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# Regional growth disparity in China 1990-2002: a village based study

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## Abstract

This paper examines the economic and noneconomic determinants of growth disparity among Chinese villages between 1990 and 2002. By estimating a growth equation, first, we confirm a significant positive effect of the initial level of human capital, as well as the initial condition of physical infrastructure. Second, social capital measured by the degree of stable social relations at the village level is also a significant growth-promoting factor. The policy implications of our findings are that public policy promoting social stability in rural areas should be strengthened, as well as increasing financial support for rural education and infrastructure construction, especially in lower income regions.

Keywords: regional disparity, growth regression, social capital, rural China
JEL classifications: D31, O18, R11

## 1. Introduction

This paper examines economic and noneconomic determinants of the difference in income growth among Chinese villages from the early 1990s to the early 2000s, using the Barro-type growth regression approach.[1] The period of estimation is 1990–2002. We focus on the significance of human capital and social capital.

In addition to a general interest in within-country disparity in the growth literature (e.g., Barro and Sala-i-Martin 1992, Sala-i-Martin 1996), the importance of empirical research on growth disparity in rural areas is apparent in the context of studies on contemporary China. The problem is which regional unit should be chosen as the unit of research. Every regional unit has its own advantages and disadvantages as a unit of study. Most recent studies on regional growth and inequality in postreform China used province-level data (see, for example, Chen and Fleisher 1996, Chen and Wu (2005), Fleisher et al. 2007, Lin and Liu 2000, Yao and Zhang 2001). Several studies such as Jones et al. (2003) and Wei (1993) conducted city-based estimation.

As Jones et al. (2003) argued, city-based analysis is preferable to province-based analysis in order to identify the effects of specific development policies and other politicoeconomic factors on regional growth. In the context of rural development, county (*xian*)-level investigation is equivalent to city-level analysis. This paper, however, focuses on the lowest level of the party/governmental hierarchy; that is, the administrative village

[1] For a discussion of the basic concept of a regional growth regression, see Barro and Sala-i-Martin 1992 and Sala-i-Martin 1996.

(*xingzhengcun,* hereinafter referred to as village).[2] The reason why this paper sets the village as the unit of analysis comes from the results of field research. Researchers who have conducted field surveys in rural China are aware that the place of residence matters very much to the income-generating activities of peasant households, not only at the macro- and micro-region levels but also at the village level. Several previous studies focused on the importance of regional factors at lower levels. Rozelle (1994) examined the determinants of the growth of income disparity among townships in Jiangsu. Knight and Li (1997), based on a village study in the Handan district, Hebei Province, discussed the "cumulative causation" at the village level that affected economic disparity among villages within a micro-region. 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 village level, based on a series of village and household surveys in five provinces. Gustafsson and Ding (2006), using the same data as this paper, compared the socioeconomic conditions of villages where the ethnic minorities live against those of villages where people of Han ethnicity live. They found that the level of industrialization, inputs in agricultural production, and stock of human capital, as well as indicators of path dependency, all affect the economic situation of the ethnic minorities' villages.

It may be claimed that the deepening of marketization in rural China after the 1990s—for example, the development of rural–urban migration and the privatization of Township and Village Enterprises (TVEs)— has weakened the influence of village authority on households'

[2] We conduct a county-based analysis that focuses on the effects of local public finance on regional growth in our future study.

economic activities. At the same time, it may be argued that recent politicoeconomic reforms in rural areas—such as tax reform (abolition of agricultural tax and local levies), the restructuring of the local administrative system (e.g., *cuncaixiangguan zhidu*; that is, budget and fiscal control of township government over administrative villages) and the reform of the household registration system—also weakened the direct influence of the village-level political economy over peasant households. However, village-based analysis is still valid. First, such reforms themselves have occurred in a highly decentralized manner, and there is large regional heterogeneity even at city or county levels. At the same time, part of the reform policies, such as village elections, introduced new sociopolitical heterogeneity at the village level that might influence households' economic behavior. Second, politicoeconomic changes after the 1990s might have redefined the role of village authority, rather than simply reducing its importance. For example, instead of allocating economic resources directly, the village might have become important as an intermediary of outside funds, a representative of the villagers' interests, or a mediator of internal conflicts, which directly and indirectly influences villagers' economic outcomes.

