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DEVELOPMENT STRATEGY AND GOVERNANCE DIVISION

February 2006

DSGD Discussion Paper No. 31

## Village Inequality in Western China: Implications for Development Strategy in Lagging Regions

Li Xing, Shenggen Fan, Xiaopeng Luo, and Xiaobo Zhang

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## ABSTRACT

Increased regional inequality has been a major concern in many emerging economies like China, India, Vietnam and Thailand. However, even a large inequality is observed within the lagging regions. The objective of this paper is to look into what are the sources of within region inequality using the community surveys and a census type of households in Western China.

This snapshot view of inequality within and between rural villages in western China is based on a census-type household survey in three administrative villages and a sampling survey of 286 natural villages in the poor province of Guizhou in 2004. In contrast to coastal regions, nonfarm income is distributed unevenly in this inland western region. This accounts for the largest share of overall income inequality. But agriculture is still the rural people's major source of livelihood in this particular location. On the expenditure side, health care is one of the most important sources of inequality. Because rural income is strongly related to human capital, the uneven access to health care will translate into a larger income gap in the long run. The analysis based on the natural village survey indicates that income varies widely across villages. Access to infrastructure and markets, education, and political participation explain most of this variation.

These findings have important implications on the future development strategy in promoting lagging regions development and poverty reduction. While the overall economic development will be the main instrument to bring the majority poor out of poverty, a targeted approach has become increasingly crucial in helping the poor villages and households. It is critical to understand why these villages and households can not particulate in the growth process and how development programs and various transfer programs help them to overcome the constraints they face.

**Key words:** Rural Development, Poverty, Inequality, and Public investment

**JEL:** H54; O47; O53; R11





# VILLAGE INEQUALITY IN WESTERN CHINA: IMPLICATIONS FOR DEVELOPMENT STRATEGY IN LAGGING REGIONS

Li Xing, Shenggen Fan, Xiaopeng Luo, and Xiaobo Zhang<sup>1</sup>

## I. INTRODUCTION

China's rapid economic growth has dramatically reduced the number of poor people over several decades. However, in the past several years, the pace of poverty reduction has halted. The total number of absolute poor has stagnated between 26 and 30 million (China Agricultural Development Report 2005), and the gap between the general population and the absolute poor has increased sharply<sup>2</sup>. Regardless of the source of data, it is clear that the incidence of rural poverty is significantly higher in western China, a region characterized by poor agricultural land and weak infrastructure (World Bank 2000; Xian and Sheng 2001). Based on the World Bank's estimates, the poverty rate averaged 19 percent in the northwest region and 11 percent in the southwest region in 1996, while the comparable figure for the whole country was 6 percent. In contrast, in that same year, only 1.2 percent of the rural population was living under the poverty line in the eastern region and 2.6 percent in the central region. Moreover, the reduction in the incidence of rural poverty was not as dramatic in western China as it was in the other regions. Consequently, rural poverty is increasingly concentrated in the western

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<sup>2</sup> China's official poverty line is 300 yuan per capita income in 1990, equivalent to \$0.66 per day measured in 1985 purchasing power parity (PPP) (World Bank 2000). The poverty line is defined as the level below which income (and food production in rural areas) is below subsistence levels for food intake, shelter, and clothing. Using this poverty line, the incidence of poverty is less than 3 percent. In 2004, the number of poor declined by 2.9 million to 26.1 million after a few years of stagnation. This decline was probably caused by a combination of the new rural income support policy, a rapid increase in agricultural prices, and good weather. In 1998, China also used a higher poverty line of 865 yuan per capita consumption per year, which is equivalent to \$1.17 international dollars without adjusting for rural/urban differences in the cost of living (Xian and Sheng 2001). Using a poverty line of \$1.08 consumption per capita per day, measured in 1993 PPP dollars, the incidence of rural poverty was 16.6 percent in 2001, and the number of rural poor was 211.6 million (Chen and Ravallion 2004).

provinces. The southwest and northwest regions together accounted for about 70 percent of the total rural poor in China in 1996, an increase of 40 percentage points over 1988. Why have the gains of economic growth not trickled down to the remaining poor?

