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Grassroots Democracy and Income Distribution:  
Evidence from Village Election in China\*

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\* We thank Abhijit Banerjee, Samuel Bowles, Esther Duflo, Justin Lin, John Strauss, Xiaobo Zhang, and participants of the conference “Liberalization experiences in Asia: A normative appraisal”, January 12-13, 2006, Delhi for their valuable comments. We also thank Dwayne Benjamin, Loren Brandt and John Giles for their generosity to share with us part of their data. Mengtao Gao, Ang Sun, Shuna Wang, and Shenwei Zhang provided excellent research assistance. We are grateful for financial supports from the Chinese Medical Board and the National 211 Projects Fund and thank the excellent data collection efforts provided by the Research Center of Rural Economy, the Ministry of Agriculture, People’s Republic of China.

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# Grassroots Democracy and Income Distribution: Evidence from Village Election in China

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**Abstract.** Using village and household survey data collected from 48 villages of eight Chinese provinces for the period 1986 – 2002, this paper studies how the introduction of village election affects income distribution at the village level. We estimate both a static fixed-effect panel model and a dynamic panel model and take care of the endogeneity of the election. The result of the dynamic panel model shows that election has a direct (marginal) effect to reduce the within-village Gini coefficient by 0.033, or 11.8% of the sample average. We also find in dynamic panel models that election does not increase the level and the progressiveness of net transfer income received by households. On the other hand, we find that election increases per-capita public investment. So election's positive role in reducing income inequality is not caused by pro-poor income redistribution, but by more public investment.

Keywords: grassroots democracy    income distribution    dynamic panel model

JEL classification: D63, D72, H41

## 1. Introduction

Democracy could reduce income inequality for two reasons. One is that democracy leads the government to cater to the interests of the median voter who in general prefers redistribution of income (Alberto Alesina and Dani Rodrik, 1994; Roland Benabou, 1996). The other is that democracy presses the government to spend more on public facilities that enhance the income capability of the poorer. Existing studies using country-level data have not provided conclusive results, though.<sup>1</sup> This paper adds onto the literature by providing a test using micro-level data collected on grassroots democracy in rural China. One problem with cross-country studies is that the function of democracy depends on a country's social settings and other institutional arrangements, but cross-sectional regressions tend to ignore those factors. Since grassroots democracy operates within the same institutional framework and roughly the same set of social settings, a micro-level study has an advantage over cross-country studies. To our knowledge, ours is the first study attempting to test the relationship between democracy and income distribution using micro-level data.

Existing evidence suggests that grassroots democracy raises the responsiveness of the local government and leads to pro-poor policies at the local level. Raghavendra Chattopadhyay and Esther Duflo (2004) found that the election of a woman village head in Indian villages had led to the introduction of pro-woman policies. Andrew Foster and Mark Rosenzweig (2001) found that village election in India had increased local governments' investment in road building and reduced their investment in irrigation facilities. They interpreted this finding as evidence for a pro-poor policy because irrigation benefited landlords and building roads provided jobs to the landless. Xiaobo Zhang, Shenggen Fan, Linxiu Zhang, and Jikun Huang (2004) found that village election increased the share of public investment in village expenditures using a sample from Jiangsu province, China. Li Gan, Colin Xu, and Yang Yao (2005a,

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<sup>1</sup> For a recent and comprehensive study, see Branko Milanovic and Yvonne Ying (2001) and the references therein.

2005b) further found that village election helped to reduce the negative impacts of health shocks on farmers' income and strengthen farmers' consumption smoothing capabilities. All these findings suggest that grassroots democracy could function to reduce income inequality at the local level. Nevertheless, they do not provide direct evidence for the strength of that relationship, nor do they tell us the channel by which democracy improves income equality. On the other hand, decentralization associated with grassroots democracy could also lead to elite capture as it makes it easier for local elites to dominate the local politics (Pranab Bardhan and Dilip Mookherjee, 2005), so it is theoretically unclear whether income distribution would be unequivocally improved by grassroots democracy.

Our test makes use of a unique panel dataset with a sample of 48 villages from 8 Chinese provinces for the period 1986-2002. China began to experiment village election in 1987 and enacted *The Organic Law of Village Committees (OLVC)* to formalize it in 1998. Since then, almost all the villages have held at least one election. In the meantime, income inequality rose from 0.29 in 1987 to 0.35 in 2000 in rural China (Carl Riskin, Renwei Zhao, and Shi Li, 2002). Our data thus cover a critical period of both election and income distribution. To avoid the complexities arising from political cycles, we focus on the effects of the introduction of the first election. We estimate both a static fixed-effect panel model and a dynamic panel model to pin down them. We also deal with the endogeneity of election with the IV method. The result of the dynamic model shows that in the short run, the introduction of election has a direct (marginal) effect of reducing the village Gini coefficient by 0.033, or 11.8% of the sample average of 0.28. This effect is very strong against the background of rising income inequality in the sample period. Moreover, we estimate several dynamic panel models to study the effects of election on net income transfer and public investment. Based on household-level data, we find that election does not affect the amount of net income transfer received by the average household, nor does it increase the progressiveness of the transfer. On the other hand, we find that election increases the level of per-capita public expenditures at the village level. We further

find with household data that election reduces the amount of total income transfer received by the average household. Since transfer income and public investment are the only two components of public expenditures, this means that election increases public investment. These findings suggest that election improves income distribution not by more redistribution of income, but by more public investment.

The rest of the paper is organized as the follows. Section 2 provides a brief introduction to village election in China. Section 3 introduces the data and some key descriptive results. Section 4 presents the main results concerning the impact of election on income distribution. Section 5 is comprised of two parts. The first part studies the effects of election on net income transfer using household level data, and the second part studies the effect of election on public investment. Section 6 concludes.

## **2. A brief introduction to village election in rural China**

The Chinese commune system was dissolved in the early 1980s. The commune as an administrative unit was replaced by the township, and the production brigade under the commune was replaced by the village committee (VC). The 1982 Constitution defines the village committee as a self-governing body of the villagers (Clause 111). However, committee members had been appointed rather than elected except in a few localities. In 1987, under the leadership of chairman Wan Li, the National People's Congress (NPC), the Chinese legislative body, passed a tentative version of the OLVC that required the village committee be elected. This law triggered elections in Chinese villages. By 1994, half of the Chinese villages had begun elections. By 1997, 25 of the 31 mainland provinces had adopted a local version of the law, and 80% of the villages had begun elections (Ministry of Civil Affairs, 1998). In 1998, the formal version of the OLVC was passed by the NPC and election has since spread quickly to almost all the villages.

The VC is comprised of three to seven members depending on the size of the village. The core members are the chairman, vice chairman, and accountant. Before 1998, candidates for the chairman were usually appointed by the township government although popular nomination, a mixture of government appointment and popular nomination, and nomination by villager representatives also existed. The formal version of the OLVC requires that candidates be nominated by villagers, and the minimum number of villagers to propose a candidate is ten. A primer, then, is held to reduce the number of candidates to two, and the formal contest is run between these two frontrunners. This version of election is popularly called *hai-xuan*. Since 1998 *hai-xuan* has become more popular. The term of the committee is three years but no term limit is required.

