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Effects of Inclusive Village Level Public Agricultural Extension Service: Policy Reform Experiment in Western China

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**Effects of Inclusive Village Level Public Agricultural Extension Service:
Policy Reform Experiment in Western China**

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Abstract: The top down public agricultural extension system in China and its early reforms during the 1990's has left millions of farmers without access to extension services. An inclusive agricultural extension system was introduced in 2005 to better meet the diverse technology needs of small farmers. Three key features of the experiment are 1) inclusion of all farmers as target beneficiaries, 2) effective identification of farmers' technology needs, and 3) establishment of an accountability system to provide better agricultural advisory services to small farmers. This paper describes design of the reform initiative and examines its effect on small farmers' access to extension services. Based on the data randomly collected from 950 farmers in six counties from 2005-2007, the paper shows that the inclusive reform initiative significantly improving small farmers' access to agricultural extension services. The implications for further reforms to the agricultural extension system are then discussed.

Key Words: Agricultural Extension, Farmers' Technology Needs, and An Accountability System

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Effects of Inclusive Village Level Public Agricultural Extension Service:

Results from a Policy Experiment in Western China

Background

China's top-down agricultural extension system played a significant role in promoting technological progress and agricultural output growth in China during the 1980s (Zhu *et al.* , 1995 ;Fan, 1996; Huang *et al.* ,1996 ;MOA, 1999). Beginning in the late 1980s, the Chinese agricultural technology extension system has encountered many challenges as further market reforms have been introduced in the country. Similar to other developing nations (Umali and Schwartz, 1994; 1997; Feder *et al.*, 1999; Kidd *et al.*, 2000), China's government has initiated reforms to partially commercialize the public agricultural extension system since the early 1990s. The results of these reforms in China are mixed (Hu *et al.* 2004). One undesirable outcome is that many township level extension organizations have collapsed, and millions of small farmers have difficulty accessing existing agricultural technology extension services (Hu *et. al.* , 2004 ; Ke *et. al.* , 2005).

In response to the mixed results of early reforms, China has started a number of new initiatives to promote a more demand-driven public agricultural extension system. In 2005, an inclusive public agricultural technology extension system was introduced in Pengzhou, Sichuan and Wuchuan, Inner Mongolia Autonomous Region (IMAR), respectively (Hu *et. al.* , 2006; Chen and Shi 2008). The goal is to meet the diverse technology needs of small farmers at the villages by implementing better mechanisms for identifying their technology needs and establishing an accountability system to encourage the extension staff to provide targeted agricultural advisory services to small farmers. Following initial successes, the reform model was embraced by the Chinese Government and scaled up to another 25 counties in 2006. The objective of this paper is to describe the design of the inclusive

reform initiative and to examine its effect on small farmers.

Design of Inclusive Village Level Public Agricultural Extension Service

The inclusive public agricultural extension service “INC initiative” was introduced in Pengzhou, Sichuan and Wuchuan, IMAR, in 2005. Five villages are randomly chosen as pilot sites in 2005 and extended to another ten villages in 2007. Five extension agents from the township extension station are randomly selected as responsible agents to look after one village in 2005, two villages in 2006, and three villages in 2007.

The main objective of the initiative is to encourage the extension agents from the township level to take a more proactive role in meeting the diverse technology needs of small farmers (Hu *et. al.*, 2006, Chen and Shi, 2008). One of the main features of the INC initiative is the use of various approaches to identify the farmers’ technology needs. The Rapid Rural Assessment (RRA) approach is used to identify the farmers’ technology needs using a participatory method. A workbook that tracks the technology needs and challenges for twenty farm families (selected randomly from the village) are completed during the workshop. A survey of farmers agricultural and livestock production activities is also completed by twenty additional individual farmers randomly selected from the village.

