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by

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an empirical study using the 2002 CASS CHIP survey *¹

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Abstract

This paper investigates the impact of community on household income in rural China. The analytical focus is, first, on the significance of physical infrastructure, human capital, and social capital at the community level, and second on the role of public management and public policy at the local level. The estimation results of household income using a hierarchical linear model demonstrate that community-level variables have significant effects on household income, and their impact varies according to the type of the community. Regarding public policy, the findings of this paper suggest the importance of institution building to cultivate governing ability for rural cadres, to promote social stability, and to develop mechanisms to meet local needs for public services.

JEL classification: D31; P25; Z13

Keywords: household income; community; social capital; rural China.

I. Introduction

A. Setting the Agenda

This paper places special emphasis on the impact of community on household income in rural China. The analytical focus is, first, on the significance of physical infrastructure, human capital, and social capital at the community level, and second on the role of public management and public policy at the local level. The estimation results of household income using a hierarchical linear model demonstrate that community-level variables have significant effects on household income, and their impact varies according to the type of the community. Regarding public policy, the findings of this paper suggest the importance of institution building to cultivate governing ability for rural cadres, to promote social stability, and to develop mechanisms to meet local needs for public services.

In the context of this paper, the term “community level” refers to the administrative villages (xingzhengcun) that are at the lowest level of the party/governmental hierarchy (hereafter referred to as “village”). In relation to the main theme of the entire volume, this paper focuses on the factors at the village level for two reasons, as follows.

First, by looking more closely at the influence of village characteristics we would be able to provide a fuller picture of the determinants of income inequality in rural China. As previous research such as that of Narayan and Pritchett (1999) has noted, household income depend on community-level factors in the rural areas of developing countries. Thus, it will be interesting to examine the type of community factors that affect household income in the Chinese context. Instead of using a simple location dummy variable as most of the previous studies have adopted, we examine community characteristics in some detail because our survey contains information regarding the

villages where the sample households are located.

Second, bearing in mind the multilayered and highly decentralized local administrative/fiscal system in China, we believe that the role of government and public policy regarding income inequality should be examined not only at the macro-level but also at the meso level, that is, at the county and subcounty levels (township and village). In fact, townships and villages have assumed an important responsibility for providing local public goods. As a result, large disparities in the provision of local public goods are observed, even among villages in the same county.² We assume that such regional disparity is one of the causes of regional income inequality in rural China.

It may be claimed that the deepening of marketization in rural China throughout the 1990s, for example the development of rural–urban migration and the privatization of collectively owned rural enterprises, has weakened the influence of village-level factors on households' economic activities. It may also be argued that recent political and economic reforms in rural areas, including tax reform and the restructuring of the local administrative system, tend to weaken the direct influence over households of the political economy at the village level. However, we believe that an investigation focusing on the village level remains important for the following reasons. First, the progress of marketization and political and economic reforms has involved great regional disparities. Second, the progress of marketization has not necessarily reduced the importance of formal institutional arrangements in influencing household income, although it has redefined the role of village management. For example, instead of allocating economic resources directly, the village might have become important as a provider of local public goods, which both directly and indirectly influences household income. Third, by shedding light on the village, we will be able to examine the role of informal institutional factors on household income.

This paper is structured as follows. In the remainder of this section, we discuss the previous research and the main data sources. Section II presents the analytical framework and the strategy for empirical study. In Section III, we estimate household income functions employing village-specific factors. We then elaborate how the characteristics of village management and public policy affect household income. Section IV concludes the paper.

B. Previous Research

Researchers who have conducted field surveys in rural China have been surprised by the substantial economic disparities among villages within the same county or even in the same township. Consequently, the literature has focused on the importance of meso level disparities. For example, based on a village survey in Handan (Hebei), Knight and Li (1997) discussed the “cumulative causation” of microregional economic development, which resulted in economic disparities among villages in the same district. Using data collected in suburban Tianjin, Perkins (2003) demonstrated that large economic variations existed among villages in a township, including wide differences in size, economic structure, and levels of well being. Sato (2003) provided a typology of market development at the meso level, based on a series of village and household surveys in five provinces.³

Studies based on the meso level surveys can identify unique regional factors that influence income inequality. For example, Perkins (2003) revealed that intervillage economic disparities were linked closely to historical variations in the survey area. However, it is difficult to generalize about findings derived from village-based surveys. In contrast, quantitative studies using large micro datasets allow generalization of results. Such studies generally investigate region-specific factors by employing simple regional or geographical dummy variables; as a result, they prohibit the understanding of the

socioeconomic implications behind such dummy variables. This paper attempts to fill out the simple regional dummies by introducing other region-specific characteristics.

C. Data

The main data source for this analysis is the rural household and administrative village surveys conducted by the Chinese Household Income Project (CHIP) Team at the Institute of Economics, the Chinese Academy of Social Sciences (CASS) (hereafter referred to as the 2002 CASS CHIP survey).⁴ Through the administrative village survey conducted simultaneously with the household survey, we collected officially recorded statistical data and other village-level information on the 961 villages where the 9200 sample households are located by circulating a questionnaire to village cadres (see Appendix Table A regarding the distribution of sample villages in the surveyed provinces).⁵ The sample villages of the NBS household survey were selected in each province by the provincial bureau of the NBS. The sample households were then drawn from each sample village (usually 10 households for each village).⁶

For the basic village statistics, we asked the statisticians to provide the officially recorded figures for 2002 and 1998. For the remaining quantitative data that are not officially recorded and for the historical data, we used the figures provided by the village cadres. Qualitative information of villages' socioeconomic conditions was also provided by the village cadres.