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, closed community is likely to increase the level of anxiety and animosity. 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 is a large body of literature on inequality in China (Rozelle 1994; Khan and Riskin 1998; Gustafson and Li 1998; Kanbur and Zhang 1999; Li et al. 2000; RCRE 2001; Zhang 2001; Morduch and Sicular 2002; Zhou and Wan 2003; Huang, Wang, and Wan 2003; Huang, Zhang, and Wang 2006; Wang and Wen 2005). Many of these studies use aggregate data, while some are based on household survey data. Yet few studies have paid attention to inequality within or between villages, largely due to the lack of data. The widely used household survey data set collected by the Research Center for Rural Economy (RCRE), Ministry of Agriculture of China include at most 10 households in a village. Although such data are helpful for measuring overall rural inequality, they are less useful for discerning the true degree of inequality within a village. Moreover, most rural poor people reside in mountainous areas and are usually sparsely spread around natural villages (or subvillages) instead of administrative villages (World Bank 2000; Park and Wang 2001). A natural village occurs when households cluster together, forming a small community. An administrative village is a region consisting of several villages designated by the state as a unit for administrative purposes.<sup>3</sup> Natural villages in western China are the most basic unit of community. To

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<sup>3</sup> The Chinese administrative systems consist of the following levels: national, provincial, prefecture, county, and township. While all these levels have governments, an administrative village is a region consisting of several villages designated by the state as a unit for administrative purposes and is not a level of government.

our knowledge, there have been no studies that examine the patterns of inequality within and between villages. This study aims to fill this 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 they are and why they are poor. This again requires detailed information at the household and community level. To address these questions, the International Food Policy Research Institute (IFPRI), Chinese Academy of Agricultural Sciences (CAAS), and Guizhou University conducted a joint survey in impoverished Puding County of Guizhou Province, the poorest province in China, at the beginning of 2005. All the households in three administrative villages and over 700 households in 286 natural villages in four townships were surveyed.

The following section presents background information about the survey. In the third section, we examine the patterns of inequality within villages, and apply a regression approach to uncover the major correlates of income in the three villages. The fourth section reports on the pattern and correlates of income distribution across natural and administrative villages. The paper ends with conclusions and policy implications.

## II. SURVEY SITES AND DESCRIPTIVE STATISTICS

Puding County, located in the central part of Guizhou Province, was selected as the survey site. The selection of Guizhou Province hardly needs any justification. It is one of the poorest provinces in China. In 1998, the last year when data are available, the poverty rate in Guizhou was 42 percent, compared with a national average of 22 percent (Xian and Sheng 2001). Its per capita income ranked last among 31 provinces in mainland China in 2004. Puding County is one of 592 counties designated as poor by the central government.<sup>7</sup> It has 11 townships, 317 administrative villages, and a total population of 402,000. About 94 percent of the total population resides in rural areas, and agricultural labor amounts to 217,000, or 63 percent of total labor. The county has more than 20 ethnic groups, including Han, Miao, Buyi, Gelao, and Yi. The minority population (all except the majority Han) accounts for about 20 percent of total population. With the implementation of a national program called the “8–7 Poverty Alleviation Project,” the number of people living under the poverty line in Puding has declined from 215,000 in 1993 to 88,000 in 2002 (PAO 2003).<sup>8</sup> By the end of 2002,

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<sup>7</sup> A poverty alleviation program was not effectively formulated until 1986. As the program’s first step, the central government designated 331 poor counties (roughly 16 percent of the total) based on per capita rural income. These counties received special funds from the central government for the explicit purpose of poverty alleviation. One billion yuan (in current prices) was allocated in 1986 alone. An additional 800 million yuan was added annually in subsequent years. These funds were supposed to be used as direct loans to poor farmers or to rural enterprises. In 1991, 236 more counties were designated as poor and received 500 million yuan in loans for poverty reduction. In 1993, the designation of poor counties was adjusted based on changes in income and price indices. The number of poor counties was thereafter fixed at 592. Most of these counties are in the border and mountainous areas of Yunnan, Sichuan, Guizhou, Shaanxi, Shanxi, Hebei, Inner Mongolia, and Gansu.