Village election in China operates in a weak institutional environment. In a typical village, the elected VC faces two major challenges that may hinder its ability to serve the wills of the villagers. The first is its relationship with the communist party committee in the village. Despite the fact that the party committee is not popularly elected, the OLVC stipulates that the VC work under the leadership of the party committee, reflecting the nature of China's one-party system. Since he/she is appointed by the higher authority, the party secretary often pursues a different agenda than the VC's. Backed by popular votes, however, the chairman of the VC often defies the direction of the party secretary, but the result of the contest is not always in his favor (Jean Oi and Scott Rozelle, 2000; Zhenglin Guo and Thomas Bernstein, 2004). To reconcile the conflicts between the VC and the party secretary, the central government has begun to encourage the latter to run for the VC chairman in elections. While this will ease the tension inside the village ( Guo and Bernstein, 2004), the VC still needs to face a second challenge that comes from above. Since village election operates in an authoritarian institutional environment, where the upper-level governments, the township and county governments in particular, are not elected and often intrude in village election and other village affairs, its effectiveness to serve the wills of the villagers has been called in doubt. Evidence does show that informed local

people tend not to trust election. For example, in a survey conducted in Fujian province, Yang Zhong and Jie Chen (2002) found that it was the villagers who had low levels of internal efficacy and democratic values that were more likely to participate in an election, and those with higher levels of internal efficacy and democratic orientation staid away from election due to their awareness of the institutional constraints placed on it.

The above two challenges raise the question as to whether election would enhance the VC's accountability to the local population. This question is compounded by the possibility of elite capture inside the village. Bardhan and Mookherjee (2005) found in India that decentralization could lead to elite capture at the local level if the financing of public goods provision was not properly designed. In the context of the Chinese village, rising business elites have been frequently found to dominate the village election (Yigao Liu, Xiaoyi Wang, and Yang Yao, 2001). Although there are not *a priori* reasons to believe that business elites would necessarily steer the VC to adopt pro-rich policies, this belief lingers within the Chinese academia and policy circles.

### **3. Data and descriptive analysis**

Our data come from two sources. One is the Fixed-Point Survey (FPS) maintained by the Research Center of Rural Economy (RCRE), the Ministry of Agriculture, and the other is a retrospective survey conducted by ourselves in the spring of 2003. The FPS started in the early 1980s and has maintained a survey frame of about 320 villages and 30,000 households in all Chinese continental provinces. It collects detailed village- and household-data covering a wide range of information. A nice feature of it is that it surveys 50 – 100 households in a village so the calculation of the Gini coefficient can be carried out with reasonable accuracy. We obtained data of 48 villages in 8



provinces for the period 1986-2002 for this study.<sup>2</sup> Data for 1990, 1992, and 1994 are missing, because RCRE did not manage to do the survey in those three years. We use the average of the nearby two years to make up the missing data in our analysis. The 8 provinces are, from south to north, Guangdong, Zhejiang, Hunan, Henan, Sichuan, Gansu, Shanxi, and Jilin. They cover diverse geographic settings and income levels. The 2003 retrospective survey provides information on village elections in the 48 villages. Detailed questions were asked on the history of election in those villages.

### ***Village election***

Except a few interruptions, our sample villages had held election every three years as long as they had started it. So the introduction of the first election is the key. Figure 1 presents the number of election villages and their accumulative percentage in each year. The year 1987 was the start of village election in China. Twelve villages in our sample had their first election in that year. Except Hunan and Guangdong, all the other six provinces had villages holding elections in that year. By the early 1990s, half of the sample villages had had at least one election. However, a rich province, Guangdong, had not started election until 1999.<sup>3</sup> By 2003, there were still two villages in Gansu, the poorest province in the sample, that had not started election. Therefore, there existed great regional and time variations in the introduction of the first election. In particular, high-income and low-income villages were mixed in terms of the timing of the first election. The introduction of election is an irreversible process, so if the timing of the first election were closely associated with the income level, it would be hard to distinguish between the true effects of election and the

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<sup>2</sup> There is a panel structure in the FPS, but it is not explicitly recorded. One major objective of the 2003 survey was to obtain household panel data. To reconstruct the panel structure, we had to use household characteristics to match households over time. Villages with a small number of matched households were then dropped in the survey. As attritions thus created were likely to be random, we treat the remaining 48 villages as a random sample.

<sup>3</sup> Guangdong did not have village committee before 1998, but instead managed the village by a representative office of the township. That is why it did not have village election before 1999.

effects of income. The mixed nature of our data renders away this possibility.

[Figure 1 about here]

### ***Trends of income distribution***

We use the Gini coefficient to describe income distribution in a village. Income is per-capita household net income provided by the FPS household survey. Household net income is defined as household income (earned income and net transfer from the government) net of operational costs. We have converted it into 2002 yuan using the rural CPI published in *China Statistical Yearbook*. We calculate the Gini coefficient for each village in each year. To take care of possible biases caused by household size, we weigh the calculation by household size, that is, we enter a household in the calculation by the number of its members. Figure 2 plots the average Gini coefficients of the 48 villages during 1987 – 2002 (we do not have household income data for 1986). We have made up the figures for 1990, 1992, and 1994 with the averages of the nearest two years. There is apparently an increasing trend of income inequality in the study period. The Gini coefficient rose from 0.26 in 1987 to 0.28 in 1992, and then to 0.32 in 2001, and 0.31 in 2002. Using data of nine provinces from the FPS survey (seven overlap with our provinces), Dwayne Benjamin, Loren Brandt, and John Giles (2005) have carefully documented the evolution of income inequality in rural China. In addition to using the rural CPI to deflate the income, they also provided spatially deflated estimates. Figure 3 provides the histograms of our estimates of the Ginis in 1987, 1999, and 2002. They largely agree with the histograms provided by Benjamin, Brandt, and Giles (2005) except minor differences,<sup>4</sup> and show that income

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<sup>4</sup> Benjamin, Brandt, and Giles (2005) study the period 1987-1999 and provide histograms for 1987 and 1999. Our distributions are slightly skewed toward the higher end than their distributions. For example, the modes of their 1987 and 1999 distributions are about 0.18 and 0.21, respectively, whereas ours are 0.23 and 0.25, respectively. However, our distributions and their distributions also share some commonalities. For example, the mode is smaller than the median and the mode moved by about the same amount from 1987 to 1999 in both our and their distributions. The number of villages in our sample is about half of their sample, so these differences and similarities are in acceptable range.

distribution was becoming more unequal. In particular, the distribution of 2002 clearly dominates the distribution of 1987 by the first-order stochastic domination.

[Figures 2 and 3 about here]

It is understandable that our estimates of the Gini coefficient are smaller than the estimates for the whole country. At the national level, the rural Gini coefficient increased from 0.29 in 1987 to 0.35 in 2000 (Riskin et al., 2002). However, the growth rate of the Gini in our sample was quite close to that at the national level: it grew by 0.05 in 15 years in our sample and grew by 0.06 in 13 years at the national level.