Because of the small number of sample households in each village, caution is required when using different data sets from the village and the household surveys, especially with regard to village-level variables aggregated from household data. As income-related data from the village survey are consistent with the data aggregated from the household survey, it is safe to argue that the income of sample households can represent that of sample villages.⁷ This does not, however, hold for other variables.

Therefore, for village characteristics, we avoid using aggregated variables with the exception of two variables for which no data are available from the village survey: the degree of social stability evaluated by the heads of households and the village's average education level. We believe that the bias is relatively small for the former variable because, in the context of rural China, villagers will share similar views about their village's social conditions. Concerning the latter variable, we introduce a village-level variable that is not the simple aggregation of the household level. It should be noted that, for the requirements of the village-mean centered modeling, several village-level variables aggregated from household data will also be employed.

II. Framework for the Empirical Study

A. Analytical Framework

Figure 1 introduces the analytical framework. Household income, that is, the dependent variable used throughout this paper, is the log of the per capita annual net income in 2002 (measured in yuan, in 2002 prices) (see Table 1). The definition of household income employed is consistent with the NBS's official peasant income statistics.⁸ We attempt to determine the magnitude and direction of village-specific factors on income inequality by estimating the household income function. As shown in Figure 1, we divide the village-specific factors into four categories: physical infrastructure; human capital endowment; level of social capital; and factors relating to public management and public policy at the village level. It is assumed that the effects of village-specific factors vary according to the basic socioeconomic conditions of the village. To sort out the differences in the effects of the village-specific factors among the different types of villages, we use measurements of the level of economic development (as measured by the share of village labor employed mainly in the nonagricultural

sector), geographical location, and historical level of labor mobility.

As we are interested in the effects of group (village) membership of households on their income, we employ a two-level hierarchical linear model instead of OLS. The first (micro) level is the household level and the second (macro) level is the village level.⁹ In this model, households are grouped into villages and village characteristics are assumed to exercise a common influence on all households within the village.

When there exists one household level of characteristics (x) and one village level of characteristics (z) that influence the per capita income (y) (in logarithm throughout the paper), the first (household) level model is written as follows:

$$y_{ij} = \beta_{0j} + \beta_{1j} x_{ij} + \underline{\varepsilon}_{ij}, \quad (1a)$$

where $\underline{\varepsilon}$ is the micro error term, and subscript i is for the household, and j is for the village. The second (village) level model that includes village characteristics (z) is described as follows.

$$\beta_{0j} = \gamma_{00} + \gamma_{01}z_j + \underline{\delta}_{0j}, \quad (1b)$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}z_j + \underline{\delta}_{1j}, \quad (1c)$$

where the subscript j indicates the village, and the δ is the macro error term.

Implicit in this formulation is the assumption that the relationship between household income and household characteristics depends on features of the village. So, for example, the returns to education may differ between villages with higher and lower levels of development.

Substitution provides the following two-level hierarchical linear model:

$$\begin{aligned} y_{ij} &= \gamma_{00} + \gamma_{01}z_j + \underline{\delta}_{0j} + (\gamma_{10} + \gamma_{11}z_j + \underline{\delta}_{1j}) x_{ij} + \underline{\varepsilon}_{ij} \\ &= \gamma_{00} + \gamma_{10}x_{ij} + \gamma_{01}z_j + \gamma_{11}z_j x_{ij} + (\underline{\delta}_{0j} + \underline{\delta}_{1j} x_{ij} + \underline{\varepsilon}_{ij}). \end{aligned} \quad (2)$$

Equation (2) illustrates that per capita income y is a function of the following components: overall intercept γ_{00} that demonstrates the grand-mean effect; the main

effect of village characteristics z (γ_{01}); the overall slope γ_{10} (the average x - y regression slope across villages) that represents the main effect of household characteristics x ; the cross-level interaction of household and village characteristics (γ_{11}); and random effects ($\underline{\delta}_{0j} + \underline{\delta}_{1j} x_{ij} + \underline{\varepsilon}_{ij}$).¹⁰

Equation (2) can be written as the combination of the fixed part

$$\mathbf{E}(y_{ij}) = \gamma_{00} + \gamma_{10}x_{ij} + \gamma_{01}z_j + \gamma_{11}z_j x_{ij}, \quad (3a)$$

and the random part

$$y_{ij} - \mathbf{E}(y_{ij}) = \underline{\delta}_{0j} + \underline{\delta}_{1j} x_{ij} + \underline{\varepsilon}_{ij}. \quad (3b)$$

In a hierarchical linear model, the first level variables can be measured either in their original levels (raw score form) or as deviations from the village mean (group-mean centered form). We conduct estimations using equations in both raw score form and village-mean centered form. A village-mean centered first level variable \bar{x}_{ij} is equal to $\bar{x}_{ij} = x_{ij} - \bar{x}_j$, where x_{ij} is the raw score for household i in village j and \bar{x}_j is the village-mean of the variable for village j .

Both approaches are instructive. If one wants to explain as much variation in the dependent variable as possible, the raw score form is useful. If one is interested in particular village-level effects and cross-level interactions between the village and the household levels, a village-mean centered model with the reintroduction of village-mean variables is appropriate (Kreft and De Leeuw 1998). In the following empirical study, we will first overview the type of household- and village-level characteristics that influence household income using the raw score form, and then examine the second-level effects and cross-level interactions employing the village-mean centered model.

B. Village-Level Variables

As summarized in Table 1, we employ the following village-level variables:

[a] Physical infrastructure: Previous research emphasized the importance of physical infrastructure for regional economic development and poverty alleviation in developing countries (Antle 1983; Lipton and Ravallion 1995). We concentrate on electricity, a type of small-scale physical infrastructure that is common to almost all villages but introduced at different times historically, as an indicator of the overall level of development of small-scale physical infrastructure. Specifically, we introduce a dummy variable for the periods when the villages were first equipped with electricity: 1 = 1949--1979; 0 = after 1980 [a-1]. We assume that this variable positively correlates with household income.