<sup>8</sup> In September 1993, the State Council approved the National Poverty Relief Program, or the so-called 8-7 Poverty Alleviation Project, which aimed to ensure adequate food and clothing for the existing 80 million

there were 120,000 people, or 31% of the total rural population, earning less than 865 yuan per capita (PAO 2003). In order to understand the patterns of income distribution at different levels, the units of observation in our survey are households and natural villages. Table 1 shows the size of each sample in the 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 kilometers from Guiyang, the capital city of Guizhou Province, and 20 kilometers from the prefecture city of Anshun. Both in terms of area and population, Chengguan is the largest among the four townships. It encompasses 46 administrative villages and a geographic area of 146 square kilometers. Its industrial output accounts for about 80 percent of the county's gross output value. Maguan Township enjoys an even better location because it sits right between Chengguan Township and the much bigger city of Anshun, and it is only 18 kilometers away from the Anshun Economic and Technology Zone.<sup>9</sup> In addition, the Anshun Power Plant, a government-owned enterprise, is located in the township, providing plentiful opportunities for employment and fiscal revenues. Maguan is the most prosperous township in Puding County. Bulang Township is 23 kilometers northwest of the county seat with 16 administrative villages. It has rich natural resources, including a hydroelectric power station, coal mines, and iron mines. Houchang Township is the most remote of the four townships. It is 41 kilometers away from the county seat and includes both the highest and the lowest points of latitude of the county. It has 17 administrative villages and ranks as one of the poorest townships in the county.

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poor within seven years (from 1994 to 2000). At the same time, the Leading Group for Economic Development of Impoverished Areas was renamed the State Council Leading Group Office of Poverty Alleviation and Development.

<sup>9</sup> The special economic zone is a special geographic area designated by different levels of government to attract foreign and domestic investment by offering free or low taxes and land use.

**Table 1. Survey Design**

	<b>Chenguan Township</b>	<b>Houchang Township</b>	<b>Bulang Township</b>	<b>Maguan Township</b>	<b>Total</b>
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)
No. of villages with census household survey	3	0	0	0	3
Total number of households (hh) surveyed	805 (census) +72 (mid-income hh) =877	70(low income hh) +70(mid-income hh) +70(high income hh) =210	64(low income hh) +64(mid-income hh) +64(high income hh) =192	80(low income hh) +80(mid-income hh) +80(high income hh) =240	1,519
Population share	0.47	0.11	0.18	0.24	1
Per capita income	1,340	1,140	1,670	1,890	

In Chengguan Township, a census household survey of about 800 households in three administrative villages was conducted.<sup>10</sup> Table 2 presents the summary statistics of the survey for three randomly chosen villages in Chengguan Township. This survey includes the characteristics of household and family members (such as employment and health), income sources, expenditure components (including productive and living expenditures), and land area.<sup>11</sup> Details on the measures of income and expenditure are provided in the Appendix.

**Table 2. Summary Statistics in Three Villages of Chengguan Township, 2004**

	1	2	3	Average/Overall
Population share	0.343	0.182	0.475	1.000
Per capita net income (yuan)	992	1,100	1,590	1,298
Income share	0.262	0.154	0.584	1.000
Per capita expenditure (yuan)	770.8	963.5	1,340	1,075
Gini in expenditure	0.345	0.391	0.353	0.383
GE in expenditure	0.206	0.263	0.222	0.254
Gini in Income	0.403	0.424	0.409	0.425
GE in income	0.280	0.339	0.288	0.319

*Data source: authors' calculation.*

<sup>a</sup> *Excluding agricultural productive expenditure.*

The first village is the farthest away from major markets and the county seat and therefore has the worst road connections and the fewest nonfarm job opportunities. Its

<sup>10</sup> The official number of residents in the three villages is 987, while the survey could locate only 805 households. After data cleaning, 803 households were kept in our analysis.

<sup>11</sup> Puding County was a designated impoverished county by the central government in 1986, and in 2002 and was on the list for a national program, "Key Counties of Poverty Alleviation and Development in State New Era".



average per capita income is only 992 yuan. The third village is near the county seat and has more nonfarm employment opportunities. It is the richest among the three with a per capita income of 1,590 yuan. Per capita income of the second village is 1,100 yuan, falling between that of the first and third villages. The average per capita income in the three villages is 1,298 yuan in 2004, comparable to the county average of 1,559 yuan in 2003 (PSB 2004). In the sample, 30 percent of the total population falls below the official poverty line of 865 yuan, and 10 percent lives on fewer than 500 yuan per year.

