some are based on household survey data. Yet, there are few studies looking at inequality within or between villages in large due to the lack of data. The widely used household survey data set collected by RCRE (Research Center for Rural Economy, MOA) includes at most ten households in a village. Although such

data is helpful for measuring overall rural inequality, it is less useful to help discern the true degree of inequality within a village. Moreover, most rural poor people reside in mountainous areas and usually sparsely spread around natural villages (or sub-villages) instead of administrative villages (World Bank, 2000; Park and Wang, 2001). To our knowledge, we have not seen any studies to examine the patterns of inequality within and between villages. This study aims to fill in the knowledge gap.

On the policy front, China's poverty alleviation strategy has shifted from regional targeting to community and household targeting. In order to better target the poor, it is essential to know who are poor and why they are poor. This again requires detailed information at the household and community level. To address the above questions, the International Food Policy Research Institute (IFPRI), Chinese Academy of Agricultural Sciences (CAAS) and Guizhou University conducted a joint survey in the nationally designated impoverished Puding County of Guizhou Province, the poorest one in China, at the beginning of 2005.

In the next section, we describe the background information of the survey. Section Three examines the patterns of within-village inequality. In addition, a regression approach is applied to uncover the major correlates of income. Section Four reports the pattern and correlates of income distribution across natural and administrative villages. The paper ends with conclusions and policy implications.

Survey Background and Descriptive Statistics

Puding County, which is located in the central Guizhou Province, includes 11 townships, 317 administrative villages, and a total population of 402,000. About 94%

of total population is rural and the agricultural labor force amounts to 217,000. Puding County has more than 20 ethnic groups, including Han, Miao, Buyi, Gelao and Yi. The minority groups (excluding Han) total 77,000 people, accounting for about 20% of total population. With the implementation of a national program "87 Poverty Alleviation Project", the number of people living under the poverty line has declined over years, from 215,000 in 1993 down to 88,000 in 2002. By the end of 2002, there were 120,000 people, or 31% of total rural population, earning less than 865 yuan per capita (Puding County Poverty Alleviation and Development Office, 2003). [1]

Table 1 reports the sample size of our survey. We first selected four townships -- Chengguan, Maguan, Bulang, and Houchang, based on the level of economic development. Chengguan Township is located in the county seat of Puding, about 120 km from the Guiyang, the capital city of Guizhou Province, and 20 km from the prefecture city Anshu. Both in terms of area and population, Chengguan is the largest among the four townships. Its geographic area is 146km^2 and includes 46 administrative villages. Its industrial output accounts for about 80% of the county's gross output value. Maguan Township enjoys an even better location because it sits right between Chengguan Township and a much bigger city Anshun and is only 18km away to the Anshun Economic and Technology Zone. In addition, the Anshun Power Plant is located in the township, providing plentiful employment opportunities and fiscal revenues. Bulang Township is 23km northwest of the county seat with 16 administrative villages. It has rich natural resources, including a hydroelectric power

[1] County Poverty Alleviation and Development Office is shortened as PCPADO.

station, coal mines, and iron mines. The Houchang Township is more remote than the other three townships. It is 41 km away from the county seat and includes both the highest and the lowest points of latitude of the county.

Table 1 Survey Design

Township	Chenguan	Houchang	Bulang	Maguan	Total
No. of administrative villages surveyed	15	17	16	20	68
(total)	(46)	(17)	(16)	（32）	（111）
No. of natural villages	72	70	64	80	286
(total)	（103）	(103)	（108）	(164)	(478)
Villages with complete household survey	3	0	0	0	3
Total number of household surveyed	877	210	192	240	1519

In Chengguan Township, a complete household survey includes 803 households in three administrative villages was conducted.[2] Table 2 presents the summary statistics of the complete household survey in three villages in Chengguan Township. These three villages are chosen randomly from the Chengguan Township[3].

Table 2 Income and Expenditure in Three Villages of Chengguan Township

Villages	Population Share	Per capita Income (yuan)	Income Share	Per capita Expenditures (yuan)
1	0.34	1,293	0.24	806
2	0.18	1,532	0.16	1,020
3	0.47	1,971	0.60	1,450
Average	1.00	1,670	1.00	1,224

Data source: author's calculation.

Table 3 presents descriptive statistics of income and expenditure of the 286 natural villages in the four townships. In each natural village, we asked a village leader to identify three typical households representing high, intermediate, and low income as well as their corresponding population shares.[4] We then interviewed the three households using the same questionnaire as for the complete household survey in the

[2] The official number of residents in the three villages is 987, while in our survey we could locate only 805 households. After data cleaning, 803 households are kept in our analysis.
[3] Puding County was designated a nationally designated impoverished county in 1986, and in 2002, Puding County was on the list of a national program "Key Counties of Poverty Alleviation and Development in State New Era".
[4] In Chengguan, we only interviewed one household with median income in each natural village as identified by village leaders. The measurement errors are minimal as we find a high correlation between the median income and average calculated income from the three surveyed households in every natural village in other three townships.

three villages in Chengguan Township.