To ensure that the agents work towards meeting the farmers’ diversified needs for farming techniques, the INC initiative includes an accountability system for the extension agents. The responsible agent is obligated to provide agricultural advisory services to all farmers in a village and his or her contact information is also displayed on a banner in the village. The agents are also required to offer PROMISE service. Under the PROMISE, the agents provide solutions or to the technology questions posed by the farmers by all means possible and they are also on call for any emergency technology issues. Finally the INC initiative includes a monitoring and evaluation component. The performance of the extension agents is evaluated by farmers in their daily work and assessed by the expert team consisting of the pilot project leader and local government officials. The key performance

indicators include the farmers' adoption of technologies introduced, the rate of door-to-door services for all farmers in "responsible" villages, and responsiveness to emergencies the farmers face. The end of year performance of the responsible agent is assessed by the local agricultural bureau with assistances from the expert team. According to the assessment, each agent may be eligible to receive a bonus of up to 4,000 *yuan* a year.

After its successful implementation of the INC reform initiative, Pengzhou scaled up the model to its 130 villages in 2007, with a few modifications. First, the extension agents are responsible for identifying the farmers' needs based on their own individual informal survey rather than the use of RRA. Second, the target group is farmers selected for technology-demonstrating purpose. Third, the maximum year-end bonus is 3,000 *yuan*. After its evaluation of the INC initiative in the two pilot counties in 2006, the Ministry of Agriculture (MoA) also introduced a similar policy initiative to twenty-five counties from twenty-five different provinces in the country. For the purpose of comparison to the INC initiative, the two MoA reform experiments in Kalaqin county, IMAR, and Pixian county, Sichuan, are included in this study.

Both Kalaqin and Pixian have used service contracts with the extension agents and provided "PROMISE" services to the selected farmers. The MoA experiments differ from the INC initiative on several fronts. First, an attempt is made to include the county level extension agents in the reform initiative. Separate service contracts are designed for the county and township level extension agents with the MoA initiative. They are required to work together to provide door-to-door technology services to pilot villages. Second, a questionnaire is designed to identify farmers' technology needs in the beginning of the year rather than the RAA method. The survey results are incorporated into the services provided by the agents. Third, the target group is the model farmers selected for technology-demonstrating purposes. Forth, local government provides extra operation funds to encourage agricultural technicians to go to the villages. In Pixian, for example, an operational fund in the amount of 5,000 *yuan* per year is provided for each responsible agent. Fifth, technicians are assessed jointly by their work units and the selected farmers. The

performance assessment is linked with agents' promotion.

The basic design and features of these reform initiatives are summarized in Table 1.

Village Setting, Data Collection and Description

In order to examine the effects of different types of reform initiatives, the survey questionnaire was designed to gather information on the farmers' access to technology services during the years 2005-07. A team of four trained enumerators conducted a random survey in IMAR and Sichuan at the end of 2007 and the beginning of 2008. The survey covered all 30 pilot villages under the INC reform initiative (fifteen in Pengzhou and fifteen Wuchuan). At each pilot county, fifteen non-pilot villages (no reform) were selected randomly as a control group. For the Pengzhou reform initiative, an additional fifteen villages were chosen randomly from its reform villages in Pengzhou. For the reform initiatives of the Ministry of Agriculture, fifteen villages were chosen randomly at Pixian County of Sichuan Province and Kalaqin Qi in the Inner Mongolia Autonomous Region, respectively. For comparison, the survey also covered the two counties neighboring to Pixian and Kalaqin as control, the city of Dujiangyan in Sichuan and Song Shan County in IMAR. Fifteen villages were randomly selected in each of the latter two counties as well. At each sample village, ten farmer families were randomly selected. A total of 1350 farmer households from 135 villages at six counties participated in the survey. Relevant information was collected for 2005, 2006, and 2007 when available. As a result, the final sample consists of a total of 2,730 observations.

While the reform initiatives differ cross counties, the six counties are also very different in their social and economic conditions. Table 2 presents the main characteristics of sample villages in 2007, while Table 3 presents the annual income of extension agents as well as the area and number of households for which they are responsible. The annual incomes of the agents responsible for the INC and Pengzhou reform villages are higher than these the non-reform villages. The differences in annual income for the extension agents are not

apparent between the two MoA reform counties and their neighboring counties. It is interesting to note that the arable land, sown area, and the number of farmer households that each agent is responsible for in the INC reform villages is, on average, five to six times of those villages. The differences between the two MoA reform counties and their neighboring counties are also significant. However, the differences between the INC reform villages and Pengzhou reform villages are much smaller than the mean county-wide differences.