### *Endogeneity of election*

One important issue for this paper to consider is the timing of the first election. After the central government put the OLVC in experiment in 1988, provinces began to enact local laws to specify the details of the implementation of the law. However, the adoption of election in the villages was not uniform. Table 1 presents the year for each sample province to adopt the OLVC and the median and standard deviation of the year of the first election in its villages. Except in Gansu, the median year of election was close to the year when a province adopted the OLVC, and the standard deviation was small in most provinces although Henan, Gansu, and Shanxi had large ones.<sup>5</sup> This shows that at least in some provinces local initiatives played a role in starting election in a village, which raises the possibility that the introduction of election was endogenous. To address this issue, we will find instruments for election and perform two-stage estimation for it.

[Table 1 about here]

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<sup>5</sup> Notice that in Hunan, Henan, Sichuan, and Jilin, the median year of election was earlier than the year of adopting the OLVC. It seems that these provinces waited after some experiments to provide the implementation details of the law.

#### 4. Impacts of election on income inequality

##### *Econometric models*

The baseline model that we are going to estimate for the impact of election on income inequality is the following panel model with village and year specific effects for the  $i$ th village:

$$(1) \quad G_{it} = \alpha E_{it} + x_{it}\beta_1 + w\beta_2 + \alpha_i + e_{it}, \quad t = 1, \dots, T,$$

where  $G_{it}$  is the Gini coefficient of village  $i$  in year  $t$ ,  $E_{it}$  is a dummy variable indicating the introduction of the first election (that is, it equals 0 for years before the first election was introduced in a specific village, and equals 1 for the year of the first election and all the subsequent years),  $x_{it}$  is a  $k \times 1$  vector of village variables that may or may not be subject to the influence of village election,  $w$  is a  $T \times 1$  vector of the village-invariant and time-specific effects,  $\alpha_i$  is the time-invariant and village-specific effect for village  $i$ ,  $e_{it}$  is the error term,  $T$  is the number of years covered by our data, which is 16, and  $\alpha$ ,  $\beta_1$ , and  $\beta_2$  are parameters to be estimated. This model can be estimated by the standard linear panel technique.

The fixed-effects estimator for model (1) allows us to control for the endogeneity of election caused by the correlation of election with  $\alpha_i$ , but it does not control for the endogeneity stemming from the correlation of election with unobserved time-variant village characteristics in  $e_{it}$ . For example, the timing of election may be affected by the level of contests within a village that is linked with income distribution. To account for this kind of possibilities, we will find instruments and use the two-stage panel method to estimate equation (1) again. For future reference, we present the first-step equation here

$$(2) \quad E_{it} = z_{it}\delta + \eta_i + v_t + \varepsilon_{it}, \quad t = 1, \dots, T,$$

where  $z_{it}$  represents all the instrumental variables for  $E_{it}$ ,  $\eta_i$  denotes the unobserved village-specific effect for village  $i$ ,  $v_t$  denotes the year-specific effect for year  $t$ ,

and  $\varepsilon_{it}$  is the independent identically distributed error term.

The Gini coefficient may exhibit persistence over time as it is unlikely to change radically over a short period of time. To account for this kind of path dependence, we will also estimate the following dynamic panel model with unobserved village specific effects

$$(3) \quad G_{it} = \gamma G_{it-1} + \alpha E_{it} + x_{it} \beta_1 + w \beta_2 + \alpha_i + e_{it}, \quad t = 2, 3, \dots, T,$$

where  $G_{it-1}$  is the lagged Gini and  $\gamma$  is the parameter associated with it and  $w$  now is a  $(T-1) \times 1$  vector of year dummies. To consistently estimate all the parameters in (3), one needs to take into account the dynamic structure of the model as well as controlling for the unobserved village specific effects. To that end, we difference (3) to eliminate the unobserved village specific effects,

$$(4) \quad \Delta G_{it} = \gamma \Delta G_{it-1} + \alpha \Delta E_{it} + \Delta x_{it} \beta_1 + \Delta w \beta_2 + \Delta e_{it}, \quad t = 3, \dots, T.$$

In this paper we use the GMM proposed by Manuel Arellano and Stephen Bond (1991) and Stephen Bond (2002) to estimate model (4).

To handle the endogeneity of election in the dynamic model, let  $\Delta \hat{E}_{it}$  and  $\Delta \hat{\varepsilon}_{it}$  denote the first-order differences of the predicted values for  $E_{it}$  and  $\varepsilon_{it}$  in equation (2), respectively. We then replace  $\Delta E_{it}$  in equation (4) by  $\Delta \hat{E}_{it} + \Delta \hat{\varepsilon}_{it}$  to get

$$(5) \quad \Delta G_{it} = \gamma \Delta G_{it-1} + \theta \Delta Q_{it} + \Delta v_{it}, \quad t = 3, \dots, T,$$

where  $\theta = [\alpha, \beta_1', \beta_2']$ ,  $\Delta Q_{it} = [\Delta \hat{E}_{it}, \Delta x_{it}, \Delta w]$ , and  $\Delta v_{it} = \alpha \Delta \hat{\varepsilon}_{it} + \Delta e_{it}$ . This equation can then be estimated by the GMM.

The validity of the GMM estimator rests on three assumptions: the dependent variable is stationary; the error term is serially uncorrelated; and the moment conditions for the validity of the GMM estimator are satisfied.

As discussed by Richard Blundell, Stephen Bond, and Frank Windmeijer (2000) and Michael Binder, Cheng Hsiao, and M. Hashem Pesaran (2005), the first-difference GMM estimator breaks down in the case of a unit root dependent variable. To see whether the Gini series is stationary, we will perform the Levin-Lin-Chu (LLC) panel unit root test as proposed in Andrew Levin, Chien-Fu Lin, and Chia-shang Chu (2002). One can view this test as a pooled Augmented Dickey-Fuller (ADF) test when lags are included, with the null hypothesis of nonstationarity (I(1) behavior). Compared with other panel unit root tests proposed in the literature, this test is suitable for the current dataset for several reasons. First, it is designed for panel data of moderate sample size like ours. Second, the test allows more general specifications of the dependent variable. In our context, the LLC test assumes that the Gini series for each village shares the same AR(1) coefficient, but allows for individual effects, time effects and possibly a time trend. Serial correlation in the error term is also allowed. Finally, the LLC test has the nice feature that the proposed t-star statistic is distributed standard normal under the null hypothesis of nonstationarity so that it is very convenient to make inference.

If the level error terms for equations (4) and (5) are serially correlated, the GMM estimator will no longer provide consistent estimates. Since the first-differenced error terms  $\Delta e_{it}$  and  $\Delta v_{it}$  have a first-order moving average form of serial correlation if the assumption that  $e_{it}$  and the underlying level error term of  $\Delta v_{it}$ ,  $v_{it}$  are serially uncorrelated is correct. Therefore, if the error terms  $e_{it}$  and  $v_{it}$  are serially uncorrelated, the first-differenced error terms  $\Delta e_{it}$  and  $\Delta v_{it}$  should have significant first-order serial correlation and insignificant second-order serial correlation. Following this idea, Bond (2002) provides the  $m_1$  and  $m_2$  test statistics for the GMM estimator. In this paper we will use these two test statistics to test whether  $e_{it}$  and  $v_{it}$  are serially correlated.

Finally, to test the moment conditions, we use the standard GMM test of

overidentifying restrictions, or the Sargan test. Under the null that the moment conditions are valid, the Sargan statistic has an asymptotic chi-square distribution. Because the number of total instruments is different in difference estimations, in this paper we provide the p-value of each of the Sargan statistic.