Table 3 Income by Township Based on the Natural Village Survey

Township	Population share	Per capita income (yuan)
1 Chengguan	0.47	1,340
2 Houchang	0.11	1,140
3 Bulang	0.18	1,670
4 Maguan	0.24	1,890

Inequality within Villages

The patterns of village inequality

As a first step, we make use of the complete household survey in three villages to examine income distribution within administrative villages. Table 4 reports the two common measures of inequality in income and expenditure, Gini coefficient and Generalized Entropy (GE) in three villages in Chengguan Township.[5] The results for inequality in expenditures show a similar picture. So the next question is: what are the major correlates of the observed high inequality?

Table 4 Inequality in Income and Expenditure Based on Household Census

Village	Gini in Expenditure	GE in Expenditure	Gini in Income	GE in Income
1	0.353	0.226	0.387	0.250
2	0.388	0.266	0.380	0.246
3	0.346	0.213	0.394	0.261
Overall	0.38	0.26	0.405	0.278

Data source: author's calculation.

Table 5 presents the results of inequality decompositions by income source. The uneven distribution of agricultural income is the largest factor contributing to the overall income inequality while non-farm job ranks as the second most important. Income from transfers such as poverty alleviation programs, reforestation projects, and disaster relief play a minimal role in affecting overall inequality. Revenues from blood sales marginally help equalize income with a small negative contribution.

[5] We only report GE (0). The results for GE with other parameters are similar.

Table 5 Income Inequality Decomposition by Sources

Income Sources	Percentage (%)
Agriculture	37.54
Non-farm jobs	36.34
Transfer income	5.73
Selling blood	-0.49
Other	20.89
Total	100.01

Data source: author's calculation.

Table 6 decomposes expenditure inequality according to agricultural inputs, rural nonfarm inputs, and consumption expenditures. Living expenditures account for over 70% of total variation while agricultural inputs explain another 24%. In the poor region, meeting basic needs is still the major task for most people. Therefore income inequality is highly related to living expenditure inequality.

Table 6 Inequality Decomposition by Type of Expenditure

Factors	Percentage (%)
Agricultural input	24.46
Rural nonfarm expenses	4.34
Consumption and other expenditure	71.20
Total	100.00

Data source: author's calculation.

To further uncover the major contributing factors to the observed inequality in living expenditure, we decompose it into more detailed categories as shown in Table 7. The expenditures of healthcare contribute nearly 40% to the overall living expenditure inequality, far greater than any other expenditure items. Our survey indicates that 41% of residents recommended for hospitalization refused to be admitted with some 33% citing the cost as the major reason. Education is another important factor, accounting for about eight percent of total variation. The high tuition and related fees for education have become a big burden for many poor households.

Table 7 The Decomposition of Inequality in Living Expenditure

Factors	Percentage (%)

Food	23.38
Clothing	2.73
Household service	7.23
Medical care	39.43
Education	8.44
Social network	5.66
Other expenditure	13.13
Total	100

Data source: author's calculation.

In Table 8, we further decompose the inequality in agricultural expenditures. Expenses (breeding and feed) in the livestock sector are the dominant divergent factors, followed by input use in farming. In 2000, Puding County made the development of the livestock sector the top policy agenda. However, the highly unequal distribution of livestock inputs may largely reflect the uneven access to water.

Table 8 The Decomposition of Inequality in Productive Expenditure

Factors	Percentage (%)
Farming	29.08
Livestock	58.01
Others	12.91
Total	100

Data source: author's calculation.

Income correlates

Having examined the patterns of inequality, we are now in a position to investigate the correlates of rural income. According to economic theories, income can be generated from human capital, social capital, and physical capital. Of course, household characteristics may also matter to income.

Table 9 reports the result of regressions in two specifications. In the above decomposition analysis, we find that medical expenditure is the most important contributing factor to overall expenditure inequality. Therefore we pay particular attention to the potential impact of health by adding an interactive term of labor and

health (“Hlabor*Hsick”) in the first specification. Having a sick family member alone is negative but insignificantly reduces income.