In addition, as an additional indicator of the level of agricultural infrastructure we employ the logit-transformed share of farmland that is irrigated in 2002 [a-2].¹¹

[b] Village-level human capital: The literature have confirmed that, along with the marketization, the return to education has increased substantially in rural China. (see, for example, Yue et al. forthcoming; Walder 2002; Zhang, Huang, and Rozelle 2002). We assume that a higher average educational attainment at the village level has a positive effect on household income because it will induce efficient economic interaction among villagers, assisting villagers to exchange useful information and skills.

As the indicator of village-level human capital, we introduce two variables. One is the share of adult population (over 16 years old) who have completed junior high school or a higher educational level, which is used in the raw score form model [b-1]. The other is the average number of years of education of working-age adults (16–65 years old), which is used in the village-mean centered form model [b-2].

[c] Village-level social capital: Generally, social capital is conceptualized as the level of trust, the degree to which common norms are shared, and the density of associational activities among community members (Dasgupta and Serageldin 2000).

Narayan and Pritchett (1999), using a village survey in Tanzania, discussed how household income depends greatly on the village-level social capital, specifically, the extent and characteristics of the villagers' associational activities. According to their study, the proximate channels through which village social capital influences household income are: better public services, greater use of modern technology, more community activity, and greater use of credit.

It would be interesting to examine whether such social factors exhibit positive externalities in rural China. Given the general context of rural China and the framework of this paper, however, the link between community-level associational activities and household income may not be relevant. This is because such activities are not common in general and because the administrative village is not necessarily a suitable unit of observation for such activities.¹² Instead, we focus on the degree of social stability at the village level as village-specific social capital, considering that social stability can be regarded as the basis for other social factors. Following previous research such as Knack and Keefer (1997), we assume a causal linkage between social stability, higher incentives and lower risks for economic activities, and higher income.

As the proxy of social stability, we employ two attitudinal questions to the head of household. These questions are: "Do you think that there is a good relationship among households belonging to different small village groups (cunmin xiaozu)?" and "Do you think that there is a good relationship among households belonging to different family groups?" To measure social stability, we categorized the answers into points ranging from five (strongly agree) to one (strongly disagree), and then summed these numbers to create a scale with a maximum of 10.

Analysis of social capital inevitably encounters the problem of endogeneity, because social stability could be the result rather than the cause of good economic

conditions in the village. The justification for introducing this variable into the cross-section analysis is that the sociocultural characteristics of villages tend to be stable over time.

[d] Characteristics of village management: Activities of the village authority are expected to have both a direct and an indirect influence on household income. While the role of village in China is rather complicated and multidimensional, we can categorize the role of village management as follows: (1) village as an economic agent; (2) village as a provider of local public goods; and (3) village as a mediator of conflicts within the community.

Since the 1980s, one of the unique characteristics of Chinese villages has been their role as an economic agent. First, villages have been owners and operators of rural enterprises and other collective businesses (see, for example Chen 1998; Oi 1999). Acting as an economic agent in this manner, the village can directly provide employment opportunities. Many village-level collective economic entities have disappeared under fierce market competition and the wave of privatization of rural industries. Nevertheless, some villages have kept managing collective economic entities. To capture this factor, we compile a dummy variable that indicates whether the village has a collective economic entity (enterprises and other business entities) [d-1].¹³ It should be noted that former village-owned enterprises that were privatized in the 1990s are also included because many such enterprises keep informal relationships with the village. Second, villages have recently been inclined to mediate economic opportunities for villagers rather than directly operate collective businesses. To capture the activity of the village in this manner, we employ a dummy variable indicating whether the village cadres have attracted any investment projects from outside the village up to 2002 [d-2].

Concerning the role of the village as the provider of local public goods, we

introduce the following two variables. First, as an indicator of production-related public services, we employ a dummy variable indicating whether the village provides irrigation services using collectively owned irrigation facilities [d-3]. Second, as a proxy of the level of local public goods, we employ the log of the per capita expenditure in the administrative village budget [d-4]. This includes expenditures on production-related services, education, public health, and other public services. To avoid the problem of endogeneity and to examine how the initial state of the provision of local public goods influences subsequent economic outcomes, we use the village budget statistics for 1998.

Village cadres formally and informally act as mediators between villagers with different interests. In this sense, the above-mentioned degree of social stability at the village level can also be regarded as an indicator of the governing ability of the village [c-1/d-5].

[e] Other village-level variables: In addition to these village-specific variables, we introduce a dummy variable for villages that suffered from a natural disaster in 2002 to control the impact of external shocks on households [e-1]. Also, village-mean variables for farmland [e-2] and productive fixed assets [e-3] are used in the village-mean centered estimations.

[f] Types of village: As mentioned above, to control for the different effects of village-level variables in the different types of villages, we classify the sample villages according to the following three criteria.¹⁴

First, as the proxy of the overall level of economic development, we introduce the logit-transformed share of nonagricultural employment in 2002 [f-1]. Nonagricultural employment share is defined as the share of the total labor force in the village that is mainly employed in the nonagricultural sector.¹⁵ Using this measurement, we also group the villages into underdeveloped villages and developed villages.

Underdeveloped villages are villages with a lower nonagricultural employment share (less than the median, that is, 30 percent or less). Developed villages have a higher share (more than 30 percent). Second, regarding the geographical location, we introduce a dummy variable for nonmountainous villages [f-2]. Third, to capture the historical level of labor mobility, we employ a dummy variable for the villages where approximately more than 10 percent of labor force had worked outside their home township for more than one month at the beginning of the 1990s [f-3].