The changes of agricultural extension services that farmers receive from the extension agents are measured by three indicators. The first indicator is the percentage of farmers who have a chance to meet the agricultural extension agent in the village. The second is the number of door-to-door village services provided by the extension agents. These two indicators measure efficiency of the reform initiative. The third is the number of techniques introduced by the agents and adopted by the farmers, which measures the quality of the services. Table 4 provides the summary results of the changes of agricultural extension services received by farmers in the reform and non-reform villages in IMAR and Sichuan.

The following general observations can be made:

First, all extension reform initiatives enhance the percent of farmers who meet the extension agents. The percentages of the farmers who have met technicians in the INC reform initiative are 91.0% and 84.0% in Wuchaun and Pengzhou, respectively, which are 71.5% and 47.3% higher than those in the non reform villages of Wuchaun and Pengzhou (19.5% and 36.7%, respectively). 68.3% of farmer have met technicians in the Pengzhou reform initiative, which is 31.6% higher than in the non-reform villages in Pengzhou (36.7%). The percentages of the farmers who have met technicians in the MoA reform initiative are 89.7% and 43.4% in Kalaqin and Pixian, respectively, which are 21.8% and 16.4% higher than those in the non reform villages in Songshan and Dujiangyan (67.9% and 27%, respectively).

Second, all reform initiatives increase the numbers of extension services accessed by farmers at their doorsteps. The numbers of services accessed by farmers in the INC reform

initiative are, on average, 1.82 and 2.30 in Wuchaun and Pengzhou, respectively. These numbers are 1.60 and 1.54 more than those in the non reform villages of Wuchaun and Pengzhou (0.22 and 0.76, respectively). The number of services received by farmers in the Pengzhou reform initiative is 1.28. This is 0.52 more than that in the non reform villages of Pengzhou (0.76). On average, farmers in the MoA reform initiative in Kalaqin and Pixian access services 2.57 and .6 times, respectively. This is 1.01 and 1.15 more than those in the non-reform villages of Songshan and Dujiang yan (1.56 and .39, respectively).

Third, all reform initiatives induce adoption of more agricultural technologies introduced by the extension agents. On average, farmers in the INC reform initiative in Wuchuan and Pengzhou adopted 1.67 and 1.93 new technologies, respectively. These numbers are 1.45 and 1.20 more than in the non-reform villages of Wuchuan and Pengzhou (.22 and .73). The numbers of technologies adopted by farmers in the INC reform initiative are, on average, 1.67 and 1.93 times in Wuchaun and Pengzhou, respectively, which represent 1.45 and 1.20 more times than those in the non reform villages of Wuchaun and Pengzhou (0.22 and 0.73, respectively). The number of technologies adopted by farmers in the Pengzhou reform initiative is, on average, 1.23, which is .5 more than that in the non reform villages of Pengzhou (0.73). The number of technologies adopted by farmers in the MoA reform initiative are, on average, 2.25 and 0.46 in Kalaqin and Pixian, respectively, which are .75 and .13 more than these in the non reform villages of Songshan and Dujiangyan (1.50 and 0.33, respectively).

The Effect of Inclusive Public Agricultural Extension Service

A Probit model below is proposed to control for the effects of farmer characteristics and allow meaningful comparisons between the effects of different reform initiatives on farmers' access to agricultural services:

$$(1) \quad A_{ijk} = a_0 + (a_i + b_i R_i) D_i + g_{ij} X_{ij} + r_{ik} Y_k + e_{ijk}$$

Where A_{ijk} expresses whether the j th farmer has seen the technician in k year under the i th

innovation experiment (if the farmer has seen the technician, the value is 1. Otherwise, the value is 0); D_i indicates the i th reform initiative and its comparison; R_i is the reform experiment dummy where $R_i=0$ is the comparison and $R_i=1$ is the experiment; X_{ij} is a vector of the characteristics of the j th farmer under the i th reform; Y_k is the year dummy and ε_{ijk} is the error term. In the above function, a_0 is the intercept; a_{1i} represents the proportion of the farmers who meet the technician in the i th innovation's comparison; and β_i represents the proportion which farmer meets of farmers who meet the technician in the i th innovation's experiment. The difference between β_i and a_{1i} is the effect of the reform i .

