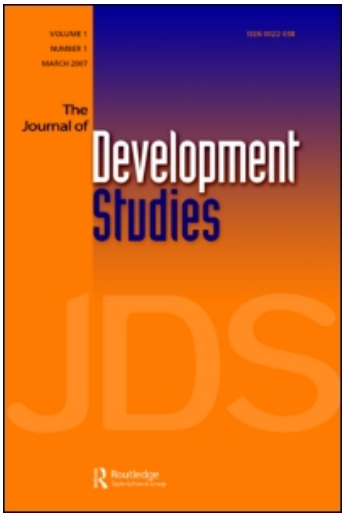

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Induced Institutional Change or Transaction Costs? The Economic Logic of Land Reallocations in Chinese Agriculture

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Induced Institutional Change or Transaction Costs? The Economic Logic of Land Reallocations in Chinese Agriculture

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ABSTRACT *The communal land rights system in China, which combines individualised farming with periodic land reallocations, provides a good case for testing the economic logic of land reallocations. Analysis of the results of a unique village survey reveals that a village's choice of land reallocation type – partial or large in scale – is significantly affected by transaction cost considerations, which vary according to village topography and size, rather than concerns for economic efficiency (tenure security), the latter of which is a proxy for the theory of induced institutional change. More specifically, villages with complex topographies tend to favour partial land reallocation, whereas larger settlements tend to reallocate land more thoroughly.*

I. Introduction

It is now widely accepted that by protecting property rights and encouraging long-term investments, good institutions play an important role in economic development (see North and Thomas, 1973; North, 1994; Sokoloff and Engerman, 2000; Acemoglu et al., 2001, 2002). Indeed, according to the theory of induced institutional change (Hayami and Ruttan, 1971; see also Demsetz, 1967), good institutions evolve in response to a growing scarcity of factor resources in an attempt to minimise losses by boosting economic efficiency.[1] An intriguing question that arises from this perspective is how to account for the persistence of seemingly inefficient institutions, such as those in present-day Chinese agriculture, which, paradoxically, combines individualised farming with periodic land reallocations.

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Indeed, Chinese agriculture presents an interesting paradox for analysis of institutional change and, more specifically, institutional choice. Although agricultural de-collectivisation in China has individualised the organisation and production of farms, land remains collectively owned by villagers, each of whom is entitled to an equal share of the *usufruct* right over the carved-up arable land. This right has resulted in the periodic reallocation of land among villagers in response to demographic and other structural changes (Kung, 1995, 2000; Liu et al., 1998; Benjamin and Brandt, 2002), an institutional practice that some researchers believe results in tenure insecurity, discourages plot-specific investments, and retards productivity growth (Wen, 1995; Prosterman et al., 1996; Li et al., 1998; Jacoby et al., 2002).

The primary contribution of this research, which employs a unique village survey, is to examine the economic logic of land reallocations in China empirically. We draw on insights developed from the theory of induced institutional change and from the transaction cost analysis of economic history, which searches for the hidden benefits associated with prevailing institutional practices (McCloskey, 1972; Fenoaltea, 1976; Dahlman, 1980). The testing of our competing hypotheses is premised upon the stylised fact that a village, although it may intend to maximise economic (investment) efficiency, is obligated to distribute land equally to the eligible population. Using per capita arable land as a pertinent proxy, we hypothesise that variations in the intensity of land reallocation can be accounted for by differences in resource endowment and, accordingly, the expected costs of the efficiency that is forgone as a result. More specifically, villages that are less favourably endowed with arable resources are more likely to be concerned with the consequences of lost private (household-level) investments, simply because the opportunity costs of forgoing output are likely to be higher in such villages. The tendency in these villages is thus either not to reallocate land at all or, to a lesser extent, to reallocate land only partially (*xiao tiaozheng*). Such partial reallocation affects only part of the land holdings and only those households that have been affected by demographic change, an arrangement that should result in less tenure insecurity than would large-scale reallocation (*da tiaozheng* or *daluan zhongfen*).[2]

The puzzle then is this: to the extent that partial land reallocation renders tenure more secure, why do some villages choose to reallocate land on a larger scale? This is where our competing hypothesis, namely, transaction costs, enters the picture. Although partial reallocations render tenure less insecure, the costs of matching up the households affected by demographic change, including the negotiations between them over the particular plots to be exchanged, are conceivably higher for larger villages. The greater matching costs faced by these more densely populated villages suggest that they are less likely to reallocate land partially, despite the greater tenure security doing so would confer upon farmers. On the contrary, given that land was carved up in an egalitarian manner upon de-collectivisation,[3] households in villages with complex topographies are likely to have ended up with a distinctly larger number of plots, thus rendering the costs of comprehensively mapping the redistributed plots among the entire village population prohibitive.[4] It follows that large-scale land reallocations are less likely to be adopted in these villages.

Our empirical results, including those on a set of control variables and endogeneity tests carried out as robustness checks, consistently support the transaction costs hypothesis; that is, our findings suggest that it is concern over transaction costs

rather than that over efficiency loss (resulting from tenure insecurity) that significantly shapes the institutional choices made in Chinese agriculture today. Our transaction costs reasoning provides important elucidation of the seeming paradox of why some villages continue to engage in large-scale land reallocation despite the greater tenure insecurity for farmers that results and the strong government policy preference against such reallocation.