The main data source of this paper is the village data set compiled from the administrative village questionnaire and household questionnaire of the Chinese Household Income Project (CHIP) for 2002 (hereinafter referred to as the 2002 CHIP data set).[3] The 2002 CHIP data set covers 961 administrative villages in 22 provinces. The sampling frame of the CHIP household survey is a subsample of the official annual household survey by the National Bureau of Statistics (NBS). Our village data cover the villages where the NBS's

[3] See Gustafsson et al. (2008) for the sampling frame and the survey methodology of the CHIPS survey.

official sample households live. Most of the data were gathered by asking village officials (party secretary, head of village committee, or village accountant) to fill out the questionnaire by referring to official village statistics.

Regarding the data on village mean income, we collected per capita annual net income of peasant households (*nongmin renjun chunshouru*) for 1990, 1998, and 2002. Table 1 summarizes the village mean income in 2002. The overall average is 2471 yuan, and the averages by the three macro-regions are 3518 yuan for the eastern region, 2068 yuan for the central region, and 1653 yuan for the western region respectively. A large income disparity occurs across macro-regions. This table also shows the decomposition of inequality in village mean income into the within-province and the between-province components. Regarding the overall inequality in village mean income, the share of between-province disparity (60 percent) is larger than that of the within-province inequality (40 percent). However, when we divide the sample villages into three macro-regions, we find that the within-province inequality dominates in the central and western regions: 92 percent and 80 percent respectively. This finding is supportive of our approach of focusing on a lower administrative unit within province.

Table 1 here

The structure of this paper is as follows. In Section 2, following Jones et al. (2003), we provide a framework for a village-based growth regression and estimate the baseline equation. Then in Section 3, we extend the growth equation by employing a social capital variable. Section 4 concludes.

## 2. Baseline growth equation

Jones et al. (2003) estimated a city-based Barro-type growth equation, using average annual growth of real per capita GDP between 1989 and 1999 as the dependent variable. Their baseline estimation employed the following explanatory variables: initial level of income (1989 per capita GDP), population growth (average annual growth rate), investment ratio (average ratios of domestic/foreign investments to GDP), level of human capital (average ratio of senior high school students to total population), initial level of physical infrastructure (highway construction in 1989), and initial level of government expenditure (ratio of city government expenditure to GDP in 1989).

Following Jones et al. (2003), we take two steps in our empirical investigation. As the first step, we estimate a baseline growth equation that employs initial level of income, population growth, initial level of human capital, initial condition of physical infrastructure, and geographical conditions (note that we cannot include physical capital investment rate because of data availability). Then, as the second step, we elaborate our baseline growth equation by employing social capital.

As mentioned above, the period of estimation is 1990–2002. A trimmed data set that contains 870 villages in 21 provinces is used in the following estimations. All the villages of Hunan Province are omitted because data on 1990 income are missing. Villages that were merged with neighboring villages during the 1990s are also excluded. Other deleted observations are because of outliers or missing data in the relevant variables.

Definitions of the variables and descriptive statistics are summarized in Table 2. The dependent variable is annual growth rate of village mean income during the period 1990–2002. Village mean income for 1990 is employed as the measure of the initial level of income. Although the income figures are based on the official village statistics, it can still be claimed

that village mean income might be biased. For 2002, the national average of annual rural household income calculated from the NBS's official household survey was 2476 yuan. This figure is almost the same as the grand average of our sample villages (2471 yuan). For 1990, the grand average of our sample villages in 2002 prices is 1343 yuan. This is also close to the NBS's national average of annual rural household income deflated by the rural CPI (1310 yuan).[4] Because the figures for village mean income were, in principle, collected from village documents, it is safe to say that the data for village mean income for both years are reliable.

However, we should still consider the possible bias in the income data. We make the following two points. First, in order to limit the influence of outliers, we employ robust regression. Specifically, we remove outliers for which Cook's D > 1 and then iteratively select weights for the remaining observations (Hamilton 1991). Second, considering the incentives of local officials, the initial income of lower income regions might have a downward bias because it is politically preferable for village cadres to report higher growth rates. If this is the case, there might be a spurious convergence in regional growth performance. As De Long (1988) argued, the problem of spurious convergence is important in the empirical growth convergence literature. However, because our aim does not involve testing the convergence hypothesis, the possible bias in initial income is not critical for the following discussion.

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[4] See National Bureau of Statistics (2003, 27) for the national average of the annual rural household income for 2002 and 1990. The nominal income for 1990 was 686 yuan. Data on rural CPI (*nongcun jumin xiaofei jiage zhishu*) are collected from the NBS (2003), *China Statistical Yearbook*, Beijing: Zhongguo Tongji Chubanshe.