Six reform scenarios are included in the model specification of equation 1. These are: the INC initiative in Wuchuan, IMAR, and its comparison; the INC initiative in Pengzhou, Sichuan, and its comparison; Pengzhou reform initiative and its comparison; the MoA reform initiative in Kalaqin, IMAR, and its comparison Songshan; and the MoA reform initiative in Pixian, Sichuan, and its comparison Dujiangyan. The household characteristics are the household head's age, education, and number of days of off-farm work whether or not there is cadre in the family, family size, the size of the dwelling, and the arable land.

The estimates of Probit model and their marginal effects are presented in Table 5. Most coefficients of characteristic variables are statistically significant at the 0.01% level, and their signs are as expected. Positive sign of the coefficient for EDU indicates that the higher the educational level of farmers, the more willing they are to accept the agricultural services. The positive coefficient of HSIZE mans that the larger a farmer's residential area, the more likely to receive agricultural services. A possible reason is that a family with a larger house typically is more wealthy and influential. Not only could those wealthier households be more likely to attract more attention from the extension agents, but they also they typically show more desire for agricultural services. The positive coefficient for CADRE indicates that a family with cadres is more likely to receive services from the extension agents. In a village, it is not unusual that a family member cadre is a contact point for the extension agent in the village. The negative coefficient of OFFFARM is as expected. It

indicates that the more a household head works off farm, the less likely he will get in touch with extension agents.

All coefficients of the reform initiatives and non-reform comparisons are statistically significant at the level of 0.01 with the exception of Dujiangyan. It shows that, after controlling for farmers' characteristics, all policy initiatives have significant, positive effects on farmers' access to extension agents. To aid in the interpretations, the marginal effects based on Probit estimates are presented in Column 2 of Table 1. Farmers from the villages with the INC reform initiative in Wuchuan are 54.1% more likely to meet the agents relative to the farmers from Wuchaun comparison (no reform). The farmers from the villages with the INC reform initiative in Pengzhou are 50.1% more likely to meet the agents than farmers from Wuchaun comparison (no reform). The farmers from villages with the Pengzhou reform initiative in Pengzhou are 40.7% more likely to meet the agents than farmers from Wuchaun comparison (no reform). The farmers from the villages with the MoA reform initiative in Kalaqin are 47.9% more likely to meet the agents relative to the farmers from Wuchaun comparison (no reform). The farmers from the villages with the MoA reform initiative in Pixian are 22.2% more likely to meet the agents relative to the farmers from Wuchaun comparison (no reform). Similarly, a net marginal effect of a specific reform initiative relative to its comparison (no reform) indicates the effect of that specific initiative. For example, farmers from the villages with the INC reform initiative in Pengzhou are 31.4% (50.1%-18.7%) more likely to meet the agents than the farmers from Pengzhou comparison (no reform). The farmers from the villages with the Pengzhou reform initiative in Pengzhou are 22.0% more likely to meet the agents relative to the farmers from Pengzhou comparison (no reform). The farmers from the villages with the MoA reform initiative in Kalaqin are 11.3% more likely to meet the agents relative to the farmers from Songshan comparison (no reform). The farmers from the villages with the MoA reform initiative in Pixian are 21.7% more likely to meet the agents relative to the farmers from Dujiangan comparison (no reform).

Moreover, the proportion of the farmers who have met the agents in Dujiangyan (no

reform) is no different from that in Wuchuan comparison (no reform). However, compared to that in Wuchuan comparison villages (no reform), the proportion of farmers who have met the agents in Pengzhou comparison (no reform) and Songshan (no reform county) is significantly higher. This indicates that the farmers in Pengzhou comparison (no reform) and Songshan (no reform county) have more chance to meet the extension agents than the farmers in Wuchuan comparison (no reform).