In addition, we would also like to claim two further contributions. The first is our novel provision of a rich narrative of the institutional differences between the two land reallocation regimes in question, as well as the corollary implications of the greater tenure insecurity associated with large-scale land reallocation, which provides an important motivation for analysing the basis of institutional choice in Chinese agriculture. Second, by uniquely capturing the entire history of land reallocation practices in the villages surveyed for this study, our data reveal the 'bi-modal' structure of such practices in rural China, that is, whereas some villages have reallocated land on a large-scale basis, others have merely readjusted a tiny fraction of their entire landholdings and only those of the households affected by demographic change. In short, our analysis contributes both to the existing literature and to policy concerns over property rights in rural China.[5]

The remainder of this article is organised as follows. In the next section, we first provide a brief summary of the literature on land reallocations, followed by a narrative of the two land reallocation regimes in question. Highlighting the critical differences between them allows us to identify the implications of each for tenure security. In section III we develop several hypotheses for testing the basis of institutional choices in Chinese agriculture, drawing on the theory of induced institutional change and the concept of transaction costs. More specifically, we test whether it is the desire to minimise transaction costs or the desire to alleviate tenure insecurity that better explains the bi-modal structure of land reallocations in rural China. In section IV, we introduce our survey data, provide the specification of our empirical strategy, and define the variables used in the regression analyses. The empirical results of various econometric specifications are reported and discussed in section V, followed by a brief conclusion in section VI.

II. The Bi-modal Structure of Land Reallocation: Large-scale and Partial Reallocations of a Common Property Resource

Why Reallocate Land?

Policy-makers in China have long been aware of the possible negative consequences of land reallocation in terms of farmers' willingness to invest in their contracted plots. In 1984, for instance, by which time 99 per cent of the households in China had switched to farming on an individualised basis, the central government fixed the contractual land-use rights period to 15 years, a sufficiently long period to encourage farmers to ensure the fertility of the soil of their contracted plots (Kueh, 1985). As a number of studies have found, however, the majority of villages have simply ignored this policy and continued to reallocate land on a periodic basis primarily in response to demographic change (see, for example, Kung, 1995; and Liu et al., 1998, among others). It is not that Chinese farmers are unaware of the potentially negative effects

of land reallocation on plot-specific investments, but rather that, because each and every member of the village community is bestowed with an equal right to use the commonly owned arable resource and enjoy an income from that use, no rationally minded individual would be willing to give up that right without compensation. As some observers of rural China have explained, this equal entitlement to land is essentially a holdover from the days of people's communes in which members were basically entitled to an equal share of minimum food entitlements. With the carving up of collective holdings, this equal right to food consumption was simply translated into an equal right to the resource – arable land – that produces the food for consumption (Kung, 1994). In the absence of a social welfare system that insures against income shocks, both this equal access to land-use rights and the possible efficiency loss that accompanies it may be regarded as the unavoidable costs of China's system of communal land rights (Burgess, 2002).

Indeed, the majority of our surveyed villages, some 76 per cent, distribute land among their farm families in a highly egalitarian manner, namely, on the basis of household size (see Table 1). Moreover, despite the central government's plea to suppress land reallocations, since de-collectivisation virtually all of these villages have exercised their 'community claim,' to use Besley's (1995) term, by reallocating land (refer to Online Appendix A, Table A2 for details). Although some may cast doubt on the continuing significance of this equity constraint, the fact that as many as 14 per cent of rural households reallocated land in the two years (2003 and 2004) immediately following the announcement of a new rural policy (2002) strictly prohibiting villages from conducting large-scale reallocation suggests that the equity constraint remains binding, albeit arguably to a lesser extent than in the past and to a different extent in different villages.[6]

Large-scale versus Partial Land Reallocations

The issue that primarily concerns us here is the extent or intensity – which can be measured in terms of frequency and magnitude – to which a village reallocates land. The impression given by Chinese scholars is that villages tend to reallocate land on a *partial* basis (among only those households affected by demographic change) once every three years and thoroughly once every five years (*sannian yi xiaotiao*, *wunian yi*

Table 1. Land allocation criteria during de-collectivisation (1980–1984)

Year of de-collectivisation	Number of villages	Land allocation criteria: Household size (%)	Labor (%)	Household size/labor (%)	Percentage of villages retaining 'Land Bank' [*Jidong Tian*] (%)
1980	13	92.31	0.00	0.00	15.38
1981	25	88.00	0.00	12.00	44.00
1982	25	80.00	4.00	12.00	32.00
1983	23	47.83	17.39	30.43	56.21
1984	9	77.78	11.11	11.11	87.50
Total	95	75.79	6.32	14.74	43.62

Source: Development Research Center, State Council, People's Republic of China (2003).

datiao), the latter presumably when the mismatch between land and labour among farm households becomes so great that partial readjustments are no longer sufficient (see Jiang and Chen, 1997, for example). Although our survey results do confirm these two distinct modes of land reallocation, the claim that villages alternate between them depending on whether there is a need to realign land and labour across households could not be further from the truth. Our findings clearly show that less than 30 per cent of the villages surveyed have adopted both practices; the rest – more than 70 per cent – have in fact reallocated land either on a partial basis (41.05%) or on a large-scale basis (29.47%), but not both (refer to Online Appendix A, Table A2). Using kernel density to estimate the ratio of large-scale to overall land reallocations (against the normal density distribution), we demonstrate the aforementioned bi-modal structure of land reallocation behaviour, with the results presented in Figure 1.[7] As can easily be seen, these villages engaged in either partial (left-hand side of the graph) or large-scale reallocations (right-hand side of the graph).