Table 9 Result of Income Determinants Regression

	Model 1		Model 2	
	Coe.	T-value	Coe.	T-value
Number of household members	-0.18	-11.60**	-0.18	-11.54**
Having religious faith as 1 and 0 otherwise	-0.10	-0.96	-0.09	-0.93
Han nationality as 1 and 0 otherwise	-0.02	-0.22	-0.03	-0.33
Marriage status of household head (defined as 1 if married and 0)	0.07	0.79	0.07	0.80
A binary variable defined as 1 when household head is male and 0	-0.13	-1.33	-0.13	-1.40
Age of household head	0.02	1.46	0.02	1.25
Age square	0.00	-1.27	0.00	-1.05
Having no labor in household as 1, otherwise as 0	0.01	0.07	-0.12	-0.94
The max years of schooling among household members	0.04	4.53**	0.04	4.48**
At least one household member received training as 1 and 0 otherwise	0.29	3.13**	0.30	3.18**
Having at least one sick family member as 1 and 0 otherwise	0.00	-0.06	-0.04	-0.85
Lack of labor and bad health	-0.44	-2.62**		
A binary variable defined as 1 if household having relatives or friends who are officials and 0 otherwise	0.18	2.63**	0.19	2.72**
Communist party member of household head as 1 and 0 otherwise	0.28	2.70**	0.28	2.69**
Having access to electricity as 1 and 0 otherwise	0.15	1.15	0.14	1.04
Having productive building or agricultural machinery as 1 and as 0 otherwise.	0.09	1.92*	0.09	1.84*
Numbers of livestock in household (head in log form)	0.08	3.54**	0.08	3.53**
The ratio of irrigation land to total land	0.33	2.60**	0.33	2.57**
Per capita arable lands (acre in log form)	0.03	2.89**	0.03	2.81**
_cons	7.33	20.91**	7.42	21.01**
Obs	799		799	
R^2	0.32		0.31	

Note: * indicates significant at 10%, and ** at 5%.

In a big family, in the event that a family member gets sick, siblings can share the burden of care therefore acting a buffer against the shock. However, in households lacking working age members, getting sick results in the loss of working time and income. As rural China ages in the next few decades, health problems are likely to

take a bigger toll on rural income if the current family-based system of healthcare prevails. Among the set of household characteristic variables, only household size is statistically significant and negative. Among the human capital variables, the highest year of schooling among family members and having training experience are highly related to per capita income. As the role of social capital, having a relative or friend working in the government or being a communist party member leads to greater income. Because social capital is largely concentrated in a small group of people, it may widen inequality (Zhang and Li, 2003).

Among the last group of variables on household assets, except for the variable on access to electricity, all other variables are positive and significant. The two land variables, the proportion of irrigated land in total arable land (a measure of quality) and per capita arable land area (a measure of quantity), are both highly significant. As shown in Table 5, agricultural income is still the largest source of overall inequality within a village. In the Guizou Province, because land has not been readjusted since the rural reform in the early 1980s, the land distribution has become increasingly uneven due to demographic change. As agricultural income is highly correlated with land, the land tenure arrangement may be an important explanatory factor for the observed inequality among farmers in a village.[6]

Inequality between Villages

Unlike in flat areas, an administrative village in most of the Guizhou Province is quite different from natural villages. Rural residents in general cluster along natural villages

[6] The dummy variables for natural villages are statistically significant but are not reported here.

instead of administrative villages which may differ greatly in terms of natural resource endowment even within the same administrative village. On average, in our sample, each administrative village comprises of more than four natural villages. The more remote an administrative village, the higher number of natural villages included.

Table 10 Inequality across Village

	Gini	GE(0)	Between-village	Between/GE
Chengguan	0.35	0.22	0.12	0.55
Houchang	0.26	0.11	0.04	0.41
Bulang	0.32	0.16	0.05	0.30
Maguan	0.24	0.09	0.05	0.57
Overall	0.32	0.18	0.1	0.56

How even is income distribution across natural villages? Table 10 lays out the overall inequality across natural villages, within and between-administrative village inequalities, as well as the ratios of between-village components to the overall inequality by township. In the table, the unit of observation in the calculation of inequality is natural villages instead of households. Therefore the inequality figures measure the variation across the spatial units of natural villages. Because the within-natural village variation is masked, the overall natural village inequality (Gini coefficient) is 0.32, smaller than income inequality measured at the household level.

In the more developed Chengguan and Maguan Townships, more than half of the village inequality can be explained by the between- administrative village difference, while in other two less developed townships, most variations comes from within the administrative village. In hilly and remote areas, the economic development level primarily depends upon natural resource endowment, such as land and water. Therefore, the difference in natural resource endowment plays a big role in explaining

the rather large within-administrative village variation. The within-administrative village inequality accounts for 44% of total variation while the between component has a larger share of 56%, suggesting large variations across administrative villages. Table 11 presents the income regressions at the natural village level.

