

# THE PROBLEM OF TAXING FARMERS IN CHINA

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## ABSTRACT

This paper places the problem of Chinese rural taxation in the context of government regulation and tries to present an integrated theoretical framework of rural development in China in the past two decades. Our theoretical framework can reconcile the stylized facts that the average level of rural taxation relative to rural net income after the 1990s did not increase very fast, but rural taxation became a very serious problem in this period. We found that this is in large part due to the increase of rural income disparity after 1990s and the uneven tax and fee distribution among different income groups. We argue that differentiated enforcement of the government regulations such as grain procurement and birth control play an important role in the rural taxation problem, and more generally, the problem of expanding local government size and rising rural income disparity. The empirical findings do support our hypothesis.

**JEL Classification:** H22, O53

## INTRODUCTION

In recent years, the problem of rural taxation in China, especially of increasing local informal charges on peasants, has become more acute. The central government has been aware of the problem for a decade, and has been taking various steps to alleviate the problem. Yet to date, these actions have met with limited success. In 2002, after a difficult decision-making process, the central government decided to implement the rural taxation reform in 20 provinces accompanied by a central transfer of RMB 25 billion and provincial transfers of about the same size. The nature of the reform can be summarized as “fee-tax-swap”, which removes all local informal fees but increases the rates of formal state agricultural taxes and aims to prevent arbitrary charges by the local governments and the “quasi-governmental” community organizations. Soon after the reform starts, it is found that great pressure is placed on the budgets of local governments. In some regions, a rebound of informal fees seems very possible.

From a historical perspective, what is happening in rural China at the turn of the 21<sup>st</sup> century is rather a rule than an exception. In China’s thousands years of history, similar patterns in rural taxation and reform with the feature of “fee-tax swap” have occurred repeatedly.<sup>1</sup> Very similar to the current rural tax reform, all the taxation reforms in ancient China aimed to remove the informal fees imposed by local governments and instead levy one or two unified formal state taxes to prevent excessive informal levies and corruption. However, what happened after all the reforms was an initial reduction or stabilization of tax burdens followed by resurging fees.<sup>2</sup>

Many scholars have paid attention to the problem of rural taxation in China. Political scientists frequently focus on the political system when attempting to explain surging fees on peasants, and argued that promoting rural elections can lead to improved local governance (Bernstein & Lu, 2001, Qing 2001, Cao 2001). Others have argued that the lack of financial resources and low shares of local government budget in total fiscal budget revenue are the source of high rural taxation burdens (Cao, 2001). Still others argue that lack of property rights protection of peasants is the key to the problem of rural tax burdens, and more generally, the key to the slow rural income growth (Zhou, 2002).

To date, there has not been any systematic research with empirical evidence on this issue, and no explanations are capable of explaining the major stylized facts under one integrated theoretical framework.

This paper is the first step in a systematic study on the problem of rural taxation, and more generally, the problem of the relationships between government regulations and rural taxation, rural factor mobility, rural income growth and disparity. Part II describes the stylized facts on rural taxation using a large panel data set in rural China. Part III presents a brief general theoretical framework to explain the mechanism behind the problem of rural taxation with testable hypothesis. Empirical evidence is provided in Part IV. Part V concludes.

## STYLIZED FACTS

A unique characteristic of rural taxation in China is that besides formal government taxes, the Chinese peasants also need to pay various informal fees to local government (mainly township government) and village community organizations (Tao 2002, Lin etc, 2002a, 2002b). Based on a large panel data set covering over 6000 thousand households and 120 villages in 10 provinces across China from 1986 to 1999,<sup>3</sup> we are able to describe the stylized facts of rural taxation in more than a decade. The most interesting finding is that, on average, there has been no significant increase of rural taxation as a share of rural net income in the period. In most provinces, total tax burdens on rural households (both formal taxation and informal fee charges) increased only 1-4 percentage points as a share of rural net incomes from 1986 to 1999 and the 1990s has seen even less increase. In some more developed coastal provinces such as Guangdong and Zhejiang, there has been some reduction of taxation rates in the whole period. This is contrary to the general belief that rural taxation, and especially the excessive informal fee charges have increased very fast in the past 15 years, especially in 1990s.