Differences between Two Alternative Modes of Land Reallocation

Why would some villages reallocate land only partially and others more thoroughly? What are the differences between the two modes of land reallocation, and which has a more negative effect on tenure security? The answers to these questions will help us to better understand the basis for this important institutional choice in Chinese agriculture. Instead of focusing only on how frequently villages reallocate land, and the extent to which the households and land within them are affected, we focus parsimoniously on the differences in the rules embedded within the two distinct practices. These rule-based differences, and the differences in expectations that they generate, are important for understanding their possible implications for tenure security and, accordingly, for plot-specific investments.[8]

The first major stylised difference between the two is that partial reallocations affect only those households affected by demographic change (births, deaths, and

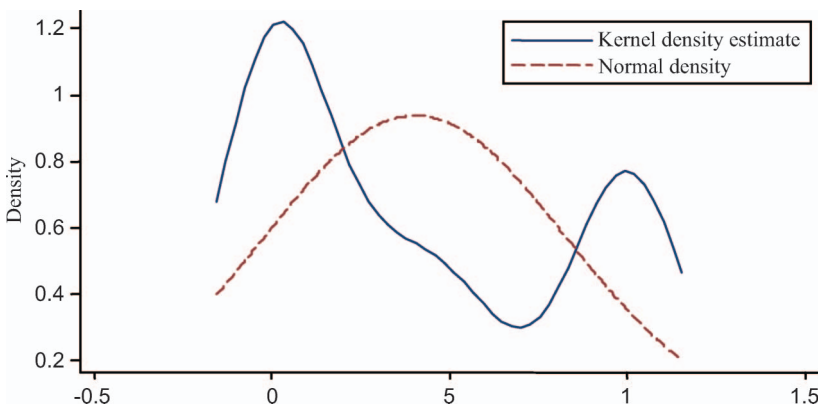

Figure 1. Kernel density estimate of the ratio of large-scale reallocations to overall reallocations.

marriages). Indeed, when asked how land is reassigned in a partial reallocation, the predominant answer given by village officials was that households that had expanded in size were given the land of those that had decreased in size. In essence, this is equivalent to saying that only households affected by demographic change are involved in such reallocations.

Contrast this with the villages that experienced large-scale land reallocation, in which 63 per cent (779/1243) of the households were affected, even though they had had virtually no change in size (Table 2). In other words, in villages in which only partial reallocations were the norm, villagers whose households had undergone no demographic change could be certain that their tenure was basically secure. Moreover, not only could they predict in advance whether they would be adversely affected, but, depending on the type of village, they knew that a negatively affected household was obligated to transfer one entire (boundary-demarcated) plot, the most commonly employed method of such reallocation (46.9%). In other villages, a little over one-third (34.9%) of households were asked to transfer only a small portion of more than one plot (mean = 2.6) during partial reallocations (Table 3). In sharp contrast, 78.6 per cent of the households in villages in which only large-scale land reallocations were practiced indicated that they were unable to retain any of the plots that they had previously farmed following a large-scale reallocation, regardless of whether they had experienced demographic change (Table 2).[9]

This evidence suggests that tenure is relatively more secure in villages in which land is readjusted on a partial basis than in those with a history of large-scale reallocation.[10] Why then do some villages continue to reallocate land on a large-scale basis (or engage in both modes)? What factors can explain their seeming lack of concern over the possible loss in efficiency arising from farmers' suboptimal investments in their contracted plots?

III. The Basis of Institutional Choice: Testing the Hypotheses of Induced Institutional Change and Transaction Costs

Our empirical test on the basis of institutional choice in Chinese agriculture is motivated by the theory of induced institutional change, which postulates that, as a

Table 2. Effects of large-scale land reallocation on plot retention

	Households in villages in which large-scale land reallocation has occurred		(1) Households with no demographic change		(2) Households with demographic change	
	N	%	N	%	N	%
Retain none of the plots	977	78.60	616	79.08	350	77.78
Retain some of the plots	266	21.40	163	20.92	100	22.22
Total	1,243	100	779	100	450	100.00

Source: see Table 1.

Table 3. Methods employed in partial land reallocation

Methods of reallocation	Number of households involved	Number of plots reallocated	Number of plots before reallocation
Out:			
(1) One entire plot	129	1.00 (0.00)	5.96 (3.99)
(2) A small part of several plots	96	2.60 (1.80)	7.97 (5.32)
(3) Other	50		6.12 (4.08)
In:			
(1) One entire plot transferred from another household	122	1.00 (0.00)	4.40 (3.26)
(2) Several plots transferred from another household	60	2.38 (1.09)	7.28 (6.51)
(3) Several plots transferred from several households	70	3.16 (1.79)	5.88 (5.34)
(4) Other	23		3.95 (1.96)

Standard deviation in parentheses.
Source: see Table 1.

factor resource becomes scarcer, it becomes more valuable, and, in response to that scarcity, efficient institutions evolve to protect it (Demsetz, 1967; Hayami and Ruttan, 1971; North, 1981). Premised on this theoretical reasoning, we postulate that the Chinese village strives to strike a balance between two competing objectives in terms of arable land usage, namely, economic efficiency and equality of land distribution. The village in our analytical framework thus seeks to maximise private investment incentives, subject to the constraint that it must ensure equitable land-use rights. In other words, a village that places a premium on economic efficiency would tend not to reallocate land, or would do so only in a partial manner, whereas one that assigns greater weight to equality would tend to reallocate land. This supposition allows us to formulate the following hypothesis on induced institutional change.

> *Hypothesis 1*. Using per capita arable land as the pertinent proxy of factor scarcity, villages with more per capita land holdings are more likely to engage in large-scale land reallocation than villages with fewer per capita land holdings, as they can better afford the cost of forgoing private investments.

Our survey findings indeed show that the amount of per capita arable land in villages with a history of partial land reallocations alone is somewhat smaller than that in their counterparts that have engaged in large-scale reallocations alone. Moreover, as the fertilisation of plots with organic matter is the main source of land-specific investment undertaken by Chinese farmers, the corollary is that favourably endowed villages can better afford the potential loss in efficiency that results from the reduced use of organic fertilisers relative to their less favourably endowed counterparts. Our empirical evidence does support this conjecture, as proportionately more households in the former use organic soil nutrients (about 75%) relative to the latter (about 47%), whereas there is hardly

any difference in terms of chemical fertiliser usage (refer to Online Appendix A, Table A2 for further details).