C. Household-Level Variables

For the household-level model, two sets of explanatory variables are used (Table 1). First, for cross-referencing, we introduce a set of basic household attributes: contracted farmland; productive fixed assets; education level of working-age adults; Communist Party membership; average age of working-age adults; household size; and dependency ratio (ratio of total household members to working-age adults). Second, we introduce a set of village-mean centered variables for contracted farmland; productive fixed assets; and education level of working-age adults employed for village-mean centered equations.

For our empirical study, in addition to the above-mentioned household attributes, we need to control the degree to which each household is independent from the village-level political economy. For this purpose, we introduce a dummy variable indicating whether or not the household had any income earned outside the village.

III. Empirical Results

In this section, we first confirm the magnitude of the intervillage disparity in household income, and second, we describe the basic findings of the household income

function using the hierarchical linear model.

A. The Magnitude of Village-Level Factors

To confirm the magnitude of the overall effect of village-specific factors on household income, we first estimate the following intercept-only model (the one-way ANOVA with random effects) that contains only the dependent variable (y_{ij}), and no explanatory variables:¹⁶

$$y_{ij} = \gamma_{00} + \delta_{0j} + \varepsilon_{ij}. \quad (5)$$

The fixed effect γ_{00} demonstrates the average of village mean income (in logarithm). Two random effects δ_{0j} and ε_{ij} indicate the variance components at the village level (intervillage variance) and household level (intravillage variance), respectively. We can thus decompose the total variation in household income into variations between and within villages.

Table 2 reports the estimation results. The intraclass correlation, that is, the contribution ratio of intervillage variance to total variance demonstrates that about 42 percent of the total variance of per capita income is explained by the intervillage variance. As is shown in the latter half of the table, the contribution ratio of intervillage variance is larger for mountainous villages and developed villages, suggesting that the magnitude of intervillage disparity does not simply decrease along with the level of regional economic development.

B. Overview of the Estimation Results

Table 3 summarizes the results of the two-level hierarchical linear models for household income, employing the village- and household-level explanatory variables listed in Table 1. The first column of the table is the baseline estimation using the village-mean centered form, which includes village-mean centered household-level variables on the endowments of physical/human capital and other household-level

variables, village-mean variables for physical/human capital, and indicators of the basic socioeconomic conditions of the village. This specification is used as the baseline to confirm the effects of household-level factors and to elaborate the effects of village-specific factors in the different types of villages. The second column is the full specification using the village-mean centered form, which adds all the village-specific variables to the baseline specification. The third column is the full specification using the raw score form.¹⁷

Before examining the effects of village-specific factors, it will be convenient to confirm whether the findings on household-level variables are consistent with other studies using the same data set. As mentioned above, we refer to the income function using OLS in Yue, Sicular, Li, and Gustafsson (forthcoming). Table 3 demonstrates that the results of the baseline estimation and the full specification using the raw score form equation are basically consistent with Yue, Sicular, Li, and Gustafsson (forthcoming).¹⁸

We now turn to the full specification to determine the effects of village-specific factors. The results from the village-mean centered form and from the raw score form are basically the same and suggest the following facts.

First, village-level physical infrastructure and human capital endowment result in positive externalities on household income. Households living in villages equipped with electricity before the reform era enjoyed approximately 9 percent higher income in 2002. Variables for the education level of the village are positive and statistically significant both in the raw score and in the village-mean centered equation. In the village-mean centered equation, it is revealed that adding one year of education to a village's average educational standard raises the villagers' income by approximately 6 percent.

Second, the degree of social stability, proxy of village social capital, has positive and statistically significant effects on household income. If the measure of stable social

relationships rises by one point, the villagers' income rises by around 3 percent. As mentioned above, the result can also be understood as implying the significance of the village cadre's ability to promote good social relationships within the village.

Third, estimation results for the variables relating to village management, on the whole, suggest that public management and public policy at the village level play a significant role in income inequality. All other factors are equal, having a village-level collective economic entity raises villagers' income by 6–8 percent. Both of the full specification equations demonstrate that larger village expenditure on public services in the past has brought an increase in the villagers' current income. It is also demonstrated that controlling the share of irrigated land in the total arable and permanent cropland and providing collective irrigation management through the village's use of collectively owned facilities have a positive and significant effect on household income. Contrary to these factors, the presence in a village of investment projects attracted by village cadres reveals no statistically significant effect, though it is, as expected, positive.

Fourth, basic socioeconomic conditions of the village also significantly correlate with household income. It is shown that a higher nonagricultural employment share at the village level is accompanied by higher income. Full specification equations reveal that, given all other factors are equal, being part of nonmountainous villages raises household income by approximately 14–16 percent. The negative and significant coefficient on the historical level of labor mobility suggests that the propensity for out-migration is higher in lower income villages.

C. Role of Village Management and Public Policy

Our next step is to investigate further the role of public management and public policy at the village level. Here we focus on three variables that represent different aspects of village management: (1) a dummy for a collective economic entity

representing the village's role as an economic agent; (2) the size of the village budget for public services, which indicates the role of the village as a provider of local public goods; and (3) the degree of social stability, which is regarded as a proxy of village cadre's governing ability. These three variables have positive, significant coefficients in our regressions (Table 3). We would like to explore further whether the impact of public management differs among different types of villages. We therefore compare the estimation results obtained by running regressions separately for different village types. In addition, we examine the cross-level interactions between village-level variables and household returns to education.

Table 4 reports the estimate results by type of village. Several points are noteworthy. First, the significance of village management is, on the whole, greater in the villages with a lower historical level of labor mobility. Two of the three relevant variables become insignificant in the case of villages that had high propensity for out-migration at the beginning of the 1990s.