Table 1 also presents per capita income in the four townships from the 286 natural villages. 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.<sup>12</sup> We then interviewed the three households using the same questionnaire that was used for the census household survey in the three villages in Chengguan Township. Using population as a weight, we were able to calculate the average per capita income and expenditure per year by natural village. The average per capita income per year varies from 1,140 yuan in Houchang Township to 1,890 yuan in Maguan Township.

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<sup>12</sup> In Chengguan, we only interviewed one household with median income in each natural village as identified by village leaders. The measurement errors were minimal because we found a high correlation between the median income and average calculated income from the three surveyed households in every natural village in the other three townships.

### III. INEQUALITY WITHIN VILLAGES

#### The Patterns of Village Inequality

As a first step, we make use of the census household survey in three administrative villages to examine income distribution within villages. Table 2 reports the two common measures of inequality in income and expenditure, the Gini coefficient and Generalized Entropy (GE) in three villages in Chengguan Township.<sup>13</sup> For the outcome variable of income, the overall Gini coefficient for the three villages is high at 0.425 and the GE is 0.319. Income inequality across the villages does not show much difference, with the Gini coefficient ranging from 0.403 in the first village to 0.424 in the second village. A Gini coefficient of a magnitude of approximately 0.4 implies a rather uneven income distribution in rural communities. 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?

We next apply Shorrocks' method of decomposing the overall income and expenditure inequality into factor components (Shorrocks 1982, 1984). Table 3 presents the results of inequality decompositions by income source as well as the corresponding shares of income and expenditures. Net agricultural income accounts for 49 percent of total rural income with a contribution to total variation of 33 percent. The uneven distribution of agricultural income is the second most important factor contributing to the overall income inequality, while disparity in local income stemming from nonfarm jobs and wage jobs ranks as the first one. Self-employment generates only about 5 percent of

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<sup>13</sup> The GE is a family of inequality measures that depend upon the selected value for the parameter  $c$  in the formula. We only report GE when  $c = 0$ . The results for GE with other parameters are similar. When  $c = 0$ , GE is the mean logarithm deviation and more sensitive to the bottom part of the distribution.

total income; however, it accounts for more than one-fifth of total variation, suggesting that the distribution of entrepreneurship is rather unequal.

**Table 3. Decomposition of Income and Expenditure by Source: Level and Inequality**

	Income/Expenditure sources (%)	Inequality decomposition (%)
<b><i>Income</i></b>		
Agriculture	48.81	33.00
Net income from farming	39.86	26.10
Net income from livestock	8.95	6.90
Local nonfarm jobs	27.32	33.34
Remittance from nonfarm jobs outside home	7.89	9.67
Self-employment	4.57	21.34
Disaster relief, antipoverty programs, Subsidy for reforestation and others <sup>a</sup>	2.73	0.58
Selling blood	8.68	2.07
<b><i>Expenditures</i></b>		
Agricultural input	21.31	21.26
Farming (seeds, fertilizer, and pesticide, irrigation, agro-tax, labor hiring)	15.02	8.44
Breeding (breeder, feedstuffs, epidemic prevention)	6.29	12.82
Consumption and other expenditure	74.20	70.27
Food, clothing, and fuel	50.29	25.89
Medical care	14.20	35.93
Education	6.99	6.11
Others (household services, etc.)	2.72	2.34
Rural nonfarm expenses	4.49	8.47

*Data source: Author's calculation.*

<sup>a</sup> *Excluding the social network inside rural areas.*

Remittances from migrants make up nearly 8 percent of total income and 10 percent of the overall inequality. Income from transfers such as poverty alleviation programs, reforestation projects, and disaster relief minimally affect income and overall inequality. Farmers in the area often sell their blood for extra income. Revenues from sale of blood are even larger than remittances, although their contribution to total

inequality is smaller. Among our sample, nearly 30 percent of households reported that they sold blood in 2004. Although income from blood sales provides farmers with necessary cash and helps smooth consumption, in the long run selling blood may adversely affect their health status, which in turn may reduce their income-generating capacity.