At the same time, however, the communal nature of property rights to land in China implies that villages are obligated to reallocate land to satisfy the constraints imposed by egalitarian land-use rights, no matter how concerned they are with economic efficiency. The fact that all of the villages surveyed have reallocated land to some extent substantiates this important qualification. Thus, where our villages differ is in the *intensity* with which they reallocate land – partially or on a large-scale basis. To the extent that partial land reallocation is more likely to confer greater tenure security upon farmers than large-scale land reallocation, we are still left with the question of why some villages have adopted only large-scale reallocation, or, simply stated, why not all villages in China reallocate land on a partial basis.[11] If we assume that village leaders are rational, then the decision of some villages to adopt an institutional choice that is seemingly less efficient suggests that the transaction costs of pursuing partial land reallocation may be higher in these villages.

As with the organisation of all economic activities, the administration of land reallocations consumes resources. More specifically, these reallocations entail two kinds of costs: mapping and matching. The former include the costs of resurveying the land and recalculating the village population eligible for land redistribution, costs that apply only to large-scale reallocation, whereas the latter are incurred in the process of dividing up and combining farm plots for reallocation through, for example, a lottery system. Unlike mapping costs, matching costs apply to both types of land reallocation.

The thrust of our transaction costs reasoning is that these two types of costs are sensitive to the two key elements of geography, namely, village topography and the size of the village settlement. More specifically, given that land of varying qualities (grades) was divided up in a largely egalitarian manner upon de-collectivisation, comprehensively mapping redistributed plots among the village population would be cost-prohibitive in villages with complex topographies (variegated soil types and gradients). An earlier survey carried out in Meitan County in Guizhou Province (Kung, 2002), in which a policy experiment establishing a land reallocation freeze was carried out in 1987, provides evidence to suggest that the transaction costs of large-scale reallocation are higher than those of partial reallocation in these kinds of villages. Endowed with less than half the national average amount of arable land, on the one hand, and severe land fragmentation, on the other,[12] many of the villages in this county had in fact chosen not to reallocate land even before the experiment was officially launched (Kung, 2002: 796–797).[13] Evidence from elsewhere in China also suggests that 'permanent land use rights are favored by those who are suffering from an excessive scattering [of] farm plots' (Kung and Liu, 1997: 47). We thus postulate that large-scale land reallocations are less likely in villages with complex topographies, which leads to our second hypothesis – the transaction costs hypothesis.

Hypothesis 2. Owing to the higher mapping costs in villages with complex topographies, these villages are more likely to reallocate land on a partial basis.[14]

Conversely, although partial reallocations render tenure less insecure, the matching of households affected by demographic change – such as negotiations between them over the specificities of the particular plots to be exchanged – is conceivably far more extensive in larger villages. The greater matching costs faced by more densely populated villages suggest that they are less likely to reallocate land on a partial basis,[15] which brings us to our final hypothesis.

Hypothesis 3. Larger villages that aim to economise on matching costs are better off reallocating land on a large-scale basis.

IV. Empirical Testing

Data

The primary goal of the survey reported here was to document the *history* of land reallocation in Chinese villages characterised by diverse resource endowments. In so doing, a more specific goal was to collect information on the type of reallocation – large-scale versus partial – that a village had adopted since de-collectivisation was implemented (that is, over the 1978–2003 period). The survey was organised in 2003 by the Development Research Center (DRC) – the high-powered research and policy arm of China's State Council – and carried out with the participation of one of the authors in six Chinese provinces selected on the basis of their geographical representation. Zhejiang and Fujian Provinces, for instance, were selected to represent the rapidly developing south-eastern coastal seaboard, whereas Hunan and Anhui Provinces in central China were selected to represent the country's 'grain basket' and also locations populated by active out-migration activities. Sichuan and Heilongjiang Provinces were chosen to cover the southwest and northeast. The geographical locations of these provinces are shown in Figure 2.

Two counties were then selected from each of the six selected provinces. To ensure that the two counties chosen were broadly representative of a province, all of the counties in each were ranked in terms of per capita gross domestic product (GDP), with those clustered around the mean selected randomly. Then, four townships were selected from each of the 12 counties. Rather than choose the average performers, one each in the higher- and lower-income categories were selected along with two that ranked in the middle. After the 48 townships were identified for inclusion, two villages from each were chosen using the same selection criteria as those used in the choice of the counties. Finally, for the household survey, 22 farm households in each of the 96 villages were selected randomly from the village roster, resulting in 2,112 household observations available for analysis.

The survey consists of 22 sections. It enumerates detailed information on the village populations (at seven specified time points between 1980 and 2002), the specifics of resource endowment (both arable and non-arable), topographical features, cropping patterns, village economic structure, and so forth. Given that the primary goal of the survey was to unveil the history of land reallocations, we collected a number of variables pertaining to agricultural de-collectivisation: the year of de-collectivisation, the criteria adopted in allocating land, the allocation criteria