Second, the coefficient on collective economic entities becomes insignificant in underdeveloped villages and mountainous villages, while it is positive and significant in developed villages and nonmountainous villages. One explanation for this finding is that, after the deepening of marketization in the 1990s, only competitive village-level collective economic entities in developed nonmountainous regions were economically viable and provided villagers with lucrative opportunities. In other words, most collective economic entities in underdeveloped and mountainous villages had difficulty providing villagers with earning opportunities. Note that former village-owned enterprises that were privatized are included and treated as collective economic entities. Consequently, these results indicate that collective rural industrialization in the early reform era still plays a role in income determination, even after the wave of privatization

in the 1990s.

Third, the effect of public expenditure is also insignificant in underdeveloped and mountainous villages. This finding implies that public goods provision at the meso level tends to be inefficient in underdeveloped and mountainous villages. This could arise due to the lack of economies of scale in public goods provision caused by the limited financial ability and geographical conditions, or due to the low governing ability at the village level and to the lack of provision of complementary public goods by upper levels of government. This finding suggests that it is necessary to improve intergovernmental fiscal transfers to underdeveloped, mountainous regions and, at the same time, to provide an effective mechanism to meet local needs for the delivery of public goods.

Fourth, contrary to the above-mentioned aspects of village management, the coefficient on social stability is larger in underdeveloped and mountainous villages. This suggests that the role of informal institutional factors is more important when the overall level of economic development and marketization is low and the formal institutional infrastructure is underdeveloped. The policy implication of this result is that not only the physical infrastructure but also the development of the institutional infrastructure that promotes social stability may be essential for income growth and poverty alleviation in the underdeveloped regions.

Lastly, we cannot draw a simple picture of the relationship between the role of village management and the level of economic development or marketization. We cannot simply assume that the overall impact of village management on household income declines along with the marketization. The impact of village management on household income appears to be related more to the historical level of labor mobility. Further research is required to elaborate the changing role of public management and public policy at the meso level, taking into consideration various other village-level factors and

cross-level interactions of village, township, county, and upper administrations.

Let us now turn our attention to the cross-level interaction effects between village management and household income. Here we focus on the influence of the characteristics of village management on the average rate of return to education at the household level. The estimation results are revealed in Table 5, which shows a positive and significant interaction effect. It is suggested that larger village expenditure for public services in the past has brought about a larger rate of return to education (Table 5a). By conducting estimates by the types of village, we have determined a larger and more significant interaction effect in nonmountainous villages (Table 5b). This finding supports the relevance of the aforementioned larger impact of public expenditure on household income in developed nonmountainous regions.

IV. Concluding Remarks

The major findings of this paper and their implications are summarized as follows. First, we have confirmed that village-specific factors significantly influence household income determination. This finding is consistent with previous research and suggests that not only the macro-level institutional and policy environment and micro-level factors, but also meso level factors should be considered when we investigate income inequality in rural China. Second, not only the endowments of physical and human capital at the village level but also the community's social capital have a significant effect on household income. It should be noted that its impact is stronger in underdeveloped, mountainous regions. Third, estimation results for the variables relating to village management, on the whole, suggest that many aspects of the role of the village - - as economic agent, provider of local public goods, and promoter of social stability - - have a significant effect on household income. It is noteworthy that

public goods provision at the meso level tends to be inefficient in underdeveloped mountainous regions. This finding reveals a serious problem in rural China, that is, the large regional disparity in the effectiveness of public policy caused by the difference between delivery and finance of local public goods, by the lack of an effective mechanism of intergovernmental fiscal transfer, and by the limited governing ability at the local level.

The findings here hold certain implications for incomes and public policy in rural China derived from this paper. First, not only the construction of physical infrastructure but also the development of an institutional infrastructure that promotes social stability is relevant for income growth in underdeveloped regions. Second, the delivery of public services remains ineffective in underdeveloped regions, which suggests that it is necessary to improve intergovernmental fiscal transfers to underdeveloped regions and, at the same time, provide an effective mechanism to capture local needs.

We conclude by stating a concern over possible unfavorable policy outcomes of certain recent rural reforms, including the taxation reform. Although the decrease of the peasants' tax burden has an equalizing impact in the short run, if it is not accompanied by a substantial increase in intergovernmental fiscal transfer and by improved efficiency of delivery of public services, the result may be a reduction of basic public services, and unequal effects in the long run. The village survey provides evidence for such unfavorable consequences. For example, of the 634 villages where the taxation reform was launched in 2002, 304 villages reported that the total amount of funds available for villages' education needs, which are obtained from a village's own funds and upper administration, decreased following the reform. Moreover, there was a statistically significant association between income levels and changes in funding for education. Poor villages were more likely to report that they had suffered a reduction in funding for

education.¹⁹ Further research is needed on the relationship between income inequality and meso level public policy.²⁰

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Table 1 Description and Summary Statistics of Variables Used in This Paper

Variables	Description	Mean (standard deviation)	Data source
Dependent variable			
Per capita income for 2002	The log of per capita annual net income based on NBS definition (yuan, 2002 prices)	7.683 (0.705) [2755.73 (2319.16)]	H
Village-level variables			
[a-1: Physical infrastructure] Equipped with electricity before the reform era	Dummy variable for the periods when the village was equipped with electricity	0.640 (0.480)	V
[a-2: Physical infrastructure] Share of irrigated farmland	The logit-transformed share of irrigated farmland in total farmland, 2002	1.789 (4.873) [0.614 (0.362)]	V
[b-1: Human capital] Share of junior high graduates	The share of adult population that has completed junior high school or a higher educational level, 2002	0.621 (0.173)	H
[b-2: Human capital] Village-mean years of education	Average number of years of education of working-age adults (16-65 years old)	7.110 (1.190)	H
[c-1 / d-5: Social capital/village management] Social stability	Average of household head's evaluation of the degree of social stability in the village (scale from 1 to 10)	7.552 (1.008)	H