Table 2 here

In addition to the initial level of income, we employ the following four explanatory variables in the baseline growth regression.

(1) Population growth. This variable controls the negative effect of population growth on income growth in per capita terms. Unfortunately, historical demographic data are only available for 1998. Under the assumption that there is no significant difference between the population growth rate of 1990–2002 and 1998–2002, we use the annual growth rate of population for 1998–2002. We expect a negative coefficient for the population growth rate.

(2) Initial level of human capital. The growth regression literature usually uses the school-enrollment rate to measure human capital investment. Because of data availability, the existing literature on regional growth in China such as Chen and Fleisher (1996), Jones et al. (2003) used the total number of students in senior high school divided by the total population. Because neither the school-enrollment rate nor the total number of students is available, here we employ the average years of education. Specifically, based on the household questionnaire, we estimated the average years of education of the villagers who were of working age (age 16–60) in 1990. We expect a positive coefficient for this human capital variable.[5]

(3) Initial condition of physical infrastructure. The level of infrastructure development at the initial stage will affect subsequent regional growth. As the proxy of the initial state of

[5] It may be claimed that the data on educational level are biased because well-educated villagers are more likely to live away from home. We believe that the censoring of well-educated villagers is not a problem because our data include not only 'resident family members (*changzhu renkou*)' but also 'nonresident family members (*fei changzhu renkou*)'.

physical infrastructure, we employ dummy variables indicating the year the village was equipped with electricity.

(4) Geographical location. We employ dummy variables for plains (*pingyuan*), hilly areas (*qiuling*), and mountainous areas (*shanqu*) as the indicator of geographical advantage. Compared with hilly areas, we expect a positive coefficient for plains and a negative coefficient for mountainous areas.

The estimation results of the baseline growth equation are summarized in Table 3. The first column shows the result of the OLS estimation. The second column reports the results of the robust regression that controls for the effect of outliers. Both sets of results are consistent and suggest that, controlling for population growth, initial level of income, and geographical location, both the initial conditions of physical infrastructure and human capital have expected influences on subsequent income growth. First, the initial level of education has a positive and statistically significant impact on the subsequent growth performance, although the impact is not large. One additional year of a village's average years of education raises the growth rate by approximately a 0.2–0.3 percentage point. Second, the initial condition of physical infrastructure has a large and significant effect on income growth. We assume that the earlier the village was equipped with electricity, the higher the income growth during the 1990s.

Table 3 here

**3. Role of social capital on growth**

As the second step of our empirical research, we extend the baseline estimation by introducing social capital at the village level into the equation.

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, more community activity, and greater use of credit.

It would be interesting to examine whether social capital at the community level exhibits positive externalities in rural China. Given the general context of rural China, 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. Instead, we employ the self-evaluated degree of good social relations within the village as a proxy of social stability at the village level. Following previous research such as Knack and Keefer (1997), Ke and Zhang (2003), we assume a causal link between social stability, higher incentives and lower risks for households' economic activities, and better regional growth performance. Specifically, we utilize two attitudinal questions to heads of households. These questions are: "Do you think that there is a good relationship among households belonging to different villagers' small groups (*cunmin xiaozu*)?" and "Do you think that there is a good relationship among households belonging to different family groups (*jiazu*)?" To measure the social relationship within the village, we categorized the answers into points ranging from five (strongly agree) to one (strongly disagree) and then summed these points to create a scale

with a maximum of 10. Then we took the average scale at the village level (as shown in Table 2, the grand average of the sample villages is 7.568).

Table 4 here

Table 4 reports the estimation results. The first column of the table summarizes the results of the robust regression after adding the social capital variable. It suggests that villages having better social relations were likely to experience higher growth during the 1990s. However, the empirical analysis of social capital inevitably encounters the problem of endogeneity. It should be noted that the measure of village social capital is based on an attitudinal variable representing villagers' perceptions in 2002. Therefore it can be claimed that good social relationships at the village level might be an outcome of income growth, not a cause of growth.

Therefore, we check the endogeneity of the social capital variable by employing the IV method. The second column of Table 4 reports the estimation results of the growth equation using village size (total population in 2002) and the level of "general trust" as instruments. Regarding the measurement of general trust, we utilize another attitudinal question to the heads of households: "Do you agree that, generally speaking, most people cannot be trusted?" According to the answers to this question, we categorized the heads of households into either the "high trust" group ("strongly disagree" or "disagree") and "low trust" group ("strongly agree", "agree", or "do not know/hard to say") and then calculated the percentage of "high trust group" households among all sample households (see Table 2 for summary statistics). By conducting the Durbin–Wu–Hausman test, we find that the null hypothesis (OLS estimator of the same equation would yield consistent estimates, that is, any endogeneity among the regressors would not have deleterious effects on OLS) is rejected at the five

percent significance level, suggesting that the IV method is required. The estimation results of the IV regression also show a positive and significant effect of the relevant social capital variable. Thus, we conclude with some confidence that good social relations within a village have a significant positive influence on income growth.