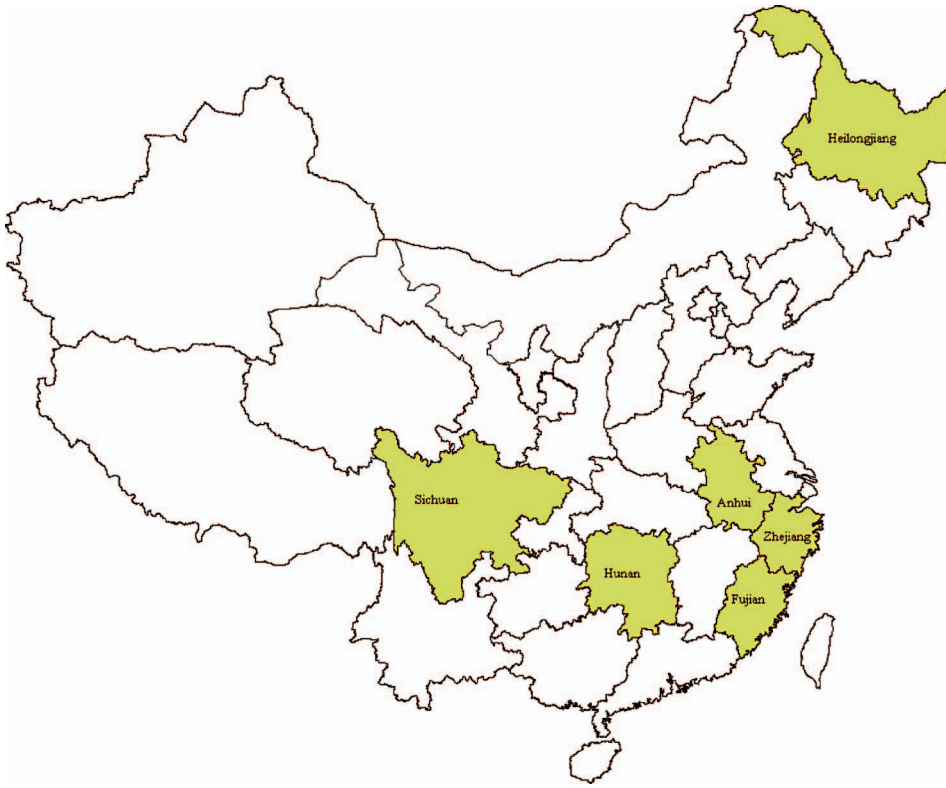

Figure 2. Geographical distribution of the surveyed provinces.

for land of varying degrees of quality,[16] whether a 'land bank' had been reserved at the time of de-collectivisation, and others. More importantly, to distinguish this study from most other surveys of land tenure, we consciously made a distinction between large-scale and partial land reallocations. For the former, we collected information on the number of times that, and the specific years in which, a village had reallocated land since de-collectivisation; the timing of and reasons for the most recent reallocation; and the procedures entailed in that reallocation and the prior notification given. Similar questions were asked about partial reallocations, including their overall frequency, the extent to which the most recent round of such allocations had affected a village's households and arable land, the methods of readjustment adopted, and the average number and size of a household's plots. These variables, particularly those concerning partial readjustments, are novel, and as such provide us with a fresh and deeper understanding of how this particular mode of land reallocation is actually carried out in Chinese villages.

Empirical Strategy and Variable Definitions

To test our hypotheses, we employ large-scale reallocations as a share of the overall land reallocations in a village (y) as our dependent variable. We regress it on the

three key independent variables (X), namely, the number of plots, the number of households, and per capita arable land. All three explanatory variables are computed in logarithmic terms. In addition, we include two control variables. First, to control for the weight a village assigns to efficiency considerations, specifically to private investment incentives (**Hypothesis 1**), we construct a variable based upon whether a village had allocated land on the basis of household labour as well as household size when it de-collectivised its land holdings.[17] Second, in our baseline estimation, we also control for differences in cropping patterns, using the ratio of rice paddies in the surveyed provinces as a pertinent proxy. Although the possible effect of cropping patterns on land reallocation choice is far from clear, its inclusion is necessary because rice paddies and dry land may have different investment requirements. Our baseline regression can be specified as

$$y = X\beta + W\gamma + \varepsilon. \tag{1}$$

We employ the ordinary least squares (OLS) method in our baseline estimation. In addition, given both the left- and right-censoring nature of our dependent variable, we also employ the Tobit model to estimate Equation (1).

To check the robustness of our results, we employ two alternative measures, namely, the frequency of large-scale (y_1) and partial (y_2) land reallocations and the seemingly unrelated regressions (SUR) model to estimate the effects of X and W, as follows:

$$\begin{pmatrix} y_1 \\ y_2 \end{pmatrix} = \begin{pmatrix} X & 0 \\ 0 & X \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \end{pmatrix} + \begin{pmatrix} W & 0 \\ 0 & W \end{pmatrix} \begin{pmatrix} \gamma_1 \\ \gamma_2 \end{pmatrix} + \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \end{pmatrix}. \tag{2}$$

Compared with Equation (1), which includes five coefficients (β and γ), Equation (2) has 10 coefficients (β_1, γ_1, β_2, and γ_2) to be estimated.

V. Empirical Results

Baseline Results

As noted, we employ both the OLS method and the Tobit model in our baseline estimations, the results of which are presented in Table 4 (the OLS results in columns 1 to 3 and the Tobit results in columns 4 to 6). A summary of the explanatory variables, including those used in the robustness check (refer to Online Appendix B), is provided in Table A1, Online Appendix A. The per capita arable land variable exhibits the expected positive sign and level of significance, and thus **Hypothesis 1** is supported: more favourably endowed villages are less likely to be concerned with the potential output that is forgone as a result of the reduced private investments that stem from tenure insecurity in the face of large-scale land reallocation. Also consistent with **Hypothesis 1** is our finding that villages more concerned with production efficiency are also less likely to reallocate land on a large-scale basis. The two proxies of transaction costs are significant across all of the estimations, and thus **Hypotheses 2** and **3** too are supported. The negative coefficient of the plot variable is consistent with our prediction that the transaction costs of large-scale land reallocations are higher in