[d-1: Village management] Collective economic entities	Dummy for villages managing collective economic entities in 2002	0.262 (0.440)	V
[d-2: Village management] Inward investment	Dummy for villages having inward investment projects attracted by village cadres until 2002	0.114 (0.318)	V
[d-3: Village management] Irrigation services by the village	Dummy for villages providing irrigation services using collectively owned facilities in 2002	0.263 (0.440)	V
[d-4: Village management] Village budget for public services, 1998	The log of per capita expenditure for public services in 1998 (yuan, 2002 prices)	2.066 (1.612) [29.48 (86.67)]	V
[e-1: External shock] Natural disaster	Dummy for villages suffering natural disaster in 2002	0.514 (0.500)	V
[e-2] Village-mean farmland	Average area of per capita contracted farmland, 2002 (mu)	1.425 (1.512)	H
[e-3] Village-mean fixed assets	Average value of per capita productive fixed assets, 2002 (yuan)	1245.63 (1699.44)	H
Types of village (Basic socioeconomic conditions)			
[f-1: Level of economic development] Nonagricultural employment share	The logit-transformed share of labor force in the village that is mainly employed in the nonagricultural sector, 2002 (developed villages=with more than 30% share;	-1.027 (6.677) [0.330 (0.221)]	V

[f-2: Geographical location] Nonmountainous villages	underdeveloped villages=30%or less share) Dummy for villages located in nonmountainous area	0.781 (0.414)	V
[f-3: Historical level of labor mobility] Development of out-migration	Dummy for the degree of development of out-migration at the beginning of the 1990s	0.400 (0.490)	V
Household-level variables			
Farmland (in raw score form)	Per capita contracted farmland, 2002 (mu)	1.425 (1.856)	H
Village-mean centered farmland	The deviation of the household's farmland from the village-mean		H
Fixed assets	The log of the per capita value of fixed productive assets at the time of purchase , 2002 (yuan, in 2002 prices)	5.708 (2.357) [1251.50 (3634.32)]	H
Village-mean centered fixed assets	The deviation of household's value of fixed assets from the village-mean		H
Education level (in raw score form)	Average years of education of working-age adults, 2002	7.065 (2.023)	H
Village-mean centered education level	The deviation of household's education level from the village-mean		H
Party membership	Dummy for households with communist party members, 2002	0.211 (0.408)	H
Average age of working-age adults	Average age of working-age adults, 2002	37.670 (7.47)	H

Household size	Total number of household members, 2002	4.141 (1.280)	H
Dependency ratio	Total number of household members divided by the number of household members of working-age, 2002	1.416 (0.466)	H
Having income earned outside the village	Dummy for households with income earned outside the village in 2002	0.312 (0.463)	H
Number of observations		9104	

Notes:

1. H indicates that the data are taken from the household data set and V indicates they are from the administrative village data set.
2. Figures in brackets show mean and standard deviation (in parentheses) of the original value of the relevant variable.

Table 2 Magnitude of the Intervillage Disparity in Rural Household Income, 2002

Dependent variable: Log of per capita income in 2002		Variance components
1. The whole villages	[N=9104, 956 villages]	
Intervillage variance		0.208
Intravillage variance		0.289
Intraclass correlation (contribution ratio of intervillage variance to total variance)		0.42
2. Intraclass correlation by the basic socioeconomic conditions of villages		
A. Level of economic development measured by the nonagricultural employment share		
Underdeveloped villages	[N=4469, 486 villages]	0.30
Developed villages	[N=4635, 470 villages]	0.49
B. Geographical locations		
Mountainous villages	[N=1995, 201 villages]	0.44
Nonmountainous villages	[N=7109, 755 villages]	0.38

Notes:

1. This table reports the results of restricted maximum likelihood estimates of the variance components at the village level (intervillage variance) and the household level (intravillage variance).
2. Intraclass correlation is calculated as $\text{intervillage variance} / (\text{intervillage variance} + \text{intravillage variance})$.

Table 3 Estimation of the Determinants of Household Income, 2002

Dependent variable: Log of per capita income in 2002	(1) Baseline (Village-mean centered form)	(2) Full specification (Village-mean centered form)	(3) Full specification (Raw score form)
Village-level			
Equipped with electricity before the reform era		0.089*** (0.025)	0.090*** (0.026)
Share of irrigated farmland		0.055 (0.039)	0.003 (0.003)
Share of junior high school graduates			0.160** (0.074)
Social stability		0.029*** (0.010)	0.031*** (0.011)
Collective economic entities		0.062** (0.026)	0.083*** (0.026)
Irrigation service by the village		0.073*** (0.026)	0.076*** (0.026)
Inward investment		0.024 (0.033)	0.024 (0.033)
Village budget for public services, 1998		0.024*** (0.008)	0.029*** (0.008)
Natural disaster		-0.075*** (0.022)	-0.074*** (0.023)
Village-mean years of education	0.072*** (0.011)	0.059*** (0.010)	
Village-mean farmland	0.036*** (0.009)	0.041*** (0.009)	
Village-mean fixed assets	0.000*** (0.000)	0.000*** (0.000)	

Nonagricultural employment share	0.041*** (0.008)	0.342*** (0.060)	0.039*** (0.008)
Nonmountainous area	0.225*** (0.032)	0.135*** (0.034)	0.158*** (0.035)
Development of out-migration	-0.111*** (0.024)	-0.113*** (0.023)	-0.109*** (0.023)
Household-level			
Farmland			0.076*** (0.007)
Farmland squared			-0.001*** (0.0003)
Fixed assets			0.012*** (0.003)
Education level			0.011 (0.013)
Education level squared			0.002** (0.0009)
Village-mean centered education level	0.038*** (0.004)	0.034*** (0.004)	
Village-mean centered farmland	0.057*** (0.005)	0.057*** (0.005)	
Village-mean centered fixed assets	0.000*** (0.000)	0.000*** (0.000)	
Average age of working-age adults	0.018*** (0.006)	0.017*** (0.006)	0.017*** (0.006)
Average age of working-age adults squared	-0.0002*** (0.000)	-0.0002*** (0.000)	-0.0002*** (0.000)
Party membership	0.133*** (0.014)	0.132*** (0.014)	0.132*** (0.014)