### ***Control variables***

We have included in  $x_{it}$  per-capita income, its square, village population (in logarithm), and the coefficients of variation of household size, average education of household adult members, household per-capita landholding, and number of wage earners in a household. Per-capita income and its square are included to capture the Kutznetz curve. Village population is included to control for the possibility that the Gini coefficient is linked to village size (for example, households in a larger village tended to be more heterogeneous so income inequality could be higher). The four CVs are included to control village variations along multiple dimensions of income sources and intra-household distribution. Supposedly, the Gini coefficient would become larger as the households become more dispersed along these dimensions. Descriptive statistics of the variables as well as the Gini coefficient and the election dummy are provided in Table 2.

[Table 2 about here]

Some further discussions about the control variables are warranted for their relationship with the estimation of the effect of election. Supposedly, election can reduce income inequality in two broad ways. One is the direct way in which the elected village committee either increases income transfer to the poor or invests more in pro-poor public projects. The other way is indirect and may be specific to the Chinese reality. After the rural reform began at the end of the 1970s, the Chinese land tenure has become a two-tier system in which land is legally owned by the village but farmed by individual farmers. The village has the right to redistribute land periodically in response to demographic changes so land distribution can be

maintained at a relatively egalitarian manner (Xiaoyuan Dong, 1996). Therefore, one source of election's positive effect in reducing income inequality could be that the elected village committee redistributes the village land to the advantage of the poor. Another source could be that the elected village committee raises the education of the poor, and a third source could be for the committee to spend more resources to generate jobs for the poor. By including the CVs of landholding, adult education, and the number of wage earners, our econometric models provide an estimate for the direct (marginal) effect of election. For a comparison, however, we will also estimate the model by taking out all the control variables. This will give us the estimate for the gross effect of election, that is, the sum of its direct and indirect effects.

### ***Instruments***

For the IV estimation of both the static and dynamic models, we find three instruments for the election dummy: a dummy indicating whether a province has adopted the national election law, the number of surnames and the percentage of population of the largest surname in a village. While the use of the first variable is self-evident, some explanations are needed for the last two variables. Families sharing the same surname belong to the same lineage and thus share a common interest to some extent. When the number of surname is large, contest of interests could become more intensified so the demand for election becomes higher. On the other hand, the dominance of a single surname would defuse the need for election as people in the village tend to share the same interests from the beginning. While risk and income sharing happens within a surname, it is unlikely that this kind of sharing could be strong enough to change the income distribution in a village. Zhang et. al (2004) also used these two variables of surnames as instruments for the first election. We improve upon their work by adding a province's adoption of the election law as another instrument. Since the distribution of surnames does not change in a meaningful way over time, we interact the two variables of surnames with the provincial adoption



dummy and use them together with the latter in the first-stage regressions. This gives us the advantage to do the first-stage regressions also using the two-way fixed-effect model.

The correlation coefficients between the election dummy and the dummy for a province's adoption of the election law, the number of surnames, and the share of population of the largest surname are 0.701, 0.165, and -0.185, respectively, and are all significant at the 1% significance level. The correlation coefficients between the election dummy and the two interaction terms that are actually used as IVs together with the adoption dummy, are 0.314 and 0.441 and are both significant at the 1% significance level. However, none of the three instrumental variables are significantly correlated with the village Gini coefficient. Therefore, they are reasonable instruments.

### ***Empirical results***

The results of the static models are presented in Table 3. The number of observations is 723 after observations with missing data are dropped. We run four regressions. Regressions (1) and (2) treat election as exogenous and estimate its total and direct effects, respectively, and regressions (3) and (4) estimate the two effects again, but treat election as endogenous. Regression (1) shows that election reduces the Gini coefficient by 0.016, and the effect is significant at the 1% significance level. However, regression (2) finds that the effect of election is highly insignificant. This shows that there are significant correlations between election and the control variables. These correlations are either a result of the interaction between election and the control variables or a result of their correlations to some common uncontrolled factors. It seems that the second possibility is more plausible because by using IVs for election, regressions (3) and (4) show that the total and direct effects of election are both significant at the 1% significance level. Regression (3) shows that the gross

effect is  $-0.088$ , and regression (4) shows that the direct effect is  $-0.077$ .

[Table 3 about here]

Among the control variables, income and its square are significant in regression (2) and their signs are consistent with the Kutznetz curve. However, this is not shown in regression (4) when election is treated as endogenous. Except this result, regressions (2) and (4) produce qualitatively similar results for other control variables. Village population and the CVs of household size and number of wage earners are significant and increase the Gini, but other variables are not significant.

[Table 4 about here]

For the dynamic models, we first perform the LLC panel data unit root test for the Gini series. Table 4 provides the test statistics under different hypothesis. From this table we observe that no matter what assumptions we put for the data generating process, the null of nonstationarity is rejected at the 1% significance level.

[Table 5 about here]

The estimation results of the dynamic models are presented in Table 5. As in the case of the static models, regressions (1) and (2) treat election as exogenous, and regressions (3) and (4) treat election as endogenous; regressions (1) and (3) estimate the gross effect of election, and regressions (2) and (4) estimate its direct effect. Since all the  $m_1$  and  $m_2$  statistics indicate that the first-differenced error term has significant first-order serial correlation but no significant second serial correlation, the null of no serial correlations for the level error terms is not rejected. In addition, the Sargan statistic gives a p-value of 1 for all the four specifications, indicating that the over-identifying restrictions are not rejected. Together with the rejection of nonstationarity, these two test results indicate that our model specification is appropriate.

As for the estimation results, lagged Gini always has a significant coefficient, indicating that there exists path-dependence in the series of Gini. Election is shown not to affect income distribution when it is treated as exogenous, but to significantly reduce the Gini coefficient when it is treated as endogenous. The gross effect is

smaller than the direct effect indicating that some of the indirect effects cancel each other. The average Gini increased by 0.05 in our sample period of 15 years, but the direct effect reduces the Gini by 0.033, or 11.8% of the sample average of 0.28, and the gross effect reduces the Gini by 0.027, or 9.6% of the sample average. At the steady state of the Gini, the gross effect of election is to reduce the Gini by 0.033 ( $0.027/(1-0.403)$ ), and the direct effect of election is to do so by 0.052 ( $0.033/(1-0.368)$ ). These are large effects, but their magnitude should be weighed against the steady-state value of the Gini. Income inequality is still rising in rural China and is unlikely to stabilize in a short period of time. So it is premature to judge the relative magnitude of election's long-term effect on income inequality. For now, we are more confident in its short-run effect.

## **5. Sources of election's positive effect on income equality**

In the last section we showed that election reduces income inequality after a reasonable range of variables were controlled for. That is to say, election has a significant direct effect on income distribution. As we discussed before, the direct effect could come from two possible sources. One is for the village to engage in more pro-poor income transfer, and the other is to increase public investment that would help the poor to benefit more. The first kind of action is detrimental to economic growth (Alesina and Rodrik, 1994), but the second kind may help growth. In particular, if it is not financed by more taxes but by reallocation within government budget from consumption to investment, public investment has a much larger chance to help growth. However, the NFS does not provide information on public investment. Instead, it provides information on village public expenditures. Public expenditures include three items: income transfer to households, spending on local public services such as schools and village clinics, and investment in productive projects such as roads and irrigation. The first item is income redistribution, and the other two items are public investment. NFS does not provide village-level information on these specific items. However, its household survey provides information on the amount of

fees that a household pays to the village and the amount of income that a household receives from the village.<sup>6</sup> Fees are collected by the village to finance village affairs, including the operational costs of the village committee and public expenditures.