Table 3 decomposes expenditure inequality according to agricultural inputs, rural nonfarm inputs, and consumption expenditures. Daily living expenses account for more than 74 percent of total income and variation. In poor regions, meeting basic needs is still the major task for most people. Therefore, income inequality is closely related to living expenditure inequality. Although on average medical care spending accounts for only 14 percent of total living expenditure, its contribution to total inequality is high at 36 percent. Our survey indicates that 41 percent of residents recommended for hospitalization refused to be admitted, with some 33 percent citing cost as the major reason. Without an appropriate public health care system in place in rural areas, poor households are particularly prone to fall into poverty traps when a family member suffers a catastrophic illness.

Education is another important factor, accounting for about 7 percent of total expenditure and its variation. The high tuition and related fees for education have become a big burden for many poor households. Not surprisingly, health care and education alone explain 42 percent of the total variation in living expenditures, suggesting that the lack of public provision of health care and education in rural areas might well be a major cause of inequality.

### **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 (education and health), political and social capital, and physical capital (possessed assets). Of course, household characteristics, such as household size and age structure, may also matter to income. Based on these considerations, we include four categories of variables—household characteristics, human capital, social capital, and household assets—in our regressions on income determinants.

**Table 4. Descriptive Analysis of Variables**

<b>Variable</b>	<b>Explanation</b>	<b>Mean</b>	<b>Std. E</b>	<b>Min</b>	<b>Max</b>
<b><i>Household and Members Characteristics</i></b>					
Hhsize	Number of household members (in log format)	1.524	0.370	0.000	2.398
Hhrelg	Having religious faith as 1 and 0 otherwise	0.098	0.298	0.000	1.000
Hhnaty	Han ethnicity as 1 and 0 otherwise	0.682	0.466	0.000	1.000
Hhmarg	Marriage status of household head (defined as 1 if married and 0 otherwise)	0.971	0.168	0.000	1.000
Hhsex	A binary variable defined as 1 when household head is male and 0 otherwise	0.951	0.215	0.000	1.000
Hhage	Age of household head	45.499	12.934	21.000	87.000
<b><i>Human capital</i></b>					
Maxeduh	Max years of schooling among household members	5.468	3.531	0.000	17.000
Trainingh	At least one household member received training as 1 and 0 otherwise	0.104	0.306	0.000	1.000
Oldh	Proportion of seniors older than 60 years to total number of household members	0.103	0.215	0.000	1.000
Bigsick	Households reporting medical expenditures as the largest spending item as 1, otherwise as 0	0.213	0.409	0.000	1.000
Oldbigsick	Interaction of OLDH and BIGSICK	0.027	0.122	0.000	1.000
<b><i>Social capital</i></b>					
Sc	Binary variable defined as 1 if household has relatives or friends who are officials and 0 otherwise	0.127	0.333	0.000	1.000
Partyh	Household head is Communist Party member as 1 and 0 otherwise	0.069	0.254	0.000	1.000
<b><i>Household assets</i></b>					
Elec	Having access to electricity as 1 and 0 otherwise	0.979	0.142	0.000	1.000
Asset	Having productive building or agricultural machinery as 1 and 0 otherwise.	0.448	0.498	0.000	1.000
Llivst	Number of livestock in household	1.819	1.006	0.000	5.000
Pirrland	Per capita irrigated land (Chinese <i>mu</i> )	0.126	0.211	0.000	3.000
Prland	Per capita net rented land (Chinese <i>mu</i> )	0.133	0.394	0.000	3.750
Pcland	Per capita contracted land (Chinese <i>mu</i> )	0.735	0.588	0.000	6.000
Pland	Per capita arable land (Chinese <i>mu</i> )	0.914	0.765	0.000	8.333

Table 4 describes the major variables used in the econometric analysis. Regarding household characteristics, a typical rural household has four members, 10 percent of households reported having a religious faith, 69 percent are of Han ethnicity, 95 percent of household heads are males, and the average age of the head of household is 45 years old. In terms of human and social capital variables, the average number of years of schooling is about five years. Ten percent of households report having received agricultural and technical training. The ratio of seniors older than 60 years old is about 10 percent of the total population. Twenty-one percent of the households rank expenditure on medical care as the top item in total living costs. About 13 percent of households have relatives or friends who are government officials, while the share of household heads who are Communist Party members is 7 percent. Among the variables on household assets, 98 percent of households have access to electricity, and 45 percent have productive building or agricultural machinery. Irrigated land per capita is 0.126 mu: on average each person owns only 0.914 mu of arable land, but there is a wide variation ranging from 0 to 8.33 mu.<sup>14</sup>