Table 4. Determinants of land reallocation choice – baseline results

	OLS			TOBIT		
	(1)	(2)	(3)	(4)	(5)	(6)
Per capita arable land (log-term)	0.185***	0.224***		0.592***	0.709***	
	[0.050]	[0.061]		[0.208]	[0.258]	
				(0.223)	(0.263)	
Number of plots (log-term)	−0.385***		−0.414***	−1.390***		−1.480***
	[0.053]		[0.053]	[0.312]		[0.333]
				(−0.523)		(−0.551)
Number of households (log-term)	0.501***		0.519***	1.811***		1.871***
	[0.066]		[0.072]	[0.398]		[0.419]
				(0.681)		(0.696)
Production efficiency consideration	−0.328***	−0.224**	−0.200**	−1.097***	−0.771*	−0.668**
	[0.077]	[0.102]	[0.084]	[0.369]	[0.423]	[0.333]
				(−0.413)	(−0.286)	(−0.249)
Paddy ratio	0.497***	0.351***	0.263**	1.719***	1.107**	1.049**
	[0.114]	[0.125]	[0.103]	[0.488]	[0.509]	[0.412]
				(0.646)	(0.410)	(0.390)
Scaling factor				0.376	0.371	0.372
Observations	95	95	95	95	95	95
R-squared	0.40	0.11	0.33	0.23	0.05	0.18
LR chi2				47.89	9.84	38.45

Notes: Coefficients reported; standard errors in square brackets; marginal effects in parentheses.
*Significant at 10 per cent level; **significant at 5 per cent level; ***significant at 1 per cent level.
Constant terms are included but not reported. Pseudo R-squared for the Tobit model.

villages characterised by rich, variegated arable resources (**Hypothesis 2**). Also consistent with our prediction, the positive coefficient of the number of households supports the conjecture that there are indeed economies of scale in reallocating land on a large-scale basis in larger villages (**Hypothesis 3**). In sum, these baseline estimation results suggest that considerations of both economic efficiency and transaction costs significantly affect a village's choice of land reallocation regime.

To gauge the *magnitude* of the effects of these key explanatory variables on the dependent variable, we compute their marginal effects and report them in columns (4) through (6) of Table 4 under the Tobit model heading (in the third row under the standard error of the three key explanatory variables). The results (all reported in column 4) show that a 1 per cent increase in per capita arable land raises the probability of a village engaging in large-scale land reallocation by about 0.223 per cent; moreover, a greater concern for production efficiency reduces that probability by 41.3 per cent. In the case of village topography, a 1 per cent increase in the number of plots reduces the probability of a village adopting large-scale reallocation by 0.523 per cent, whereas a 1 per cent increase in the number of households increases it by about 0.681 per cent.

Effects on the Frequency of Land Reallocation

In addition to examining the effects of topography and village settlement size on the choice of land reallocation type, we also employ the frequency of land reallocation as a determinant of tenure security. As we are able to differentiate between large-scale and partial land reallocations, we estimate them separately, first using the OLS model in our baseline estimates and then the SUR model to correct for the correlation of the disturbance terms between the dependent variables. However, this change in the dependent variable means we are unable to test **Hypothesis 1** in this exercise.

The OLS results reported in column (1) of Table 5, in which we pool the two types of reallocation regime, show that only the number of households is marginally significant and exhibits a negative sign. Once we differentiate our dependent variable in terms of scale, however, the results are much more robust. As can be seen in column (2), both the negative (and significant) relationship between the number of plots and large-scale land reallocation and the positive (and significant) relationship between the number of households and such reallocation are indeed consistent with our transaction cost predictions (**Hypotheses 2** and **3**). The results are similarly consistent with regard to the frequency of partial land reallocation. The larger the number of plots and the smaller the number of households, the greater the frequency of partial land reallocation (column 3).

Given that the disturbance terms of our two dependent variables are likely to be highly correlated, we check the robustness of the OLS results by performing the same regressions using the SUR model, with the results reported in columns (4) and (5) of Table 5. We can see that the two key explanatory variables remain significant.

Instrumental Evidence

An inevitable question arising from our estimations is whether our key explanatory variables may suffer from a potential endogeneity bias. For instance, although the

Table 5. Determinants of land reallocation choice – measured by frequency

	OLS			Seeming Unrelated Regression	
	(1)	(2)	(3)	(4)	(5)
Dependent variable	Frequency of LR	Frequency of FLR	Frequency of PLR	Frequency of FLR	Frequency of PLR
Per capita arable land (log-term)	−0.337 [0.429]	0.263 [0.218]	−0.600 [0.369]	0.263 [0.204]	−0.600 [0.442]
Number of Plots (log-term)	0.615 [0.401]	−1.017*** [0.236]	1.631*** [0.391]	−1.017*** [0.234]	1.631*** [0.508]
Number of households (log-term)	−1.054* [0.565]	0.883*** [0.294]	−1.937*** [0.512]	0.883*** [0.292]	−1.937*** [0.632]
Production efficiency consideration	−0.927 [0.619]	−1.153*** [0.292]	0.227 [0.549]	−1.153*** [0.348]	0.227 [0.754]
Paddy ratio	0.751 [1.202]	1.196*** [0.438]	−0.445 [1.134]	1.196*** [0.455]	−0.445 [0.987]
Observations	95	95	95	95	95
R-squared	0.13	0.26	0.17	0.26	0.17

Notes: Coefficients reported; standard errors in square brackets.
*Significant at 10 per cent level; **significant at 5 per cent level; ***significant at 1 per cent level.
Constant terms are included but not reported. LR = land reallocation; PLR = partial land reallocation; FLR = full land reallocation.

number of plots is arguably exogenous, the average number of plots farmed by households is likely to have altered over time in villages that have reallocated land. To correct for this potential problem, we employ the average number of plots (in logarithmic terms) in all of the surveyed villages within the same county except for one village (n-1) that is used as the instrumental variable. The same (n-1) strategy is applied to the other two explanatory variables of interest. We adopt the number of households and per capita arable land in all but one of the villages within the same county as the pertinent instrument. The results of these Tobit-IV estimations are reported in column (1) of Table 6.