Then how can we reconcile the rural taxation dynamics with the fact that problem of rural taxation became more acute after 1990s. Further investigation shows that the main reason that rural direct taxation became an acute problem is the increase of rural income disparity after the 1990s and the uneven tax and fee distribution among different income groups. According to our estimation, rural Gini index in the 10 provinces increased from 0.40 to 0.47 from 1986 to 1999, while at the same time, rural taxation incidence among different income groups did not change accordingly. For example, if we include all formal taxes and informal fees paid by rural households, the share of taxes of the lowest income group in 1986 (annual per capita income less than RMB 200 Yuan) of net income is 10.5 percent, while that of the highest income group (annual per capita income larger than RMB 4000 Yuan) is 9.5 percent. However, in 1999, the share of taxes of the lowest income group (annual per capita income less than RMB 400 Yuan) in net income is 10.5 percent, while that of the highest income group (annual per capita income larger than RMB 8000 Yuan) is 4.4 percent. Given the income level of low-income groups, the higher taxation rates reduce their income significantly and further aggravate their poverty. Therefore, it is rather the increasingly regressive nature of rural taxation and the heavier burdens on poor peasants than the increase of average rural taxation level that caused the problem of rural taxation in China.

The reason that the poor peasants pay much higher shares of their incomes for taxes and fees is connected to the agriculture-dependent nature of rural taxation in China. Taxation on the Chinese rural households is dominantly agricultural taxes levied on arable lands. However, after mid 1980s, larger share of rural income came from non-agricultural sources such as township and village enterprises and migration remittances, which are not subject to state tax administration given the ineffectiveness of the Chinese tax system. Since the poor people are usually the group of people with the lowest proportion of income from non-agricultural sources, they are more vulnerable to rural direct taxation.

However, the income disparity explanation is only partial for at least two reasons. First, the fact that rural income disparity became much higher in the 1990s is something that needs to be explained in any worthwhile integrated theoretical framework that considers rural taxation. Second, the degree of rural income growth, disparity and factor mobility, and the size of local government expansion measured by the level of local government expenditures are also differentiated significantly across regions (Zhu, 2001; Xiang, 2001). Therefore, a more general theoretical framework is definitely needed to explain systematically these major stylized facts.

## A GENERAL THEORETICAL FRAMEWORK ON RURAL TAXATION

### **Higher-Level Government Regulations Plays a Key Role**

We believe that the difficulties in reducing rural tax burdens and the problems encountered in the current rural taxation reform in China is due to a lack of a general theoretical framework with empirical support. No systematic policy recommendations and reform measures can be proposed without an in-depth understanding of the nature of the problem.

We hold that the higher-level government regulations, such as grain procurement, birth control, and many other un-funded development mandates such as the nine-year compulsory education, play a key role putting strains on local governments. The intuition is as follows: since higher-level government needs local governments to implement regulations but does not provide sufficient funding, and since there is an information asymmetry in regulation enforcement between the two (i.e., the higher-level governments cannot perfectly monitor implementation of regulations), local governments may easily expand local bureaucracy and engage in rent-seeking in the name of implementation of the higher-level government regulations. Given that local government expansion encourages rent seeking, crowds out private investment, reduces peasant consumption, they will aggravate rural tax burdens and lower rural income growth. It naturally follows that the differentiated regulations result in differentiated bureaucratic expansions, and further lead to differentiated impact on tax burdens and income growth. Another channel that government regulations may affect rural income growth is that they may have negative impacts on rural factors (such as land, labor and capital) market developments and limit factor mobility.

### **Homogeneous Regulation with Heterogeneous Enforcement**

An important aspect of our regulation argument is that while implemented nationally, the regulations are subject to heterogeneous enforcement, which leads them to have different impacts across regions and households. For example, the central government implemented the grain procurement policy in almost all provinces. However, the quantities of government grain procured (and the ratio of government procurement to total grain output) are very different across different provinces (counties, townships, villages, and even households). The quantity of grain procurement (and its ratio to total grain output) for every province, county, township and village is determined by upper level governments according to a set of rules which take in account the factors such as natural conditions, historical factors, and even political concerns, such as local food self-sufficiency. The fact is that there is sufficient differentiation in grain procurement regulation enforcement across regions and even across households. For the birth control regulation, the central government policy are much more homogeneous across regions. However, the difficulties in implementing the relatively homogeneous regulation also vary across regions. In poor areas where income is low, non-agricultural employment limited and female education underdeveloped, peasants usually want to have more children than their counterparts in richer regions. Therefore, the difficulties in implementing the relatively homogeneous birth control policy in poorer regions are much higher, which entails higher administrative costs and more staffing.