Using the available village and household-level information, we form a strategy to test whether election has improved income distribution by more redistribution of income or by more public investment. We will first study how village election changes the amount of net income transfer that a household gets from the village. Net income transfer is defined as the amount of transfer income minus the amount of fees. If election does not affect its level and progressiveness, we know that the improvement of income equality is not caused by more income redistribution. Next we will study village election's impact on public investment. This amounts to studying election's impacts on public expenditures and total income transfer. If election increases the former but does not affect the level of the latter, then we know that public investment must have increased because transfer income and public investment are the only two components of public expenditures.

We obtain the figures for fees and transfer income for the period 1987-2002 from the accompanying household survey of the NFS.<sup>7</sup> After households with missing data are dropped, 1,118 households remain in the sample. The longest time span is 16 years and the shortest is 5 years. The figures for public expenditures are obtained from the village survey of the NFS. The time span is from 1986 to 2002 and the total number

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<sup>6</sup> Villages also collect taxes for higher level governments. They cannot use taxes to finance local affairs, nor can they change the rate of taxation.

<sup>7</sup> Again, data 1990, 1992, and 1994 are filled by the averages of the adjacent two years to better capture the dynamics. The results that do not fill the missing values are similar and can be presented upon request.

of cases is 789.<sup>8</sup> We have converted all the financial data into 2002 yuan and use their per-capita figures in regressions. The basic statistics of the three dependent variables can be found in Table 2.

### *Net transfer income*

For net transfer income, we are interested in both the average effect of election and its effect on households with different levels of income. The equation that we will estimate is the following dynamic panel model:

$$(6) \quad W_{ijt} = \lambda W_{ijt-1} + \alpha E_{jt} + \beta_1 E_{jt} \times Y_{ijt} + Z_{ijt} \beta_2 + \alpha_{ij} + w \beta_3 + e_{ijt}, \quad t = 2, \dots, T,$$

where  $W_{ijt}$  is per-capita net transfer income (yuan) of the  $i$ th household in village  $j$ ,  $Y_{ijt}$  is its per-capita net earned income (i.e., net income before taxation and income transfer),  $Z_{ijt}$  is a set of family characteristics that may affect its payment of fees and transfer income,  $\alpha_{ij}$  is the fixed-effect for this household,  $w$  is the set of year dummies, and  $e_{ijt}$  is an i.i.d. error term.  $Z_{ijt}$  includes per-capita net earned income (1,000 yuan), per-capita land (mu), average age, male ratio, and average education of adults (years in school). All these variables are meant to control family attributes that may affect the amount of fees paid by a household and the amount of transfer income received by it. Their basic statistics can be found in Table 2.

The parameter  $\beta_1$  captures election's impact on the progressiveness of income transfer in terms of earned income. This is so because the model in (6) takes care of the household specific effects, and for that matter, also the village specific effects, so the estimate of  $\beta_1$  is not driven by cross-village variations.

[Table 6 about here]

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<sup>8</sup> As in the case of the Gini, we replace the three missing years by the average of the two nearby years. The number of cases for public expenditures is larger than that of the Gini because public expenditures have one more year of data and have less missing data for other years.

Table 6 provides the results for net transfer income using the GMM estimator. Regressions (1) and (2) do not treat election as endogenous, and regressions (3) and (4) treat it as endogenous and the previous three instruments are used again. Regressions (1) and (3) do not include the interactive term between election and per-capita earned income, and regressions (2) and (4) do so. The LLC panel data unit root test rejects the null of nonstationarity at the 1% significance level. In addition, the  $m_1$  and  $m_2$  statistics show no evidence of first-order serial correlations for the level error terms and the Sargan statistic indicates that the over-identifying restrictions are not rejected.

All the four regressions show that net transfer income is progressive in terms of net earned income and the two dynamic models show that it is also progressive in terms of landholding. In the short run, earning one thousand yuan more of income implies that a person would receive about 7.5 yuan less of net transfer income on average (regressions (1) and (3)), and having one mu more of land would lead to a reduction of 6.8 yuan (regression (3)). The long-run effects are larger by about two thirds. Although equality by household size is emphasized in land allocation (Shouying Liu, Michael Carter and Yang Yao, 1998), land distribution deviates from equality because of demographic changes, so it is natural that net income transfer decreases with family per-capita landholding.

Election is shown to have no significant impact on the level of net transfer income except in regression (1) where it is significantly negative. That is, election would reduce the degree of income redistribution if it has any effect at all. Regression (2) shows that election does not affect the progressiveness of income redistribution, but regression (4) shows that election significantly reduces it. Compared with a village without election, a village with election would reduce the progressiveness by 2.3 yuan per 1,000 yuan of net earned income. The bottom line is that election does not increase the level of net transfer income, nor does it increase its progressiveness. Therefore, income redistribution is not the channel for election to reduce income inequality.

### ***Public investment***

The regressions that we will run for public expenditures are the dynamic panel models presented in equations (4) and (5) where the Gini coefficient is replaced by per-capita public expenditures in the village. The control variables are the same as before. We only study the direct effect of election so all the control variables are put in the regressions. We do this because we want to know channels of election's direct effect on income distribution. Table 7 presents the results. Regression (1) corresponds to the model in (4) and treats election as exogenous, and regression (2) corresponds to the model in (5) and treats election as endogenous. Again, the LLC panel data unit root test rejects the null of nonstationarity at the 1% significance level. In addition, the  $m_1$  and  $m_2$  statistics show no evidence of first-order serial correlations for the level error terms and the Sargan statistic indicates that the over-identifying restrictions are not rejected.

[Table 7 about here]

Both regressions show that election significantly increases public expenditures. The magnitude is 189 yuan in regression (1) and 237 yuan in regression (2). Regression (1) has more significant results than regression (2) for the control variables. The variables that are significant in both regressions are village population and the CV of wage earners in a household; both increase public expenditures. It seems that there is a scale effect that enables a larger village to afford more public expenditures. On the other hand, a more diverse village in terms of industrial employment may be more prone to engaging in redistribution.

[Table 8 about here]

To show election's effect on public investment, our remaining task is to study how per-capita total transfer income changes as a village begins to hold election. To that end, we repeat the four regressions for net transfer income by replacing the dependent variable by per-capita total transfer income. The results are presented in Table 8. The

three conditions for consistent GMM estimator are again satisfied. All the four regressions show that total transfer income is progressive in the sense that a richer household gets less transfer. Regressions (1) and (2) show that the effect of election is not significant although both regressions provide a negative estimate for it. Regressions (3) and (4) provide opposite estimates for the coefficient of the election dummy: it is significantly positive in regression (3) but significantly negative in regression (4). In addition, regression (4) reveals that the interaction term between election and net earned income is significantly positive. That is, election increases the amount of the transfer income received by the average household, and in the meantime reduces the progressiveness of the transfer. This seems to suggest that election leads to pro-rich redistribution policies. Our study of the net income transfer also provided weak evidence for such policies as election tends to reduce the progressiveness of net income transfer. This may be a peculiar result that is specific to rural China. There was a rather long history of egalitarian tradition in the Chinese village under the commune system and this tradition might have been carried over by unelected village leaders even after the commune system fell in the early 1980s. To the extent that election empowers the whole population, it thus can be seen as a correction to the long-lasting egalitarianism that election weakly reduces the progressiveness of income redistribution.