The results of *Wald* tests indicate that the reform initiatives have differential effects on the farmers' access to the services. There is small difference on the effects of the INC reform initiative on the farmers from Pengzhou and Wuchuan. The farmers from the villages with the INC reform initiative in Wuchuan are 4% (54.1%-50.1%) more likely to meet the agents relative to the farmers from Pengzhou reform villages. Such difference can largely be accounted for by different technology requirements by the farmers in Pengzhou and Wuchuan. Farmers in Wuchuan mainly produce potato and oats, while farmers in Pengzhou produce more than ten crops. It is relatively easier for the extension agents to meet with the farmers in Wuchuan than in Pengzhou. The difference on the effect of the INC initiative and Pengzhou initiative is relatively larger. The farmers from the villages with the INC reform initiative in Pengzhou are 9% (50.1%-40.7%) more likely to meet the agents relative to the farmers from Pengzhou reform villages. Such difference can largely be accounted for by different target service groups between the two initiatives. The key difference between the two initiatives is the service target group. The Pengzhou initiative largely serves the demonstrating farmers in the villages, which would reduce the likelihood that it would serve more small farmers. The farmers from the villages with the INC reform initiative in Pengzhou are 27.9% (50.1%-22.2%) more likely to meet the agents relative to the farmers from Pixian county (MoA initiative). The key differences between the two initiatives are the target group, the bonus, and whether or not there is PROMISE service. The farmers from the villages with the INC reform initiative in Wuchuan are 6.2% (54.1%-47.9%) more likely to meet the agents than farmers from Kalaqin district (MoA initiative). The difference between the two initiatives is relatively small. The key differences between the two initiatives are the bonus and whether or not there is PROMISE

service. These results suggest that the target service group of each reform initiative is crucial in its design when having its intended effect on farmers' access to the extension services.

Conclusion and Implication

The paper describes the most recent reform initiative to promote inclusive public agricultural advisory services in rural China. The effect of this inclusive reform initiative on the farmers' access to agriculture extension services are examined using the data randomly collected from 950 villages in counties in IMAR and Sichuan, in 2007 and 2008. Two major conclusions can be reached. First, the introduction of all reform initiatives considered under the study increases the farmers' chance of receiving agricultural advisory services from extension agents. Second, the farmers under the small farmer inclusive reform initiative are more likely to receive the agricultural advisory services than those under other reform initiatives considered under the study. Three distinctive features of the reform initiative are the inclusiveness of all farmers in the reform initiative, systematic approach of identifying the farmers' extension needs, and implementation of PROMISE service with an incentive mechanism.

The results of the study suggest two policy implications: First, it is essential to reform the delivery of the existing public extension system in poor areas in China to enhance efficiency. Second, if the reform is to increase farmers' access to agricultural advisory services, it is important for any reform initiative to serve all the farmers in the village and to adopt the PROMISE service mechanism.

Reference

Chen, K. and S. Shi. 2008. *Mechanism and Application of Demand Driven Agricultural Extension Services: the Role of China-Canada Small Farmer Adapting to Global Markets Project*. Thematic Report #5, Beijing Project Office (BPO), China-Canada Small Farmer Adapting to Global Markets Project. (in Chinese)