### **Theoretical Hypothesis From the Regulation Framework**

With this “homogeneous regulation with heterogeneous enforcement” concept, we can build up an integrated theoretical framework with the following set of logically consistent hypothesis (due to lack of data, we describe the hypothesis only from the perspective of government grain procurement regulation).

- *Grain Procurement Regulation and Rural Taxation Hypothesis:* Controlling for other factors, the higher the degree of government regulation enforcement (represented by the government grain procurement per capita at village level), the higher the rural taxation per capita.
- *Grain Procurement Regulation and Local Government Size and Corruption Hypothesis:* Controlling for other factors, the higher the degree of government regulation enforcement: the higher the local government size (represented by the local government expenditures per capita), the more likely the local illegitimate fundraising and corruption.
- *Grain Procurement Regulation and Factor Mobility Hypothesis:* the grain procurement regulation tends to limit the mobility of production factors such as land and labor. Controlling for other factors, the higher the government grain procurement per capita, or as a percentage of total grain output in a rural household, the less mobile its production factors, i.e., the less likely its land will be leased out, the less likely its labors will migrate.

- *Grain Procurement Regulation and Income Growth Hypothesis*: by imposing heavy tax burdens on peasants and not contributing much to local public good provision, and also by limiting factor mobility and preventing local and household level comparative advantages from being brought into full play, grain procurement regulations also have negative effects on rural income growth. Controlling for other factors, the higher the government grain procurement per capita or as a ratio of total grain output in a rural village, the lower the income growth.

If the above hypothesis holds, what follows is that with differentiating grain procurement regulation across regions (and also across households), regions (and households) that are more heavily regulated will have heavier rural taxation, be more vulnerable to local bureaucracy expansion and serious corruption, display lower factor mobility and thus lower income growth. The more heavily regulated regions (and households) will then be more locked in agricultural production, which will further lead to heavier rural taxation burden and even lower income growth. This constitutes a vicious cycle for these heavily regulated regions (and households), while the opposite happens to the less regulated regions (and households). Therefore, the differentiating regulation enforcement leads to higher rural income disparity and differentiating rural tax burdens.

## EMPIRICAL ANALYSIS

Based on the large panel data set, we carry out empirical tests on the hypothesis drawn from the theoretical framework.

### Grain Procurement Regulation and Rural Taxation Hypothesis

The variable list is presented in Table 1. In Table 2, we report the results from the panel data two-way effect models that control both village and year dummies as the usual practices for panel data analysis. Hausman statistics are also reported in the choices of presenting either the two-way fixed effect results or the two-way random effects.

Table 1. Variable List for Rural Taxation Hypothesis.

Variables	Definitions
Independent	$feel_{ij}$ is defined as all formal state agricultural taxes plus all local levies per capita. $j$ denotes village,
	$i$ denotes household. $fee2_{ij}$ is defined as local levies per capita. $fee3_{ij}$ is defined as those various local levies not legitimated by national government policy but imposed by local (county or township) government and village community organizations per capita.
Dependent	$food\_Quota_j$ is government grain procurement quota (Kg) per capita at village level (can be viewed as exogenous).
	$avland_{ij}$ is the area of operating arable land for a household.
	$ind_j$ is a variable that denote the degree of industrialization. It is the percentage of operating income of industrial enterprises in the gross operating income of the village. Lagged value is used to control for endogeneity. $public_j$ is the degree of township and village enterprise public ownership. It is operating income for collective enterprise as a percentage of gross operating income of a village. Lagged value is used to control for endogeneity.
	$hinc_{ij}$ is the household net income. $hincome$ is the per capita household net income.
	$Vsize_j$ is the total population of a village. All variables are logged. Other control variables such as dummy variables indicating whether the household contains a member in military soldier, township and village government, and the Communist Party are also added but omitted due to space limitation

As Table 2 indicates, for regression of *lfee1*, *lfee2* and *lfee3*, *lfood* 's coefficients are always positive, and are significant except in the regressions of *lfee3* on *lfood*, which generally supports our hypothesis. The coefficients for *lavland* are always positive both for OLS and two-way effect regressions, meaning the larger the land cultivated by rural household per capita, and the higher the taxation burdens as a percentage of incomes. The coefficients of *Lpublic* are positive and significant in all two-way models, which might show that higher degree of public ownership will tend to raise tax and fee levies. *lind* 's coefficients negative for all local levies in two-way effect models since higher industrialization might increase local revenue, thus lower rural household taxation; *lhincome* has positive but less than one coefficients in all cases, which means that the richer pay more taxes but the taxation regime is regressive in nature. *Lvsize* 's coefficients shows there is significant economy of scale as village population grows.