However, the increase of the average amount of income transfer is small, being only 5.72 yuan per-capita. Compared with election's positive effect on per-capita public expenditures, which is 189 to 237 yuan, this is a negligible effect. As a result, it is safe to conclude that election increases public investment.

## **6. Conclusions**

In this paper we use a unique panel data set to study the effect of grassroots democracy on income distribution. Using the dynamic panel model and accounting



for the endogeneity of the election, we have found that the direct effect of election is to reduce the Gini coefficient by 11.8% and its gross effect is to do so by 9.6%. The direct effect was obtained after we controlled a reasonable range of village characteristics that may have direct implications to village income distribution, so it is brought about either by more income redistribution or by more public investment. Further econometric analysis showed that election has not significantly changed the level of net transfer income received by the average household. In addition, election has significantly increased per-capita public expenditures, but only weakly increases per-capita total transfer income received by households. Therefore, the reduction of the Gini coefficient is not a result of pro-poor income redistribution, but instead a result of increased public investment. Since the level of public goods provision is generally low in rural China, it is reasonable to believe that poor households would benefit more from increased public investment because the rich can rely more on their own investment to generate income.<sup>9</sup>

Our work contributes to the analysis of decentralized governance in weakly institutionalized polities that by far the academia lacks sufficient understanding on (Daron Acemoglu, 2005). We show that grassroots democracy works to enhance local governance even in the highly centralized political system in China. The period covered by our study was one when income inequality in rural China rose up quickly, so our finding of the positive role of village election in lowering income inequality by way of more public investment is especially significant. Inside China, village election has been frequently criticized as an expensive yet ineffective device to strengthen the accountability of the village government. Our results provide strong evidence to disqualify such criticisms.

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<sup>9</sup> One piece of evidence supporting this argument was provided by Xiaobo Zhang and Shenggen Fan (2004) who worked with provincial-level aggregate data and found that public investment enlarges income inequality in the richer east part of China whereas it reduces it in the much poorer west part.

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Table 1. Adoption of the OLVC in sample provinces

	Guangdong	Hunan	Zhejiang	Henan	Sichuan	Gansu	Shanxi	Jilin
Year adopting OLVC	1998	1989	1988	1992	1991	1989	1991	1991
Median year of first election	1999	1988	1989	1991	1989	1995	1993	1989
St. dev. of year of election	0.5	1.7	3.9	4.6	1.7	6.8	4.6	2.7

Source: survey data.

Table 2. Summary statistics for variables

Variable	Mean	Std. Dev.	Min	Max
<b>1987-2002 village variables (# of obs.=723 )</b>				
Gini coefficient	0.28	0.08	0.09	0.69
Election dummy	0.71	0.45	0.00	1.00
Per-capita net income (1,000 yuan)	6.92	13.58	0.37	119.78
Village population (logarithm)	7.06	0.70	5.46	8.57
CV of household size	0.34	0.08	0.12	0.79
CV of household adults' average education	0.35	0.11	0.04	1.00
CV of per-capita household landholding	0.58	0.71	0.04	5.57
CV of wage earners in household	2.07	1.46	0.00	5.57
<b>1986-2002 village variables (# of obs.=789 )</b>				
Per-capita public expenditures (1,000	0.39	2.98	0.00	82.07
<b>1987-2002 household variables (# of obs.=16,095)</b>				
Per-capita net transfer income (yuan)	65.85	291.54	-349.92	2443.95
Per-capita transfer income (yuan)	98.37	288.16	0.00	2519.29
Per-capita net earned income (1,000 yuan)	2.37	2.53	-12.10	113.32
Per-capita landholding (mu)	1.35	1.89	0.00	24.00
Average age	31.70	9.60	8.20	82.50
Male ratio	0.55	0.21	0.00	1.00
Average education of adults (year)	5.20	1.87	0.00	12.00

Notes: All financial data are measured in 2002 yuan using the rural CPI published by *China Statistical Yearbook* as the deflator. Net income is household income net of operational cost, taxes, and fees, plus transfer income. Taxes are income handed over to higher-level governments above the village. Fees are collected to finance the operation of the village government and village public good provision. The exchange rate between yuan and US dollar is 8.11 yuan to 1 dollar as of the end of 2005. One mu is one fifteenth of a hectare.

Table 3. Election's impacts on income inequality: static models <sup>a</sup>

	Election exogenous		Election endogenous <sup>b</sup>	
	(1)	(2)	(3)	(4)
Village election	-0.016*** (0.006)	-0.004 (0.006)	-0.088*** (0.019)	-0.077*** (0.021)
Per-capita net income (1,000 yuan)		0.002** (0.001)		0.001 (0.001)
Per-capita net income squared		-0.000** (0.000)		-0.000 (0.000)
Log village population		0.042** (0.020)		0.043** (0.022)
CV of household size		0.131*** (0.033)		0.104*** (0.038)
CV of average edu. of household adults		-0.006 (0.034)		-0.043 (0.039)
CV of per-capita household landholding		-0.001 (0.005)		0.004 (0.006)
CV of household wage earners		0.014*** (0.002)		0.009*** (0.003)
Constant	0.266*** (0.007)	-0.091 (0.138)	0.283*** (0.009)	-0.064 (0.154)
Adjusted R <sup>2</sup>	0.662	0.704	0.663	0.709

Notes:

a. The dependent variable is the Gini coefficient. The number of observation is 723. Regressions (1) and (2) treat election as exogenous and are estimated by the standard two-way fixed-effect panel method. Regressions (3) and (4) treat election as endogenous and are estimated by the two-stage fixed-effect panel method. Figures in parentheses are standard errors.

b. The timing of a province's adoption of the election law and its interactive terms with the number of surnames and the percentage of population of the largest surname in a village are used as the instruments for village election.

\*, \*\*, and \*\*\* indicate the 10%, 5%, and 1% significance level, respectively.

Table 4. Panel data unit-root tests for the Gini series

Chosen deterministics	lag	Coefficient	t-value	t-star	P>t
(1)	(2)	(3)	(4)	(5)	(6)
Constant	1	-0.41	-12.86	-6.35	0.000
Constant	2	-0.41	-12.86	-6.89	0.000
constant and trend	1	-0.64	-17.22	-8.008	0.000
constant and trend	2	-0.64	-17.22	-8.66	0.000

Notes: Column (1) allows different specifications of the deterministic terms, column (2) allows different lag orders used in the LLC test, column (3) gives the estimated coefficients, column (4) gives the usual t-values, and columns (5) and (6) provide the t-star statistics for inference and their p-values.