It is interesting to examine whether the role of social capital differs by the level of economic development. We divided the sample villages into a high-income group and a low-income group by median value of the initial income (per capita income in 1990) and conducted the IV estimations separately for the two groups. Table 5 reports the results. Social capital is found to be insignificant in the high-income group, whereas education is significant in both the high- and low-income groups. This finding is important from the standpoint of public policy for rural development in China. First, it implies that stable social conditions at the local level play a more important role in areas where the overall level of economic development is low and the formal institutional infrastructures (for example, the financial and governing abilities of local government) are supposed to be weak. Second, the finding that the initial level of education equally affects subsequent growth in the high- and low-income groups confirms the significance of recent policy arrangements to raise the quality of education in low-income regions.

Table 5 here

As discussed above, we assume a causal link between stable social conditions and higher incentives for economic activities. To test this link empirically, we examine whether village-level social capital correlates with peasants' microentrepreneurship. Specifically, we ask the heads of households another attitudinal question: "Are you active in adopting new agricultural technology?" The possible answers are three points ("very positive"), two points

("moderately positive"), and one point ("not so positive"). We took the average of the points at the village level and categorized them into a rank variable: three (positive group, average point ≥ 2.5), two (intermediate group, average point ≥ 2 and < 2.5), and one (negative group, average point < 2).[6] We use this rank variable as the dependent variable and conduct a logit regression. Because the dependent variable is ranked but does not follow a natural ranking scheme, we estimate a maximum-likelihood stereotype logistic regression. This method is a compromise between ordered logistic and multinomial logit models and can be utilized when we are unsure of the ordering (Anderson 1984). The focal explanatory variable is the above-mentioned measure of village social relations capital. As controlling variables, we employ the following three village-level variables: educational level (average years of education in 2002), income level (log of per capita annual household income in 2002), and land endowment (per capita arable land and its square term in 2002). It should be noted that income level represents not only the overall level of economic development but also a proxy of villages' industrial/employment structures. Because high-income villages tend to depend less on agriculture, we expect a negative coefficient for this controlling variable.

Table 6 here

Table 6 reports the estimation result. We find, with other factors being equal, that peasants who live in villages where there are good social relations are more likely to have a positive attitude toward new agricultural technology. The coefficients for controlling variables are also reasonable. Educational level has a statistically significant positive effect on the attitude toward new agricultural technology. The significant negative coefficient for

[6] "Do not know/hard to say" is included in the third group.

income level indirectly suggests that peasants are not interested in new agricultural technology where they depend less on agricultural activities. Land endowment has a nonlinear, inverted U-shaped relation to the attitude toward new technology, suggesting that both poor and rich land endowments tend to reduce the incentive to adopt new technology for more intensive production.

## 4. Concluding remarks

This paper, using a simple cross-sectional growth regression framework, examined the determinants of income growth at the village level. The major findings can be summarized as follows. First, we have confirmed the significant positive impact of the initial level of human capital, as well as the initial condition of physical infrastructure, on subsequent growth performance. This is consistent with the previous cross-country/regional growth literature. Second, the estimation result employing social capital suggests that stable social relations at the local level can also promote regional growth. Although the detailed mechanisms that link social capital to growth at the local level are to be investigated in future research, we found that the village-level social capital correlates positively with peasants' microentrepreneurship. Third, regarding the development of lower income regions, our findings suggest that public policy promoting social stability should be strengthened, as well as increasing financial support for rural education and infrastructure construction. More detailed analyses on the political economy at the village level, including the role of local governance and public finance, will be investigated in future research.

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Table 1 Regional disparity of village mean income, 2002

| | Overall | Eastern region | Central region | Western region |
|---|---|---|---|---|
| Village mean income | 2,471 | 3,518 | 2,068 | 1,653 |
| Disparity in village mean income across macro-regions (overall mean = 100) | 100 | 142 | 84 | 67 |
| Disparity of village mean income | | | | |
| Gini coefficient | 0.294 | 0.282 | 0.162 | 0.232 |
| Theil index | 0.143 | 0.128 | 0.041 | 0.086 |
| Decomposition of Theil index by province (%) | | | | |
| Within-province inequality | 40 | 49 | 92 | 80 |
| Between-province disparity | 60 | 51 | 8 | 20 |
| Number of observations | 951 | 346 | 320 | 285 |

*Source*: For this table and the following tables, all data are from the 2002 CHIP village data set.