Table 5 reports the result of regressions in four specifications. In the above decomposition analysis, we find that medical expenditures are 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 (*Oldh\*Big sick*) of demographic structures (*Oldh* is the proportion of senior people in the family and *Big sick* denotes health shocks in the first and third specifications). Considering that land has not been adjusted in Guizhou since the rural reforms in the early 1980s, we divide per capita cultivated land into two components in the third and fourth regressions: per capita contracted landholding and per capita land renting. In the second specification, the

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<sup>14</sup> One mu =1/15 hectare.

coefficient for the health shock variable alone is insignificant. In a big family, in the event that a family member gets sick, siblings can share the burden of care, thereby acting as a buffer against the shock. The negative and significant coefficient for the interactive term of labor and health in the first specification indicates that in households lacking working age members, getting sick is highly related to loss of 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.

**Table 5. Result of Income Determinants Regression**

Variable	Model 1		Model 2		Model 3		Model 4	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Lnhhsize	-0.616	-7.430**	-0.605	-7.350**	-0.575	-6.490**	-0.564	-6.420**
Hhrelg	-0.016	-0.150	-0.016	-0.150	-0.013	-0.120	-0.013	-0.120
Hhnaty	-0.045	-0.450	-0.055	-0.560	-0.047	-0.480	-0.057	-0.580
Hhmarg	0.049	0.340	0.034	0.240	0.090	0.640	0.077	0.540
Hhsex	-0.067	-0.590	-0.076	-0.650	-0.067	-0.590	-0.075	-0.650
Hhage *100	-0.044	-0.150	-0.051	-0.170	-0.055	-0.180	-0.062	-0.210
Maxeduh	0.042	1.930*	0.042	1.910*	0.040	1.840*	0.040	1.810*
Maxeduh 2	-0.001	-0.500	-0.001	-0.530	-0.001	-0.460	-0.001	-0.490
Trainingh	0.307	2.900**	0.315	2.960**	0.310	2.910**	0.319	2.980**
Laborh	0.105	0.690	0.119	0.790	0.089	0.580	0.103	0.680
Oldh	0.087	0.380	-0.039	-0.180	0.063	0.280	-0.066	-0.300
Bigsick	0.084	1.230	-0.008	-0.130	0.084	1.240	-0.009	-0.150
Oldh*Bigsick	-0.562	-2.920**			-0.569	-2.880**		
Sc	0.123	1.530	0.134	1.690*	0.127	1.590	0.139	1.750*
Partyh	0.266	2.270**	0.266	2.230**	0.243	2.050**	0.242	2.010**
Elec	0.166	1.230	0.132	0.970	0.177	1.300	0.143	1.040
Asset	0.054	0.980	0.053	0.970	0.048	0.880	0.048	0.870
Lnlivst	0.180	3.120**	0.178	3.090**	0.190	3.290**	0.189	3.260**
Pirrland	0.112	0.940	0.105	0.880	0.119	1.020	0.113	0.970
Pland	0.140	3.290**	0.143	3.340**				
Pcland					0.187	3.750**	0.191	3.800**
Prland					0.072	0.790	0.071	0.780
_cons	7.299	19.430**	7.356	19.410**	7.185	18.900**	7.241	18.910*
Obs	798		798		798		798	
Adjusted-R2	0.279		0.272		0.282		0.275	

Note: Due to missing values for a few variables, the total number of observations in the regression drops to 798 from 803.. \*Significant at 10%.. \*\*Significant at 5%.

Among the set of household characteristic variables, only household size is statistically significant and negative. Among the human capital variables, having the highest year of schooling among family members and having training experience are strongly related to greater per capita income.

In terms of the role of social and political capital, being a Communist Party member is associated with greater income. Because social and political capital is largely concentrated in a small group of people, it may widen inequality. Among the last group of variables on household assets, per capita arable land area (a measure of quantity) and the number of draft animals are both highly significant.

The coefficient for the contracted landholdings is significantly positive. In Guizhou Province, because land has not been readjusted since the rural reforms of the early 1980s, land distribution has become increasingly uneven due to demographic changes. 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.<sup>15</sup> In principle, a well-functioning land rental market can help mitigate the problem. However, the coefficient for the variable of rented land is positive yet insignificant. Further research is required to evaluate the development of land rental markets.