Table 5. Election's impacts on income inequality: dynamic models <sup>a</sup>

	Election exogenous		Election endogenous <sup>b</sup>	
	(1)	(2)	(3)	(4)
Lagged Gini	0.499*** (0.063)	0.299*** (0.096)	0.403*** (0.129)	0.368** (0.145)
Village election	-0.002 (0.002)	0.006* (0.003)	-0.027** (0.013)	-0.033* (0.019)
Per-capita net income (1,000 yuan)		0.002* (0.001)		0.002 (0.001)
Per-capita net income squared		-0.00001** (0.000)		-0.00002** (0.000)
Log village population		0.034 (0.025)		-0.024 (0.044)
CV of household size		0.069*** (0.026)		0.240* (0.134)
CV of average edu. of household adults		0.013 (0.054)		-0.041 (0.130)
CV of per-capita household landholding		0.006 (0.019)		0.004 (0.023)
CV of household wage earners		0.006*** (0.002)		0.008*** (0.002)
Constant	-0.000 (0.001)	0.002** (0.001)	0.001 (0.001)	0.004** (0.002)
m1 <sup>c</sup>	-3.96	-3.39	-3.26	-2.47
m2 <sup>c</sup>	0.75	0.71	0.76	0.03
Sargan (P-value) <sup>d</sup>	1.000	1.000	1.000	1.000

Notes:

- The dependent variable is the Gini coefficient. The number of observations is 619. All results are estimated using the two-step GMM method proposed by Arellano and Bond (1998), and Bond (2002). Year dummies are included in all models. Regressions (1) and (2) treat election exogenous and regressions (3) and (4) treat it endogenous. Figures in parentheses are robust standard errors.
- The timing of a province's adoption of the election law and its interactive terms with the number of surnames and the percentage of population of the largest surname in a village are used as additional instruments for village election.
- m1 and m2 are test statistics for the first-order and second-order serial correlation of the first-differenced residuals, asymptotically distributed  $N(0,1)$ .
- Sargan is a test of the over-identifying restrictions for the GMM estimators, asymptotically chi-squared distributed. P-value is reported. This test uses the minimized value of the corresponding two-step GMM estimators.

\*, \*\*, and \*\*\* indicate the 10%, 5%, and 1% significance level, respectively.



Table 6. Effects of election on net transfer income received by households

	Election exogenous		Election endogenous	
	(1)	(2)	(3)	(4)
lagged net transfer	0.443*** (0.007)	0.439*** (0.008)	0.425*** (0.001)	0.422*** (0.002)
Election	-15.666*** (5.599)	-9.152 (7.909)	2.689 (2.312)	-4.455 (3.676)
Per-capita net earned Income (1,000 yuan)	-7.513*** (1.019)	-4.436** (2.037)	-7.571*** (0.175)	-9.341*** (0.740)
Election×per-capita net earned income		-1.835 (2.210)		2.337*** (0.864)
Per-capita land (mu)	-1.621 (2.011)	-2.502 (2.001)	-6.862*** (1.445)	-7.462*** (1.433)
Average age	-2.808* (1.519)	-2.834* (1.526)	1.704*** (0.647)	-0.611 (0.889)
Male ratio	-10.160 (13.464)	-12.543 (13.550)	7.327 (4.871)	-4.248 (5.686)
Average education of adults (years in school)	9.847** (4.950)	9.789** (4.972)	-8.379*** (2.072)	-4.696** (2.241)
Constant	42.540*** (9.997)	42.262*** (9.861)	42.231*** (9.932)	41.502*** (9.761)
m1	-6.74	-6.69	-6.70	-6.69
m2	-0.93	-0.94	-0.69	-0.70
Sargan (P-value)	1.000	0.9430	1.000	0.9324

Notes: The dependent variable is per-capita net transfer income received by a household measured in 2002 yuan. Total number of observations is 13,237. All results are estimated using the two-step GMM method proposed by Arellano and Bond (1998), and Bond (2002). Year dummies are included in all models. Models (1) and (2) are estimated treating election as exogenous, and models (3) and (4) are estimated treating election as endogenous, using the timing of a province's adoption of the election law and its interactive terms with the number of surnames in a village and the percentage of population of the largest surnames as the instruments. Robust standard errors are in parentheses. \*, \*\*, and \*\*\* indicate the 10%, 5%, and 1% significance level, respectively.

Table 7. Effects of election on per-capita public expenditures

	(1)	(2)
lagged public expenditure	0.248*** (0.006)	0.204*** (0.041)
election	0.189*** (0.028)	0.237** (0.104)
per-capita net income (1,000 yuan)	0.042*** (0.004)	0.041*** (0.008)
per-capita income squared	-0.0003*** (0.000)	-0.0003*** (0.000)
Log village population	0.638*** (0.109)	1.525*** (0.306)
CV of household size	-0.300*** (0.096)	-0.408 (0.548)
CV of average edu. of household adults	0.502** (0.217)	-0.288 (0.703)
CV of per-capita household landholding	-0.102*** (0.026)	0.035 (0.078)
CV of household wage earners	0.084*** (0.011)	0.045** (0.022)
Constant	-0.004 (0.003)	-0.017** (0.008)
m1	-1.51	-1.41
m2	0.27	0.20
Sargan	1.000	1.000

Notes: The dependent variable is per-capita public expenditures (1,000 yuan) in 2002 yuan. Total number of observations is 743. Regression (1) treats election as exogenous and regression (2) treats it as endogenous. The instruments are the timing of a province's adoption of the election law and its interactive terms with the number of surnames in a village and the percentage of population of the largest surnames as the instruments. Year dummies are included in all models. All results are estimated using the two-step GMM method proposed by Arellano and Bond (1998), and Bond (2002). Robust standard errors are in parentheses. \*, \*\*, and \*\*\* indicate the 10%, 5%, and 1% significance level, respectively.

Table 8. Effects of election on per-capita total transfer income received by households

	Election exogenous		Election endogenous	
	(1)	(2)	(3)	(4)
Lagged transfer	0.410*** (0.005)	0.410*** (0.005)	0.405*** (0.001)	0.402*** (0.002)
Election	-7.959 (5.215)	-8.025 (7.202)	5.717*** (2.001)	-10.727*** (2.745)
Per-capita net earned Income (1,000 yuan)	-7.464*** (0.976)	-5.236*** (2.006)	-7.153*** (0.043)	-10.761*** (0.663)
Election × Per-capita net earned income		-0.318 (2.138)		4.773*** (0.764)
Per-capita land (mu)	4.437** (1.800)	4.025** (1.777)	0.017 (1.054)	-0.304 (1.029)
Average age	-1.026 (1.385)	-0.907 (1.412)	1.566*** (0.412)	-0.549 (0.785)
Male ratio	-25.044* (12.800)	-29.066** (12.867)	-1.317 (3.943)	-11.136** (4.352)
Average education of adults	-0.291 (4.563)	0.069 (4.628)	-7.827*** (2.201)	-3.691 (2.502)
Constant	2.148** (1.087)	1.984* (1.110)	-1.315*** (0.454)	0.477 (0.616)
m1	-6.40	-6.36	-6.47	-6.36
m2	-1.30	-1.30	-1.02	-1.03
Sargan (p-value)	1.000	1.000	1.000	1.000

Notes: The dependent variable is per-capita total transfer income received by a household in 2002 yuan. Total number of observations is 13,349. Year dummies are included in all models. Robust standard errors are in parentheses. Models (1) and (2) are estimated treating election as exogenous, and models (3) and (4) are estimated treating election as endogenous, using the timing of a province's adoption of the election law and its interactive terms with the number of surnames in a village and the percentage of population of the largest surnames as the instruments. All results are estimated using the two-step GMM method proposed by Arellano and Bond (1998), and Bond (2002). \*, \*\*, and \*\*\* indicate the 10%, 5%, and 1% significance level, respectively.