Table 2. Government Regulation and Rural Taxation Regressions.

Model	Lfee1		Lfee2		Lfee3	
	OLS	Two-way Effect	OLS	Two-way Effect	OLS	Two-way Effect
Lfood_Quota	0.163*** (68.79)	0.171*** (66.37)	0.198*** (72.35)	0.22*** (75.28)	0.093*** (35.35)	0.088*** (34.06)
Lavalnd	0.762*** (79.63)	0.623*** (70.93)	0.905*** (81.95)	0.728*** (73.31)	0.422*** (41.17)	0.389*** (37.63)
Lhincome	0.297*** (-103.99)	0.218*** (44.32)	0.118*** (19.04)	0.16*** (2.98)	0.299*** (52.04)	0.324*** (55.66)
Lpublic_lag	-0.917*** (-28.93)	0.437*** (14.02)	-0.447*** (-12.36)	1.12*** (31.81)	0.229*** (6.78)	0.227*** (6.68)
Lind_lag	0.989*** (30.46)	0.006** (2.36)	0.537*** (14.327)	-1.09*** (-30.11)	-0.44 (-1.27)	-0.028 (-0.828)
lvsize	-0.074*** (-13.36)	-0.034*** (-6.154)	-0.10*** (-15.79)	-0.088*** (-14.19)	-0.095*** (-15.972)	-0.091*** (-14.78)
Constant	0.57*** (15.86)	1.34*** (40.45)	0.71*** (17.24)	1.64*** (43.78)	2.317*** (60.626)	2.378*** (26.67)
Obs	76696					
Adjusted R <sup>2</sup>	0.18	0.36	0.18	0.38	0.11	0.10
Hausman test	57.82 (prob=0.00)		27.26 (prob=0.00)		5.60 (Prob=0.47)	

Note: 1, t statistics in the parenthesis. 2, "\*\*\*", "\*\*", "\*" means the corresponding coefficient is significant at 10%, 5% and 1% level respectively.

### Grain Procurement Regulation and Local Government Size Hypothesis

The variable list is in Table 3. From Table 4, we can see that the regression results do strongly support our hypothesis. The coefficients of *lfood* are positive at 1% confidence level in all regressions. This means higher degree of government grain procurement lead to higher total local government expenditure, higher administrative fees and cadre expenses, and even higher corruption, i.e., local officials can spend more under unspecified purposes.

Table 3. Variable List for Government Size Hypothesis.

Variable	Definitions
Dependent	<i>Exptotal</i> is defined as all village expenditure(including those submitted to upper level government such as township governments and those go to county level governments per capita within a village .
	<i>Exptown</i> is defined as funds submitted to upper level governments plus village administrative fees, plus “other expenditures with unspecified purposes” per capita within a village .
	<i>expvadmin</i> is defined as per capita administration expenditure, plus village cadre subsidies and expenses within a village.
	<i>Expvother</i> is defined as the per capita “other expenditures with unspecified purposes” within a village. The “other expenditures with unspecified purposes” can be understood as expenditures village cadres used for purposes that are hard to report when surveyed, therefore can be viewed expenditures for local cadres’ own benefits.
	<i>Villcome</i> is the per capita village net income. All variables are logged
Independent	<i>lfood</i> , <i>Lvsize</i> , <i>lind</i> , <i>lpublic</i> are defined as in Table 1

Table 4. Government Regulation and Government Size Regressions.