- Fan, S., 1996. *Research Investment, Input Quality, and the Economic Returns to Chinese Agricultural Research*. Working Paper, International Food Policy Research Institute. Washington D.C.
- Feder, G., A. Willett, and W. Zipp. 2001. Agricultural Extension: Generic Challenges and the Ingredient for Solutions. Working paper 2129, World Bank, Washington, D.C.
- Hu, R., Cao, J., Huang., Peng, S., Huang, J., Zhong, X., Zou, Y., Yang, J., and Buresh, R. J., 2007. Farmer Participatory Testing of Standard and Modified Site-specific Nitrogen Management for Irrigated Rice in China. *Agricultural Systems* Vol 94, 331–340.
- Hu, R., Yang, Z., Kelly, P., and Huang, J., 2008. Agricultural Extension System Reform and Agent Time Allocation in China. *China Economic Review*. Forthcoming.
- Hu,R., Huang, J., Li, L. 2004., Chinese Agricultural Technology Extension: Present Situation, Questions and Solutions. *Management World* 5, 50-57 (in Chinese).
- Hu,R., Li, L., Zhang, Z., and Shi, S., 2006. A Study of Demand-driven Technology Extension Mechanism. *Agriculture Economy Questions* 11, 50-56. (in Chinese).
- Huang, J., Hu, R., Zhang, L., and Rozelle, S., 2000. *The Economy of Science and Technology in China*. China Agriculture Press, Beijing.
- Huang, J., Hu, R., Song, J. and Rozelle, S. 1999. Agricultural Techniques from Produced to Adopted: the Behavior Comparison of Government, Agriculture Scientist, Agriculture Technician and Farmer. *Influence of Sciences for Social* 1. (in Chinese).
- Huang, J., Hu, R., and Sun, Z. 2000. Let Science and Technology Enter into Thousands of Rural Households: Set Up New ATE Innovation System. *Agriculture Economy Questions* 4, 17-25. (in Chinese).
- Huang, J. and Rozelle, S. 1996. Technological Changes: the Re-discovery of the Engine of Productivity Growth in China's Rural Economy. *Journal of Development Economics* 49.
- Ke, B., 2005. Survey of Agricultural Technology Extension System and Reform Ideas. *China Rural Economy*, No.2, 46-54. (in Chinese).
- Kidd, A. D., J. Lamers, P. Ficarelli, and V. Horrmann. 2000. Privatizing Agricultural Extension: Caveat Emptor. *Journal of Rural Studies*. 16: 95-102.
- Ministry of Agriculture of China [MOA], 1999. *50 Years for Agricultural Science and Technique in China*. China's Agricultural S&T Press, Beijing.
- Qiao, F., Zhang, L., Hu, R., 1999. An Analysis of Extension Behavior of Agricultural Service Technician. *Agriculture Technique Economics* 3, 12-14. (in Chinese).
- Umali, D. L. and L. Schwartz. 1994. *Public and Private Agricultural Extension: Beyond Traditional Frontier*. The World Bank Discussion Paper236, The World Bank, Washington, D.C.
- Umali, D. L. and L. Schwartz. 1997. Public and Private Agricultural Extension: Partners or Rivals? *World Bank Research Observer* 12(2): 203-24.

- Zhang, D. 2007. Provision and Determinants of Public Service of Local Agricultural Technology Extension in China. Doctoral Dissertation, Center for Chinese Agricultural Policy (CCAP), Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences.
- Zhu, X. 1995. *Market-oriented and the Reform of China Agriculture R & D System: History of Agriculture Economics and Technique Development*. China Agriculture Press, Beijing.

Table 1. INC and Other Reform Initiatives of Agricultural Extension System at Villages

Types of Reform Initiatives	Target Groups/Commodity/Services	Identification of Farmers' Needs	Accountability System for Extension Agent	Monitoring and Evaluation	Incentive mechanism	Location and Year Started
INC	<ul style="list-style-type: none"> - All farmers at the village - All crops and livestock - All services related to crop and livestock activities 	<ul style="list-style-type: none"> - Design appraisal from for identifying farmers' technique needs - Randomly select farmers to attend the focus group. - Held discussion among the experts to identify the farmers' technique problems. - Compiling information on farmers' technique needs - Held technique training with farmers to confirm farmers' technique needs 	<ul style="list-style-type: none"> - Individually based - Responsible for extension at three villages - Participate in the needs assessment for farmers - Providing effective services to meet farmers' needs - Ensure farmers' access all the time (i.e.24 hours telephone access) - On call services for emergent problem. 	<ul style="list-style-type: none"> - The percentage of farmers visited at the responsive villages based on the randomly selected farmers - The number and types of technique services provided based on the randomly selected farmers - Responsiveness for emergent issues - The number of technique problems solved - The number of demo farmers - Number of calls made to the monitors - Year-end performance assessment by the project leader and the local government 	<ul style="list-style-type: none"> - Subsidies for travel expense, and telephone bill for providing advisory service - Year-end bonus in a range from 0-4000 Yuan 	<ul style="list-style-type: none"> - Pengzhou, Sichuan; and Wuchuan, IMAR - Started in 2005
Pengzhou	<ul style="list-style-type: none"> - Demo farmers at the village - All crops and livestock - Technical services related to crop and livestock production 	<ul style="list-style-type: none"> - Select farmers for interview by extension agent (not random) - Identify technique problems for those selected farmers 	<ul style="list-style-type: none"> - Individually based - Responsible for extension at three villages - Participate in the needs assessment for farmers - Providing effective services to meet farmers' needs - Ensure farmers' access all the time (i.e.24 hours telephone access) - On call services for emergent problem. 	<ul style="list-style-type: none"> - The percentage of farmers visited at the responsive villages - The number and types of technique services provided - Responsiveness for emergent issues - The number of technique problems solved - The number of demo farmers - Number of calls made to the monitors - Year-end performance assessment by the project leader and the local government. 	<ul style="list-style-type: none"> - Subsidies for travel expense, and telephone bill for providing advisory service - Year-end bonus in a range from 0-3000 Yuan 	<ul style="list-style-type: none"> - Pengzhou, Sichuan - Started in 2006