*Notes*: *Village mean income* is per capita annual net household income in 2002 collected from the village questionnaire. Both the Gini and the Theil measures are weighted by village population in 2002. Ten villages are omitted because of missing data.

Table 2 Data descriptions and summary statistics for baseline and extended estimations

| Variables | Mean | Std. dev. | Description |
|---|---|---|---|
| Dependent variable<br>Annual income growth rate 1990–2002 | 0.056 | 0.043 | Average annual growth rate of village mean income (per capita annual net household income) in 2002 yuan inflated by the rural CPI at the national level |
| Explanatory variables for baseline estimation | | | |
| Initial level of income | 1343.30 | 880.35 | Village mean income in 1990 (in 2002 yuan deflated by the rural CPI) |
| Population growth | 0.005 | 0.014 | Average annual rate of population growth 1998–2002<br>(population data for 1990 not available) |
| Initial level of human capital | 6.437 | 1.287 | Estimated average years of education of working population in 1990 (estimated based on the household questionnaire) |
| Initial condition of physical infrastructure | 0.277 | | Answers by village cadres (not based on official records) |
| Equipped with electricity before 1969 | | | |
| Equipped with electricity in 1970–79 | 0.350 | | |
| Equipped with electricity in 1980–89 | 0.263 | | |
| Equipped with electricity after 1990 | 0.110 | | |
| Geographical location | | | Location based on NBS's official geographical categories |
| Mountainous areas | 0.206 | | |
| Hilly areas | 0.289 | | |
| Plains | 0.505 | | |
| Explanatory variables and instruments for extended estimation | | | |
| Social capital (good social relations at the village level) | 7.568 | 1.009 | Heads of households' evaluation of the degree of good social relations within the village (points ranging from 0 to 10) |
| General trust | 62.561 | 28.663 | Indicator of general trust of heads of households |
| Village size | 1825.56 | 1181.55 | Total population in 2002 |
| Number of observations | 870 | | |

*Notes*: Because of missing data, the number of observations for the growth regression and relating empirical analyses is 881. All the villages of Hunan province are omitted because the data of village mean income for 1990 are missing.

Table 3 Baseline growth regression, 1990–2002

| *Dependent variable*: Annual growth rate of village mean income 1990–2002 | (1) OLS | (2) Robust regression |
|---|---|---|
| Population growth | –0.239 | –0.271 |
| | (2.93)*** | (3.39)*** |
| Initial level of education | 0.004 | 0.004 |
| | (4.26)*** | (3.80)*** |
| Log of initial income | –0.047 | –0.048 |
| | (23.41)*** | (24.23)*** |
| Equipped with electricity in 1970–79 | –0.008 | –0.010 |
| | (2.81)*** | (3.31)*** |
| Equipped with electricity in 1980–89 | –0.016 | –0.014 |
| | (4.75)*** | (4.34)*** |
| Equipped with electricity after 1990 | –0.023 | –0.023 |
| | (5.11)*** | (5.18)*** |
| Mountainous area | –0.007 | –0.007 |
| | (2.19)** | (2.10)** |
| Plains | 0.008 | 0.009 |
| | (2.94)*** | (3.36)*** |
| Constant | 0.369 | 0.375 |
| | (23.75)*** | (24.23)*** |
| Number of observations | 870 | 870 |
| Adjusted R-squared | 0.386 | 0.404 |
| F statistic (8, 861) | 69.39 | 74.64 |
| Prob. > F | 0.000 | 0.000 |

*Notes*: Omitted variables are equipped with electricity before 1969 and hilly areas. Absolute value of t statistics in parentheses. * denotes statistically significant at the 10% level; ** at the 5% level; and *** at the 1% level respectively.