Two-way Effects				
	Lexptotal	Lexptown	Lexpadmin	Lexpother
Lfood_quota	0.109*** (5.544)	0.082*** (2.877)	0.093*** (4.458)	0.074** (2.276)
Lvsize	-0.11* (-1.63)	0.169 (0.168)	-0.164 (-2.199)	0.0067 (0.58)
Lind_lag	0.745*** (3.249)	-0.214 (-0.650)	0.968*** (3.976)	0.905** (2.391)
Lpubic_lag	2.095*** (6.058)	1.403*** (2.819)	2.021*** (5.499)	1.618** (2.83)
Lvincome	0.283*** (3.371)	0.177 (1.464)	0.320*** (3.594)	0.433*** (3.12)
C	2.760*** (3.891)	1.476 (1.446)	1.525** (2.024)	-1.839 (-1.568)
Obs	538			
Adjusted R <sup>2</sup>	0.387 19.48	0.239 25.66	0.458 17.76	0.278 10.20
Hausman test	(prob= 0.001)	(prob= 0.000)	(prob= 0.003)	(prob= 0.06)

Note: 1, t statistics in the parenthesis 2, “\*”, “\*\*”, “\*\*\*” means the corresponding coefficient is significant at 10%, 5% and 1% level respectively.

The coefficient of *lpublic* is also positive in all regressions, which means that a higher degree of public ownership is associated with higher village level expenditures, and manifests the fact that local cadres may also spend through TVEs. In addition, higher industrialization and income level all raise government expenditures.

### Grain Procurement Regulation and Factor Mobility Hypothesis

We also carried out empirical tests of the Grain Procurement Regulation and Factor Mobility Hypothesis using the Probit and Tobit model. We find that that under all circumstances, food regulation (represented by the amount of government grain procurement quota as a percentage of total grain output or per capita grain quota) does have negative impact on the probability of land lease-out after controlling the household's technical efficiency indicator<sup>4</sup>, the number of labor in a household, and the amount of the capital and land in a household, the education level of the household head, and dummy variables indicating whether the household contains a member of state government, township and village government, and the Communist Party. For the labor mobility, similar empirical tests are carried out with the finding that in all cases, food regulation has negative impact on the probability of labor migration for a household, as does the amount of the capital in a household, while the number of laborers, the education level of major labor, all have positive coefficients. In conclusion, the regression results support our hypothesis of the negative impact of grain procurement regulation on factor mobility.<sup>5</sup>

Table 5. Variable List for Income Growth Hypothesis.

Variable	Definitions
Dependent	<p><i>a_growth</i> is the average growth rate of net income per capita from 1995 to 1999.</p> <p><i>a_vinc95</i> is the net income per capita for village in 1995, used as initial income level variable.</p> <p><i>a_food</i> is the average grain procurement as a percentage of total grain production in a village</p>
Independent	<p><i>a_labg</i> is the village labor growth rate during the same period, <i>a_invest</i> is the average village investment rate from 1995 to 1999. <i>a_edu</i> is the average proportion of labors with education of secondary school and above in the total labor force for a village from 1995 to 1999. <i>a_gov</i> is the average village organization expenditure (including those submitted to higher level government such as township funds) as a percentage of total village income..</p> <p><i>a_gov1</i> is the average collective reproduction expenditure (such as new collective enterprise investment) as a percentage of village organization expenditure.</p> <p><i>a_gov2</i> is the average household reproduction expenditure from village budget (such as new collective investment) as a percentage of total village organization expenditure.</p> <p><i>a_gov3</i> is the average collective and household reproduction expenditure plus transportation and education pooling funds as a percentage of total village organization expenditure, which represents the proportion of village expenditure used in local public goods provision in total village organization expenditure.</p> <p><i>a_gov4</i> is the average village expenditure submitted to higher-level government (mainly the township pooling funds) as a percentage of village organization expenditure.</p> <p><i>a_govl</i> is the average social transfer expenditure as a percentage of village expenditure.</p> <p>Other control variables are omitted here due to space limitation</p>

### Grain Procurement Regulation and Income Growth Hypothesis

Table 5 and 6 are the variable list and regression results respectively. From Table 6, we find that the food procurement proxy always has negative and statistically significant coefficients, and the coefficients are always very large. Labor growth and education attainment's impact are not significant, but investment rate has positive effects on growth. In addition, the government expenditure as a percentage of total village income (*a\_gov*) has negative coefficients, but significant only in column (1), which might be due to the fact that we put both food regulation proxy (*a\_food*) and government expenditure variable (*a\_gov*) into the equation, but the former has positive impact on the latter.