Table 1. INC and Other Reform Initiatives of Agricultural Extension System at Villages						Continued
Types of Reform Initiatives	Target Groups/Commodity/Services	Identification of Farmers' Needs	Responsibility System for Extension Agent	Monitoring and Evaluation	Incentive mechanism	Location and Year Started
MoA Kelaqin	<ul style="list-style-type: none"> - Demo farmers at the village - Special crops - Technical services related to special crops 	<ul style="list-style-type: none"> - Design questionnaire by a team of county level extension bureau - Complete the questionnaire by individual farmers - Assess farmers technique needs by county level extension bureau 	<ul style="list-style-type: none"> - Station based - Providing door-to-door services to demo farmers by township extension agent - A team of extension experts from the county level extension bureau to provide service during the busy season 	<ul style="list-style-type: none"> - Year-end performance evaluation of township extension station by the county agriculture bureau, township government and clients (including the demo farmers) with relative weights of 50%, 30% and 20% - Year-end performance evaluation of township individual extension agent by the county agriculture bureau, township government and clients (including the demo farmers) with relative weights of 40%, 30% and 30%. - The performance indicators are qualitative in nature. 	<ul style="list-style-type: none"> - Performance evaluation linked with the promotion of individual extension agent. - Permit the extension agent to earn extra income by selling agricultural inputs 	<ul style="list-style-type: none"> - Kelaqin, IMAR - Started in 2006
MoA Pixian	<ul style="list-style-type: none"> - Specialized and demo farmers - All crops - Technical services related to special crops 	<ul style="list-style-type: none"> - Design questionnaire by a team of county level extension bureau - Complete the questionnaire by individual farmers - Assess farmers technique needs by county level extension bureau 	<ul style="list-style-type: none"> - Station based - Providing door-to-door services to demo farmers by township extension agent 	<ul style="list-style-type: none"> - Year-end performance evaluation of township extension station by the county agriculture bureau, and township government with relative weights of 70% and 30% - Year-end performance evaluation of township individual extension agent by the county agriculture bureau, township government and clients (including the demo farmers) with relative weights of 60%, 10% and 30%. - The performance indicators are qualitative in nature. 	<ul style="list-style-type: none"> - 5,000 yuan operational fund per extension worker - 30% more transportation subsidy than the agricultural bureau - Performance evaluation linked with the promotion of individual extension agent. 	<ul style="list-style-type: none"> - Pixian, Sichuan - Started in 2006