The Tobit-IV regressions show that neither per capita arable land nor production efficiency considerations remains significant, whereas the two measures of transaction costs do, thus suggesting that the land reallocation choice is determined primarily by transaction costs, not by efficiency considerations. In fact, the marginal effects of the variables for the number of plots and number of households are much larger (for instance, the marginal effect of the number of plots is $-1.264 = -3.371*0.375$, column 1, Table 6) than those in the baseline estimation (-0.385, column 1, Table 4), which suggests that there is indeed an endogeneity problem in our earlier estimations. These robust findings go a long way toward explaining why large-scale reallocations remain the preferred choice for some villages, despite their adverse effects on tenure security.

Although the number of plots and the amount of per capita arable land in a village are likely to remain constant over time, the same cannot be said of village population or size in terms of the number of households, both of which are likely to change over

Table 6. Determinants of land reallocation choice – instrumental evidence

	(1)	(2)	(3)	(4)	(5)
Per capita arable land (log-term)	−0.655 [0.878]	−0.236 [0.980]	0.330 [0.464]	−0.161 [0.532]	0.024 [0.634]
Number of plots (log-term)	−3.371** [1.408]	−2.745* [1.609]	−1.811** [0.833]	−2.460*** [0.906]	−2.258** [1.030]
Number of households (log-term)	4.323** [1.840]	3.451* [2.099]	2.154*** [0.818]	2.439*** [0.889]	2.376*** [0.918]
Production efficiency consideration	−0.851 [0.540]	−0.939** [0.463]	−1.007*** [0.381]	−0.872** [0.426]	−0.928** [0.425]
Paddy ratio	1.183 [0.849]	1.308* [0.750]	1.462** [0.584]	1.394** [0.657]	1.354** [0.644]
Growth rate of population (1980 − 2002)	−0.291 [0.373]	−0.146 [0.422]	0.089 [0.232]	0.003 [0.245]	0.050 [0.252]
IV − 1				0.771 [0.517]	
IV − 2					0.374 [0.488]
Scaling factor	0.375	0.375	0.376	0.375	0.375
Observations	95	95	95	95	95
Wald chi2					

Notes: Coefficients reported; standard errors in square brackets; marginal effects in parentheses.
*Significant at 10 per cent level; **significant at 5 per cent level; ***significant at 1 per cent level.
Constant term are included but not reported. Pseudo R-squared for the Tobit model.

time in response to demographic changes. To check whether our original instrument for village size is plausible, we first employ the number of village households in 2002 (column 2) using the 1980 (*n-1*) village population as the instrument. Clearly, this instrument is correlated with the number of village households in 2002, and thus should have no effect on a village's choice of land reallocation type. We further check the validity of our instrument in column (3) using the village population in 1980 as yet another plausible instrument that is clearly correlated with the current village size. The results across all three estimations are significant, although the level of significance is weaker with the second instrument.

To further test the exogeneity of our original instrument, we repeat the same steps, but add the first two instruments to the estimations separately as exogenous regressors to see whether they have any direct effect on the dependent variable (columns 4 and 5). Only when the two exogenous regressors have no direct effect on the land reallocation choice can they be regarded as plausible instruments. This test can be regarded as an easy-to-interpret version of the over-identification test. As the results show, neither of these instruments is significant as an exogenous regressor, thus suggesting that neither directly affects the choice of land reallocation type.

VI. Conclusion

Our unique combination of individualised farming and bifurcated model of periodic land reallocations have allowed us to test the economic logic of land reallocations in

Chinese agriculture empirically by drawing on the insights of the induced institutional change and transaction cost economics theories. Our analysis of a unique village survey fails to offer any support for the notion that the choice of land reallocation mode is related to differences in per capita arable land across villages, our proxy for the theory of induced institutional change. Instead, by decomposing transaction costs into its mapping and matching dimensions, we find support for our hypothesis that the choice of large-scale or partial land reallocation is largely a function of these two costs. More specifically, villages with complex topographies tend to choose partial land reallocation because mapping the redistributed plots among the entire village population would be cost-prohibitive. Conversely, large communities prefer to engage in larger-scale land reallocation because they tend to face higher matching costs.

By relating the two largely exogenous factors that bear upon the choice of land reallocation type to the two separate elements of transaction costs, this study provides an economic rationale – grounded solidly in both theory and empirical analysis – for the bifurcated land reallocation practices observed in Chinese agriculture. We are thus able to make sense of why some villages continue to reallocate land on a large-scale basis, despite escalating policy concerns over such practices and the potential loss of economic efficiency in farming. In the parlance of transaction cost economics, there are hidden benefits embedded in large-scale land reallocation. More generally, the persistence of the majority of villages in adopting a consistent land reallocation pattern over time suggests that they are simply making rational decisions (to economise on the attendant transaction costs) based on their endowment characteristics rather than being trapped in an inferior institutional equilibrium. To the extent that institutional choice is endogenous, any attempt by the government to bring about Pareto improvements by means of administrative fiat is unlikely to succeed, as borne out by many villages' insistence on reallocating land in a seemingly economically inefficient manner.

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Notes

1. For North (1981), for instance, the transformation from hunting-and-gathering to settled agriculture (the 'First Economic Revolution') is premised upon the growing scarcity of large animals caused by over-hunting – the latter a consequence of open access or weak property rights.
2. Given that all of our surveyed villages have reallocated land since de-collectivisation, we focus on analysing the choice between large-scale versus partial reallocations. Our analysis is still relevant for policy, in view of the finding that 5.5 per cent of the households surveyed nationally in 2005 ignored this policy and continued to reallocate land on a large-scale basis, despite strict prohibitions against doing so in the new Rural Land Contract Law of 2002. Altogether, 14 per cent of the surveyed households were found to have reallocated land between 2003 and 2004 (either partially or on a large scale), according to this nationwide China General Social Survey (China General Social Survey, 2005).