However, we also find that  $a\_gov3$ , which represents the proportion of all village expenditures used in local public goods provision in total village organization expenditures does have positive impact on rural income growth (similar results can be found for coefficients of  $a\_gov1$  and  $a\_gov2$ ). These results support our argument that local expenditure is not mainly used in providing local public goods that can promote local productivity and income growth.

Table 6. Government Regulation and Rural Income Growth Regressions.

	(1)	(2)	(3)
Vinc95	-0.000015 (-1.13)	-0.000004 (-0.34)	-0.000008 (-0.69)
a_food	-0.161* (-1.77)	-0.203** (-2.35)	-0.155* (-1.73)
a_labg	0.051 (0.271)	0.023 (0.123)	0.039 (0.22)
A_invest2	0.004*** (2.69)	0.006*** (3.42)	0.004** (2.51)
a_edu	-0.014 (-0.29)	0.0001 (0.003)	-0.0046 (-0.09)
a_gov	-0.186* (-1.6666016)	-0.153 (-1.55988)	-0.168 (-1.55199)
a_gove1	0.111* (1.77)		0.209*** (2.78)
a_gove2	0.106 (1.24)		0.24** (2.16)
a_gove3		0.129** (2.38)	
a_gove4			0.112* (1.93)
a_gove5			0.173* (1.73)
Obs	102		
Adj R <sup>2</sup>	0.22	0.24	0.26
F	1.99	1.89	2.5

Note: 1, t statistics in the parenthesis 2, \*\*\*, \*\*, \* means the corresponding coefficient is significant at 10%, 5% and 1% level respectively.

## CONCLUSIONS

In this paper, we try to reconcile the stylized facts that the average level of rural taxation relative to rural net income after the 1990s did not increase very fast, but rural taxation became a very serious problem in this period in a general theoretical framework. We found that this is in large part due to the increase of rural income disparity after 1990s and the uneven tax and fee distribution among different income groups. We argue that differentiated enforcement of the government regulations such as grain procurement and birth control play an important role in the rural taxation problem, and more generally, the problem of expanding government size and rising rural income disparity. The empirical findings do support our hypothesis.

If our theory holds, a final solution to the problem of heavy rural taxation and rising income disparity should be the removal or at least relaxation of the central government economic and social regulations on rural areas. If the government regulations such as grain procurement did lower rural income growth of the heavily regulated regions and households by increasing rural tax burdens and limiting labor and land mobility, removing or relaxing the government regulations will not only reduce the rural tax burdens and channel more tax revenues toward rural public goods provision, but also promote rural factor mobility, and thus increase rural income growth and promote rural income.



Only with the un-funded mandates and government regulations removed, it is possible to break out of the Huang Zongxi Law that have daunted China for thousands of years and begin to establish a modern system of public finance and local governance.

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Notes:

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<sup>1</sup> Even back to Tang dynasty in the 8<sup>th</sup> century, the Emperor took the so-called "Two-Tax Reform" (Liang Shui Fa), which essentially was intended remove all the informal charges and limit taxation to two formal state taxes (land tax and poll tax). In 1581, the Ming Dynasty also implemented a new taxation policy called as "One-Whip Rule" (Yi Tai Bian Fa, proposed by the famous Prime Minister Zhang Juzheng) to unite all the land tax, poll tax and informal taxes into one formal state taxes. In 1712, the Qing Dynasty also adopted a new tax rule of "Converting Poll Tax To Land Tax and No Additional Taxes Any More" (the so-called Tang Ding Ru Mu, Yong Bu Jia fu).

<sup>2</sup> According to Huang Zongxi, a famous Confucian at the beginning of Qing Dynasty at the turn of 18<sup>th</sup> century, the long-run effects of these rural taxation reforms were to increase rather than reduce tax burdens on peasants. The reason is that with the downward rigidity and frequent increases of government expenditures, formal tax revenues after the reform inevitably fell short of expenditures. This gave local governments no alternative but to re-impose informal fees, during which process excessive levies and corruption followed.

<sup>3</sup> The data set is from the Fixed Point Rural Survey carried out by the Fixed Point Rural Survey Office, i.e., the Survey Department of the Research Center on the Rural Economy (RCRE), at the Ministry of Agriculture in Beijing

<sup>4</sup> i.e., household agricultural technical efficiency calculated using the stochastic frontier production function approach.

<sup>5</sup> Tables for regressions are omitted due to page limit. They can be requested by contacting the corresponding author