Household size	-0.227*** (0.024)	-0.227*** (0.024)	-0.229*** (0.024)
Household size squared	0.013*** (0.002)	0.013*** (0.002)	0.013*** (0.002)
Dependency ratio	-0.104*** (0.013)	-0.104*** (0.013)	-0.099*** (0.013)
Having income earned outside the village	0.126*** (0.014)	0.128*** (0.014)	0.131*** (0.014)
Constant	7.290*** (0.157)	6.974*** (0.176)	7.170*** (0.170)
Random-effects Parameters			
Village-level variance	0.077 (0.005)	0.070 (0.005)	0.073 (0.005)
Household-level variance	0.253 (0.004)	0.253 (0.004)	0.252 (0.004)
Deviance	14838.67	14818.48	14800.23
R-squared			
Number of observations	9104	9104	9104
Number of villages	956	956	956

Notes:

1. This table reports the results of a two level hierarchical linear model nested at the village level. All the equations are fitted with fixed slopes for the first level variables.
2. Coefficients on provincial dummies are not reported.
3. Standard errors are provided in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.
4. Province dummies are included in all of the equations, but are not reported here. About half of the province dummies are statistically significant, which illustrates the significance of the location factor.

Table 4 Effects of Village Management by the Village Types, 2002

Types of villages	Village-specific variables added to the baseline equation	Collective economic entities	Village budget for public services, 1998	Social stability
Level of economic development				
Underdeveloped villages	[N=4469, 486 villages]	0.049	0.011	0.037**
Developed villages	[N=4635, 470 villages]	0.145***	0.059***	0.029*
Geographical location				
Mountainous villages	[N=1995, 201 villages]	-0.070	-0.015	0.047*
Nonmountainous villages	[N=7109, 755 villages]	0.125***	0.039***	0.031***
Historical level of labor mobility				
Villages of low mobility	[N=5461, 588 villages]	0.123***	0.037***	0.053***
Villages of high mobility	[N=3643, 368 villages]	0.060	0.032**	0.007

Notes:

1. This table reports the coefficients on the variables that relate to village management estimated by the village types. Estimations are based on the baseline equation in the village-mean centered form (the first column of Table 3) and the relevant village-specific variables are added in the equations.
2. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5a Cross-Level Interaction Effect of Village Management and Rate of Return to Education

Village-level variables on village management	Collective economic entities	Village budget for public services, 1998	Social stability
Coefficient on village-level variables on village management	0.098 (0.026)***	0.036 (0.008)***	0.035 (0.011)***
Coefficient on village-mean centered education level	0.035 (0.008)***	0.031 (0.008)***	0.033 (0.025)
Coefficient on interaction term of education with village-level variable on village management	0.010 (0.007)	0.004 (0.002)*	0.001 (0.003)

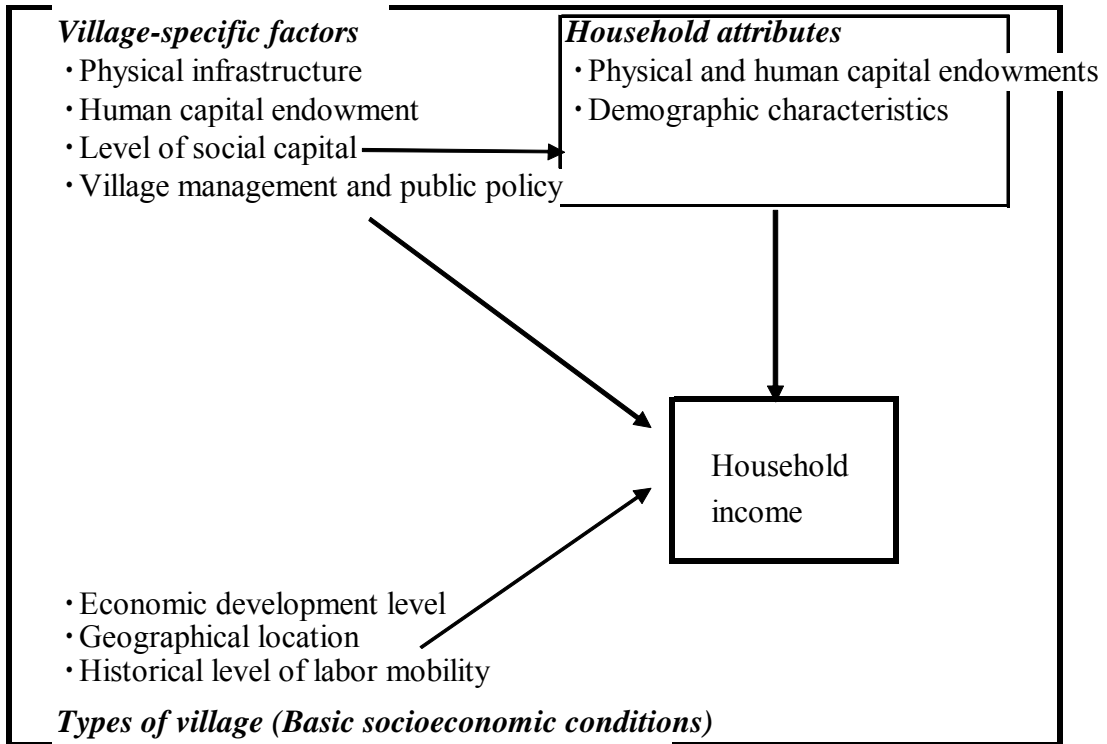
Table 5b Village Budget for Public Services and Rate of Return to Education: By Geographical Location