Table 11 Correlates of Per Capita Income at the Natural Village Level

	Model 1		Model 2	
	Coefficient	T-value	Coefficient	T-value
Variables at the administrative village level				
Per capita arable land area for village as a whole(acre/person in log)			0.170	2.03**
Share of agricultural output value for village as a whole			-0.002	-1.84*
The longest distance between two natural villages with a village (km)			-0.045	-2.69**
Variables at the natural village level				
Having a road connection (1 as yes and 0 as no)	0.117	1.63	0.103	1.47
Distance to the nearest town (km in log)	-0.056	-2.31**	-0.047	-2.03**
Per capita arable land area at the natural village level (acre/person in log)	0.084	1.75*	0.057	1.19*
The share of flat land in total arable land	0.153	1.35	0.164	1.46
Whether water is a problem in the dry season	-0.093	-1.46	-0.072	-1.14
The share of Han nationality in total population	0.002	2.11**	0.002	1.72*
Whether has a temple in the natural village	0.073	1.00	0.036	0.50
The share of labor force with secondary or higher level of education	0.238	2.42**	0.213	2.24**
The number of people from the natural village served in village council	0.103	1.83*	0.078	1.41
Number of observations	276		276	
R^2	0.26		0.31	

The first specification includes only variables at the natural village level. The first two variables measure the location and connectivity of the natural village. The coefficient for road connection is positive with a significance level of 0.104. The coefficient for distance to the nearby town center is significantly negative, suggesting that remoteness does matter for economic development level. Per capita land area is

positively correlated to village income level while land quality also matters despite a lower significance level. Water shortage during the dry season negatively affects income but the coefficient is insignificant. In terms of social variables, we include in the regression the proportion of Han ethnicity whether there is a temple or church, and how many people from the village serve in the village council. The ethnicity variable is positively significant, implying that villages with more minority ethnic groups perform worse. The more people from the natural village served in the village council, the more developed is the natural village. Finally, labor quality, measured as the share of labor force with secondary or higher level of education, is positively correlated with the overall income level.

To check the robustness of the results, in the second specification, we add several variables at the administrative village level. The first variable is the land/population ratio to measure land endowment. It is highly related to the income level, demonstrating the importance of agricultural land in these areas. The second variable, the share of labor force engaged in agricultural production, captures the degree of labor market development. The negative coefficient for this variable suggests that villages with access to nonfarm opportunities are better off. The third variable is the distance between the two farthest natural villages within an administrative village, aiming at measuring the spread of a natural village. The coefficient for the variable is significantly negative. When natural villages are clustered, there is a positive agglomeration effect on income. When adding the three variables at the administrative village level, the variable of per capita land area becomes insignificant perhaps

because the endowment variable at the administrative village level is highly correlated to land/population ratio at the natural village level. The coefficients for three variables, Han ethnic group, distance to town centers, and labor quality, turn out to be robust to the two specifications.

Conclusions and Policy Implications

Based on primary surveys at the household, natural village, and administrative village level, this paper looks at the patterns of village inequality in western China. Several findings emerge from the analysis. First of all, in poorer areas, agriculture is still the dominant source of farmers' income and therefore land is the most important asset to farmers. Because Guizhou province has adopted a strict land policy of "never adjusting land no matter birth or death" since the rural reform, with demographic changes, access to land has become increasingly unequal. Although secure land tenure is certainly important for farmers to make investments in their land, the increasing uneven distribution of land turns out to be a key factor to the large rural inequality.

The input on livestock sector is found to be highly variable. This may reflect the nature of water resource distribution in the Guizhou Province. Being a mountainous province, rural Guizhou has it own characteristics particularly with regard to water resource. Even within one natural village, the access to water can be highly uneven. Because the production of livestock is water intensive, the unequal access to water may lead to the observed uneven development of livestock production. If livestock is promoted across the board without taking local conditions into account, this may lead to counterproductive consequences in some places.

The second most important asset for farmers is their human capital including education and health. The paper shows that expenses on medical care and education are the largest contributing factors to overall expenditure inequality. Because of the high expenses of medical care, most farmers refuse to see a doctor when getting sick. In households without prime age family members, falling sick is equivalent to a disaster, directly driving the household into poverty. The proportion of household reporting selling blood also sends an alarming signal about the plight of farmers in the poor regions. Although selling blood can help generate the much needed cash and overcome budget constraints in the short run, but in the long term, this will do more hurt on health, their most precious human capital. The vicious circle may enlarge income inequality. We find government transfers have a minimal influence on farmers' income. Because of the high targeting cost, it is difficult to improve rural income inequality through greater transfers. Our survey also shows farmers receive negligible income from natural resources, such as collective forests and coal mines. In China, these natural resources nominally belong to the state and farmers have no rights in sharing the rent. With the booming of natural sectors, the problem becomes more pronounced. Such a phenomenon indicates the institutional root on inequality in rural areas may be deeper than previously thought. To eliminate poverty and reduce inequality in rural areas, it is critical to reform the property rights arrangement on resources, including land and non-land resources..

Finally, the survey at the natural village level demonstrates that the between-village variation can be equally large as within-village inequality. Locations do matter to the

well beings of many rural people. Therefore, when targeting the poor, both villages and households should be considered.

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