Figure 1. Introduction of village election in the sample villages

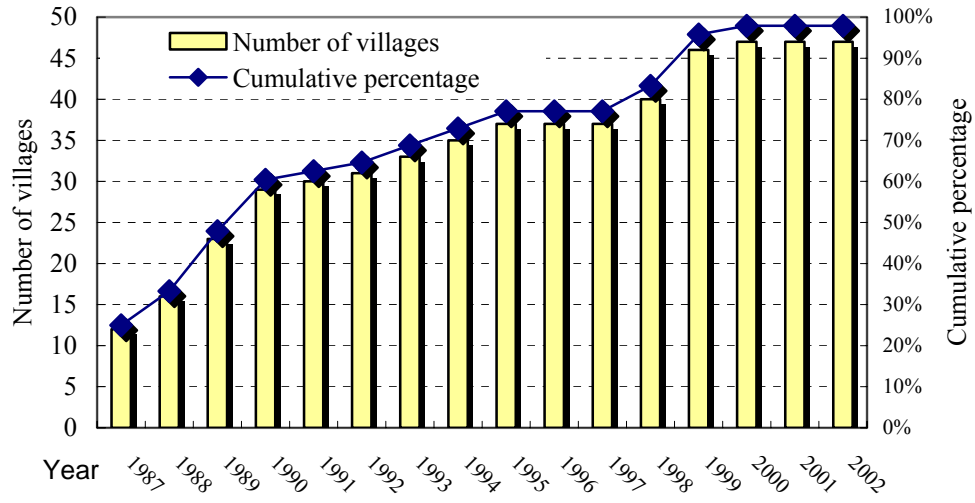


Figure 2. Trend of the Gini coefficient in the sample villages: 1987 – 2002

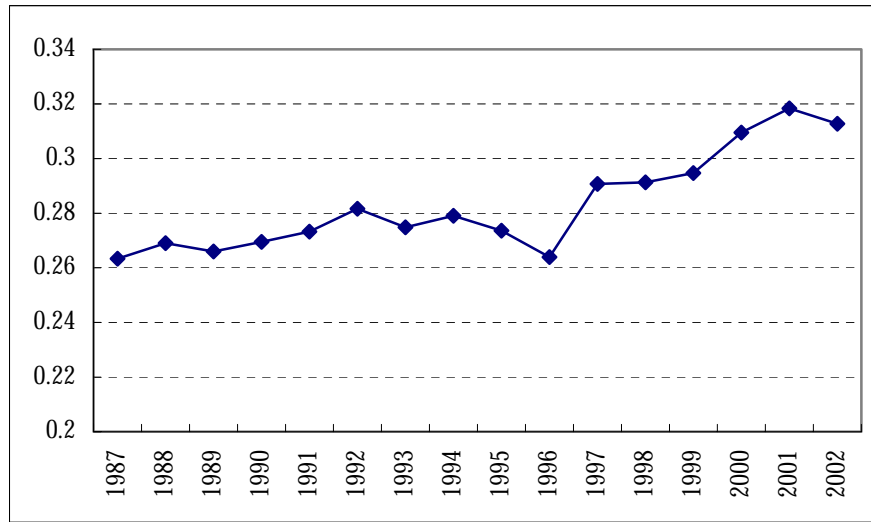
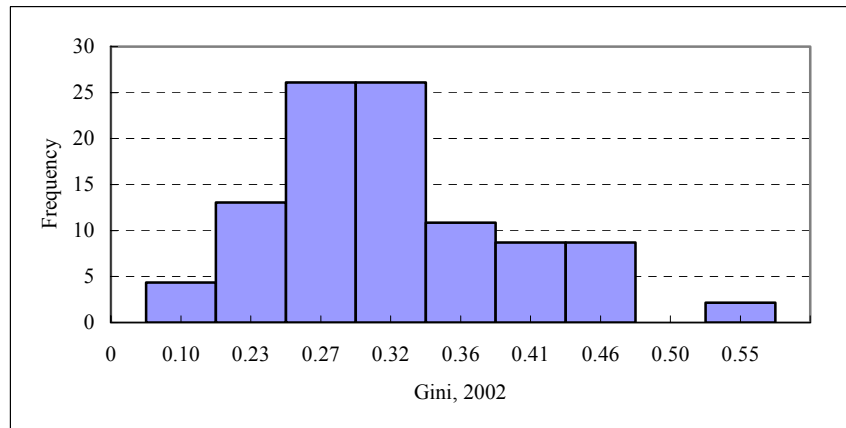
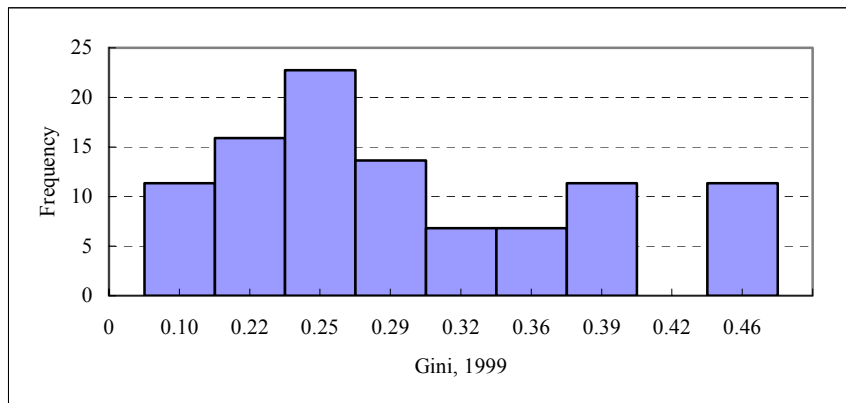
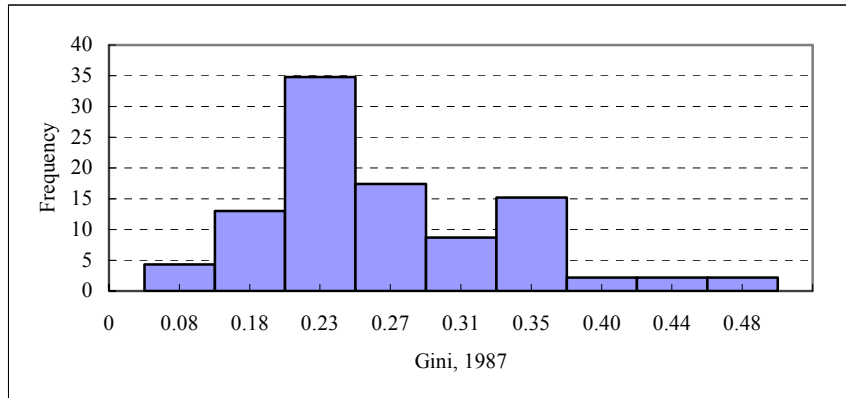


Figure 3. Histograms of the Gini in 1987, 1999, and 2002



Notes: The number for each bar in the figures is the average of the Ginis represented by the bar.