3. Land in rural China is typically divided into a number of grades, differentiated on the basis of soil quality, location, and, in some instances, the attendant irrigation facilities (Kung, 1994). For this reason, households in villages characterised by complex topographies are usually assigned a distinctly larger collection of plots.
4. More specifically, mapping costs refer to the time and effort incurred in thoroughly resurveying and recombining plots of varying grades, locations, and facilities, a procedure that is necessary prior to redistributing the newly combined plots among eligible households through a matching process, such as a lottery system.
5. Although a number of factors have been invoked as determinants of the intensity of land reallocations, most of them – for instance, off-farm economic activities and land rental markets – are highly endogenous (Kung, 2000; Brandt et al., 2004; Yao, 2004). The exogenous effect of factor endowment on the transaction costs of land reallocation is, in our view, a missing element in the existing literature on institutional choice in Chinese agriculture.
6. Granted, we do not expect this equity constraint to be the same in every village. Deininger and Jin (2003), for instance, find that 68 per cent, 64 per cent, and 42 per cent of survey respondents in Guizhou, Yunnan, and Hunan Provinces, respectively, express support for the no land reallocation policy. In our survey, only 30.5 per cent of survey respondents support this policy, whereas 31.5 per cent oppose it, and 37.9 per cent are indifferent. The greater support found in Guizhou and Yunnan is attributable not only to the fact that Guizhou is the province in which a policy experiment to freeze land reallocation was implemented, but also to the fact that its predominantly hilly terrain renders large-scale land reallocation rather costly (the issue of policy endogeneity is discussed in greater depth below; also see Kung, 2002, for further details). Although Yunnan was not part of this experiment, it shares a similarly complex geomorphology with Guizhou and thus faces the same constraints. Moreover, although Schwarzwalder et al. (2002) claim that a good majority of their surveyed households support a proposed policy to stop reallocating land for 30 years, there may very likely be a discrepancy between the stated and revealed preferences of their respondents. For instance, 30 per cent of our respondents similarly indicate a preference for ceasing to reallocate land in future, but only 4.1 per cent (5.1%) actually disapprove of the most recent large-scale (or partial) reallocation.
7. The kernel density estimator is defined as $\hat{f}(x) = \frac{1}{n}\sum_{i=1}^{n}\frac{1}{h}\phi\left(\frac{x_i - x}{h}\right)$, where $\phi(\cdot)$ is the standard normal density function.
8. Even studies that examine the exogenous effect of land reallocations on specific farm investments and, accordingly, agricultural productivity fail to take into account the differences in rules and expectations between the two types of land reallocation (Li et al., 1998; Jacoby et al., 2002).
9. That 21.4 per cent of those affected by large-scale land reallocations are able to retain some of the plots originally allocated to them can be attributed to the practice of some villages to reallocate only one particular grade of land (out of three, for example). This is apparently what Gong and Zhou (1999: 140, 142) found in Shangnan County, Shaanxi Province.
10. What is not revealed by this survey is how the partial reallocation rules are determined. In particular, to what extent do negatively affected households have the right to decide which of their plots (if more than one) is to be transferred in the event of a partial readjustment? This is an issue for future research.
11. In fact, policy-makers in China are patently aware of the differences in tenure security inherent in the two reallocation modes. For instance, although they have explicitly banned village authorities from reallocating land on a large scale since 2002, they continue to sanction partial reallocations when land has been severely damaged by natural disasters, as long as the decision to reallocate land is approved by two-thirds of the village representatives (Article 27 of the Rural Land Contracting Law [The Ninth National Party Congress of the Communist Party, 2002]).
12. The hilly terrain of Guizhou cannot be portrayed more graphically than in this description written by a journalist in *Business Week*: 'Even the rice paddies grow tiny as they fight for the last patches of level ground' (Roberts, 2000: 26). In the Meitan County villages surveyed by Kung (2002: 796), the average number of plots farmed by the households there in 1999 was 12.73, which is undoubtedly on the high side compared to, for instance, 2.03 in Shaoxing County in Zhejiang Province in eastern China and 2.66 in Weihui County in the northern Chinese province of Henan (Kung and Liu, 1997: 37).
13. The Meitan policy experiment is endogenous in the sense that the households there were already predisposed to freezing land reallocation, presumably because of the problem of land fragmentation. Even prior to 1987, the year in which the policy was implemented, 70.65 per cent of these households indicated that they had made no land readjustments since the switch to the Household Responsibility

system, and that the practice of ceasing such reallocations had been adopted by the overwhelming majority (77%) of the county's villages in 1984 at the latest, not in 1987 (Kung, 2002: 797). See also Zhou and Liu (1994) for a detailed account of the Meitan experiment.

14. In addition, the fact that a village has a large number of plots helps it to avoid the potential costs of breaking up existing large plots. Moreover, to the extent that people have closer social connections in smaller villages, it also helps to lower the costs of matching. We owe this insight to an anonymous referee.
15. Although it is easy to identify the households affected, matching the transfer of land between them is a much more daunting task in larger villages. For instance, if two of these households are located far away from each other, then the one at the receiving end may be unwilling to accept a distant plot(s). Moreover, such costs would be even higher when it was necessary to carve up larger holdings. We owe this observation to the same anonymous referee acknowledged in the previous note.
16. For example, land of varying quality (good, average, and poor) could be distributed equally among all households; the good land could be distributed equally, with households drawing lots for the other two types; or, after establishing a quality/yield coefficient for land of different degrees of quality, complete holdings could be allocated. See Kung (1994: 182–183).
17. As Table 1 shows, less than 15 per cent of the surveyed villages adopted these dual criteria upon de-collectivisation, and only 6 per cent allocated land based only on a household's labour capacity.

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