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<sup>15</sup> The dummy variables for natural villages are statistically significant but are not reported here.



#### IV. INEQUALITY ACROSS VILLAGES

An administrative village in most of Guizhou Province is quite different from a natural village. Rural residents in general cluster within natural villages, instead of administrative villages, which implies that there may be greater variations in natural resource endowment even within the same administrative village. However, because the size of a natural village is usually small, a cluster of natural villages is combined to form an administrative village, in order to have enough scale to provide basic public goods and service. On average, in our sample, each administrative village is composed of more than four natural villages. The more remote an administrative village, the higher the number of natural villages included. As shown in Table 1, in the townships of Chengguan and Maguan, which have vast plains, there are only two to three natural villages in each administrative village. In the more remote and mountainous Houchang and Bulang townships, administrative villages on average include more than six natural villages.

**Table 6. Inequality across Villages**

Township	Natural village		Administrative village		Administrative/ Natural (%)	
	Gini	GE	Gini	GE	Gini	GE
Chengguan	0.346	0.221	0.259	0.103	74.9	46.6
Houchang	0.258	0.110	0.138	0.032	53.5	29.1
Bulang	0.317	0.158	0.175	0.046	55.2	29.1
Maguan	0.238	0.092	0.183	0.056	76.9	60.9
Overall	0.319	0.181	0.215	0.075	67.4	41.4

How even is income distribution across natural villages? Table 6 lays out the overall inequality across natural and administrative villages. In this table, the unit of observation for calculating inequality is natural villages and administrative villages, instead of households. Therefore, the inequality figures measure the variation across the

spatial units of natural and administrative villages. Because the large variation within natural villages is hidden, the overall natural village inequality (Gini coefficient) is 0.319, smaller than income inequality measured at the household level. In the same vein, the overall inequality at the aggregate administrative village level is 0.215.

Among the four townships, village inequality is greatest in Chengguan. Distance to the county seat may be one of the major determinants of village performance. In the more developed and flat Chengguan and Maguan townships, natural village inequality can be explained by variations across administrative villages more than in the other two less-developed townships. 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 variation within administrative villages. In the plain areas, the variation in natural resource endowment from village to village is relatively small; therefore, the difference across administrative villages plays a more decisive role.

Having observed the patterns of village inequality, the question arises: what are the major determinants of the large variations observed between villages? Table 7 presents the regressions on the correlates of per capita income at the natural village level and township dummy variables. 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 0.117. The coefficient for distance to the nearby town center is significantly negative, suggesting that remoteness does matter for economic development. In terms of social variables, we include in the regression the proportion of Han ethnicity, whether there is a temple or church in the village, and how many people from the village serve on 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 serve on the village council, the more developed in terms of per capita income is the natural village. Finally, labor quality, measured as the share of the labor force with secondary or higher level of education, is positively correlated with the overall income level.

**Table 7. Correlates of Per Capita Income at the Natural Village Level**

	Model 1		Model 2	
	Coefficient	t-value	Coefficient	t-value
<i>Variables at the administrative village level</i>				
Share of labor engaged in agricultural production			-0.002	-1.94*
The longest distance between two natural villages within the administrative village (km)			-0.042	-2.48**
Important decisions made by village party secretaries or upper-level governments			-0.181	-1.76*
Subjected to natural disaster in 2004			-0.117	1.63
<i>Variables at the natural village level</i>				
Having a road connection (1 is yes and 0 is no)	0.117	1.63	0.118	1.62
Distance to the nearest town (km in log)	-0.056	-2.31**	-0.042	-1.72**
Per capita arable land area ( <i>mu</i> /person in log)	0.084	1.75*	0.043	0.79
The share of flat land in total arable land	0.153	1.35	0.171	1.60
Whether water is a problem in the dry season	-0.093	-1.46	0.215	0.80
Share of Han ethnicity in total population	0.002	2.11**	0.002	2.22**
Whether there is a temple in the natural village	0.073	1.00	0.022	0.31
Share of labor force with secondary or higher level of education	0.238	2.42**	0.201	2.03*
Number of people from the natural village who serve on village council	0.103	1.83*	0.088	1.55
Test for township dummy variables ( <i>p</i> value)	0.004		0.039	
Number of observations	276		276	
Adjusted R <sup>2</sup>	0.225		0.269	