Table 4 Growth regression with social capital (robust regression and IV)

| *Dependent variable*: Annual growth rate of village mean income 1990–2002 | (1) Robust regression | (2) IV estimation |
|---|---|---|
| Population growth | –0.268 | –0.237 |
| | (3.35)*** | (2.63)*** |
| Initial level of education | 0.003 | 0.003 |
| | (3.72)*** | (3.10)*** |
| Log of initial income | –0.048 | –0.049 |
| | (24.29)*** | (20.03)*** |
| Equipped with electricity in 1970–79 | –0.009 | –0.008 |
| | (3.24)*** | (2.41)** |
| Equipped with electricity in 1980–89 | –0.014 | –0.015 |
| | (4.25)*** | (4.15)*** |
| Equipped with electricity after 1990 | –0.023 | –0.028 |
| | (5.30)*** | (5.02)*** |
| Mountainous area | –0.007 | –0.004 |
| | (2.02)** | (1.10) |
| Plains | 0.009 | 0.007 |
| | (3.29)*** | (2.29)** |
| Social capital at the village level | 0.002 | 0.018 |
| | (1.94)* | (2.02)** |
| Constant | 0.361 | 0.250 |
| | (21.39)*** | (4.10)*** |
| Number of observations | 870 | 870 |
| Adjusted R-squared | 0.405 | |
| Centered R-squared | | 0.250 |
| F statistic | (9, 860) 66.67 | (9, 859) 50.37 |
| Prob. > F | 0.000 | 0.000 |
| Test of endogeneity | | 4.125 |
| Durbin–Wu–Hausman chi square test | | (p = 0.041) |
| Test of overidentification | | 0.188 |
| Sargan statistic | | (p = 0.665) |

*Notes*: Instrumented variable is social capital at the village level, instruments are the measure of general trust and village size. Absolute value of t statistics in parentheses. * denotes statistically significant at the 10% level; ** at the 5% level; and *** at the 1% level respectively.

Table 5 Comparison of high and low income groups (IV estimation)

| *Dependent variable*: Annual growth rate of village mean income 1990–2002 | (1) High income villages | (2) Low income villages |
|---|---|---|
| Population growth | –0.221 | –0.109 |
| | (0.11) | (0.61) |
| Initial level of education | 0.002 | 0.004 |
| | (1.78)* | (1.93)* |
| Log of initial income | –0.035 | –0.062 |
| | (7.66)*** | (8.88)*** |
| Equipped with electricity in 1970–79 | –0.003 | –0.017 |
| | (0.96) | (2.33)** |
| Equipped with electricity in 1980–89 | –0.013 | –0.020 |
| | (3.19)*** | (2.61)*** |
| Equipped with electricity after 1990 | –0.009 | –0.042 |
| | (1.19) | (3.98)*** |
| Mountainous area | 0.006 | –0.013 |
| | (1.25) | (1.94)* |
| Plains | 0.011 | –0.007 |
| | (3.24)*** | (0.89) |
| Social capital at the village level | 0.001 | 0.035 |
| | (0.11) | (1.97)* |
| Constant | 0.272 | 0.218 |
| | (4.63)*** | (1.79)* |
| Number of observations | 438 | 432 |
| Adjusted R-squared | | |
| Centered R-squared | 0.160 | 0.218 |
| F statistic | (9, 427) 9.00 | (9, 421) 13.24 |
| Prob. > F | 0.000 | 0.000 |
| Test of endogeneity | 0.000 | 6.139 |
| Durbin–Wu–Hausman chi square test | (p = 0.990) | (p = 0.013) |
| Test of overidentification | 0.178 | 0.001 |
| Sargan statistic | (p = 0.673) | (p = 0.971) |

*Notes*: Instrumented variable and instruments are the same in Table 4. Sample villages are divided into two groups by the median of the initial income (per capita income in 1990). The absolute value of t statistics in parentheses. * denotes statistically significant at the 10% level; ** at the 5% level; and *** at the 1% level respectively.

Table 6 Determinants of attitude toward new agricultural technology (stereotype logit regression)

| *Dependent variable*: Rank variable ranges from 3 (very positive) to 1 (not positive) indicating heads of households' self-evaluated attitude toward new agricultural technology | |
|---|---|
| Social capital at the village level | 0.801 |
| | (6.95)*** |
| Initial level of education | 0.137 |
| | (1.70)* |
| Log of village mean income 2002 | –0.455 |
| | (2.34)** |
| Per capita land endowment | 0.387 |
| | (2.82)*** |
| Square term of per capita land endowment | –0.030 |
| | (1.98)** |
| Number of observations | 859 |
| Wald chi squared (Prob. > chi squared) | 68.24 (0.000) |
| Log likelihood | –804.476 |

*Notes*: Absolute value of z statistics in parentheses. * denotes statistically significant at the 10% level; ** at the 5% level; and *** at the 1% level respectively.