	Mountainous villages	Nonmountainous villages
Coefficient on the village budget for public services, 1998	-0.015 (0.023)	0.039 (0.008)***
Coefficient on village-mean centered education level	0.048 (0.008)***	0.019 (0.007)***
Coefficient on interaction term of education level with village budget for public services	0.002 (0.005)	0.006 (0.002)***

Notes:

1. This table reports the coefficients on the variables for village management, village-mean centered years of education of working-age adults, and their interaction terms. Estimations are based on the baseline equation in the village-mean centered form (the first column of Table 3) and the relevant variables are added in the equations.
2. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Figure 1 Framework of the Study



Source: by the author

Appendix Table A Distribution of Sample Villages by Province, 2002 Data Sets

Province	Number of sample administrative villages	Province	Number of sample administrative villages
Beijing	16	Hunan	45
Hebei	37	Guangdong	53
Shanxi	40	Guangxi	40
Liaoning	45	Chongqing	20
Jilin	48	Sichuan	50
Jiangsu	44	Guizhou	40
Zhejiang	53	Yunnan	26
Anhui	44	Shaanxi	37
Jiangxi	43	Gansu	32
Shandong	63	Xinjiang	80
Henan	53		
Hubei	52	Total	961

Endnotes

- *¹ Manuscript prepared for Björn Gustafsson, Li Shi, and Terry Sicular (eds.) *Inequality and Public Policy in China*, Cambridge: Cambridge University Press, forthcoming in 2007. The surveys on which this paper based on were funded by the Ford Foundation, Swedish International Development Cooperation Agency, Asian Development Bank, Masayoshi Ohira Memorial Foundation, the Grant in Aid for Scientific Research of the Japan Society of the Promotion of Science (JSPS), and Hitotsubashi University. The authors are grateful for their generous support.
- ² The institutional cause of large disparities in the village-level political economy is that the administrative village is regarded as a “self-governing community (nongcun jiceng zizhi zuzhi),” not a formal governmental apparatus in spite of its de facto position as a local government.
- ³ Many qualitative studies focus on a single village or several villages (see, for example, Friedman, Pickowicz, Selden, and Johnson 1991; Huang 1985; Zhongguo Shehui Kexueyuan Jingji Yanjiusuo “Wubao” Diaocha Ketizu 1999).
- ⁴ Regarding to a detailed illustration of the CASS CHIP survey, see Li, Luo, Wei, and Yue (forthcoming).
- ⁵ The administrative village survey is funded partly by the Japan Society for the Promotion of Science (JSPS) and Hitotsubashi University.
- ⁶ Note that the work sample for empirical study only has 9104 households because of missing values for village-level variables (e.g., village expenditure in 1998).
- ⁷ The village mean income for 2002 collected from the village questionnaire has a strong correlation with the village mean income aggregated from the household survey ($r = 0.809$, $n = 951$).
- ⁸ The rental value of housing is not included. See the Introduction and Appendix

of this book for detailed discussion of the definition of income.

⁹ As for the methodology of the hierarchical linear model, see Kreft and De Leeuw (1998) and Raudenbush and Bryk (2002).

¹⁰ As for random effects, δ_{0j} indicates the deviation of each village from the grand mean and δ_{1j} indicates the unique increment to the overall slope associated with village j .

¹¹ Logit-transformed share of farmland R is defined as $R = \ln(r / (1-r))$, where r is the original figure for the share of irrigated farmland.

¹² The lineage organization (zongzu), that is, the traditional Chinese patrilineal descent, or the natural village (zirancun) would be a more suitable unit for analysis, although the administrative village and the natural village sometimes overlap, especially in North China.

¹³ The term economic entity here refers to jingji shiti in Chinese, which means generally an economic unit engaged in business activities.

¹⁴ Regarding the typology of villages, we refer the historical study by Huang. In order to examine the village-state relations in North China in the twentieth century, he classified 33 Mantetsu-surveyed villages according to the level of commercialization and labor mobility (see appendix of Huang 1985).

¹⁵ As official village level documents no longer have reported statistics on employment structure, the figures are based on estimation by village cadres. Logit transformation is made by the same way as the share of irrigated farmland.

¹⁶ This is the combined model of the household level model $y_{ij} = \beta_{0j} + \varepsilon_{ij}$ and the village level model $\beta_{0j} = \gamma_{00} + \delta_{0j}$.

¹⁷ All the equations are fitted with fixed slopes for household-level variables. This is because our trials to fit random slopes for household-level variables show that variances of the slopes are not significant and because addition of random slopes will make the fixed part of parameters more unstable.

¹⁸ Though it is not reported in the table, we also conducted OLS estimation with robust standard error for clustering at the village level and confirmed that the results are consistent with the hierarchical linear equations.

¹⁹ The percentages of villages that reported a reduction of such funding were: 34 percent of high-income villages (more than 3500 yuan per capita net annual income), 47 percent of upper-middle-income villages (2500–3500 yuan), 51 percent of lower-middle-income villages (1500–2500 yuan), and 54 percent of low-income villages (less than 1500 yuan). Several previous studies have already reported similar findings (see, for example Qi, Zhao, and Yuan 2003 and Zhu, Zhang, and Yan 2003).

²⁰ Several other issues also must be deferred to further studies. For example, it would be interesting to employ a microgrowth framework to examine the determinants of income growth at the village level (for relevant previous literature, see Ravallion and Jalan 1996).