*Note: Dummy variables for townships are included but not reported in both specifications.*

*\* Significant at the 10% level. \*\* Significant at the 5% level.*

To check the robustness of the results, in the second specification, we add several variables at the administrative village level. The first variable, the share of the 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 second variable is the distance between the two farthest natural villages within an administrative village, which aims to measure the spread of a natural village. The coefficient for the variable is significantly negative. When natural villages are clustered, agglomeration has a positive effect on income. The third variable is a dummy variable measuring whether villages suffered from natural disasters (drought, plant diseases, or animal diseases) during 2004. It has a negative correlation with the outcome variable at the natural village level.

When the three variables are added at the administrative village level, the coefficients for three variables, Han ethnic group, distance to town centers, and labor quality, turn out to be robust in the two specifications. Improving the connectivity of villages and the education level of the labor force in poor regions can help improve both efficiency and equity.

## V. CONCLUSIONS AND POLICY IMPLICATIONS

Based on primary surveys at the household, natural village, and administrative village levels, this paper analyzes the patterns of village inequality in western China. Several findings emerge from the analysis. First, access to land plays a large role in explaining the overall inequality within the village. This is because agriculture is still the most important source of farmers' income, accounting for more than 70 percent of total income. Since Guizhou Province has adopted a strict land policy of "never adjusting land regardless of birth or death," with demographic changes, access to land is likely to become increasingly unequal. Although secure land tenure is certainly important for encouraging farmers to make investments in their land, the increasingly uneven distribution of land may turn out to be a key factor for large rural inequality if agriculture prevails as the major income source.

The second most important asset for farmers is their human capital, including health and education. This research shows that expenses for medical care rank first in overall expenditure inequality. Because of high medical expenses, most farmers refuse to see a doctor when they ill. In households with few family members of prime working age, falling sick is equivalent to a disaster, directly driving the household into poverty. The proportion of households that reported selling blood also sends an alarming signal about the plight of farmers in the poor regions. Although selling blood can help generate much needed cash to overcome budget constraints in the short run, in the long run, it will harm farmers' health, their most precious human capital. The vicious circle may dampen income inequality.

This study shows that access to nonfarm employment has been one of the major sources of income inequality within the village among households. The share of remittance is relatively small compared to the large number of migrants working in the

coastal areas. Even today, there are still various implicit and explicit restrictions in hiring rural migrants in various coastal cities, such as quotas and registrations (Zhao, 2003). They have to pay higher fees to access to education, health, and social welfare that are entitled to the urban residents. These factors have severely distorted labor markets and weakened the remittance linkages between coastal and interior regions.

We also find government transfers have a minimal influence on farmers' income, largely because the amount of transfers is so small. Because of the high targeting cost, it is difficult to improve rural income inequality through greater transfers. Our survey also shows that 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 right to a share of the rent. With the booming of natural resource sectors, the problem has become more pronounced. Such a phenomenon indicates that the institutional roots of 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 nonland resources. Otherwise, it is difficult to increase the income of the poor and to reduce the income gap by relying primarily on fiscal transfers.

Finally, the survey at the natural village level demonstrates a large degree of inequality across villages. Location does make a difference in the wellbeing of many rural people. Therefore, when targeting the poor, both villages and households should be considered. As labor quality is positively related to income level at the natural village level, improving rural education plays a positive role in achieving both equity and efficiency.

## **APPENDIX**

The questionnaires on income and expenditures are modified versions of those used by the Rural Survey Organization of the National Bureau of Statistics, China. Total expenditure refers to the sum of expenses of rural households for production (breeding, fertilizers, pesticides, and so on), consumption (food, clothes, durables, fuel, and so forth), and transfers. Total income refers to the sum of income earned from various sources by the rural households and their members during the reference period, including agricultural income, wage income, and income from household operations. Net income is equal to the total income minus corresponding expenses, such as household operation expenses, taxes and fees, depreciation of fixed assets for production, and gifts to people outside the village. The gift exchanges within villages are not counted because of the difficulty of disentangling the historical transactions in a snapshot survey. The expenditures on major production equipment and draft animals are not included as household operation expenses of the current period to avoid negative values.

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