Table 2. Characteristics of the Sample Villages by Reform Initiatives in 2007

Types of reform initiatives	The number of sample villages	Population per village	Average number of households per village	Arable land per village (Hactare)	Sown land per village (Hactare)	Non-agricultural population per village
<u>The INC Reform initiative and control non reform Comparison</u>						
Wuchuan, IMAR						
INC initiative (reform village)	15	1,722	431	1,119	954	267
Non reform (control village)	15	1,597	435	1,075	834	290
Pengzhou, Sichuan						
INC initiative (reform village)	15	1,978	653	110	281	514
Non reform (control village)	15	2,637	830	132	297	295
<u>The Pengzhou initiative, the MoA reform, and control non reform comparison</u>						
Pengzhou, Sichuan: INC initiative	15	2,077	654	117	250	413
MoA						
Reform county: Kalaqin, IMAR	15	2,289	584	237	238	205
Control non reform county: Songshan, IMAR	15	3,443	888	846	694	628
Reform county: Pixian, Sichuan	15	2,419	765	170	283	755
Control non reform county: Dujiangyan, Sichuan	15	2,136	654	200	366	596

Source: Authors' survey.

Table 3. Extension Agents' Income and Their Responsible Land and Households in 2007

Type of Reform Initiatives	Agent's annual income (Yuan)	Responsible arable land per agent ('000 Hectare)	Responsible sown area per agent ('000 Hectare)	Responsible number of farmer households per agent ('000)
<u>The INC reform initiative and control non reform comparison</u>				
Wuchuan, IMAR				
INC initiative (reform village)	21,550	3.07	2.87	1.53
Non reform (control village)	16,280	0.56	0.54	0.33
Pengzhou, Sichuan				
INC initiative (reform village)	26,420	0.31	0.72	1.42
Non reform (control village)	21,660	0.39	1.25	3.52
<u>The Pengzhou Initiative, the MoA reform, and control non reform comparison</u>				
Pengzhou, Sichuan: INC initiative	21,970	0.29	0.73	1.56
MoA				
Reform county: Kalaqin, IMAR	20,120	0.41	0.37	0.84
Control non reform county: Songshan, IMAR	21,030	1.62	1.55	1.60
Reform county: Pixian, Sichuan	24,680	0.37	0.62	1.52
Control non reform county: Dujiangyan, Sichuan	24,600	0.08	0.21	0.62

Note: The data for the INC and Pengzhou initiatives are based on the pilot villages, while for other initiatives are the county-wide averages.

Source: Authors' survey.

Table 4. Services Received and the Number of Techniques Adopted by Farmers

	Have met the agents (%)	Services received Percents Numbers		Techniques adopted Percents Numbers	
<u>The INC reform initiative and control non reform comparison</u>					
Wuchuan, IMAR					
INC initiative (reform village)	91.0	84.2	1.82	80.1	1.67
Non reform (control village)	19.5	18.8	0.22	17.9	0.22
Pengzhou, Sichuan					
INC initiative (reform village)	84.0	79.0	2.30	74.3	1.93
Non reform (control village)	36.7	34.6	0.76	35.5	0.73
<u>The Pengzhou initiative, the MoA reform, and control non reform comparison</u>					
Pengzhou, Sichuan: INC initiative	68.3	57.2	1.28	56.8	1.23
MoA					
Reform county: Kalaqin, IMAR	89.7	84.5	2.57	83.2	2.25
Control non reform county: Songshan, IMAR	67.9	64.2	1.56	63.0	1.50
Reform county: Pixian, Sichuan	43.4	36.1	0.60	35.1	0.46
Control non reform county: Dujiangyan, Sichuan	27.0	25.0	0.39	22.7	0.33

Source: Authors' survey

Table 5. Estimates of Probit Model on the Farmers' Access to Extension Services

	Coefficients	Z-value	Marginal Effects
INC reform initiative			
Reform village: Wuchuan, IMAR	2.278	(18.48)**	0.541
Reform village: Pengzhou, Sichuan	1.893	(13.79)**	0.501
Control non reform village: Pengzhou, Sichuan	0.492	(4.11)**	0.187
Pengzhou local government reform Initiative	1.319	(9.54)**	0.407
MoA reform initiative			
Reform county: Kalaqin, IMAR	2.025	(11.52)**	0.479
Control non reform county: SongShan, IMAR	1.150	(8.08)**	0.366
Reform county: Pixian, Sichuan	0.598	(4.58)**	0.222
Control non reform county: Pixian, Sichuan	0.127	(0.96)	0.050
Farmer characteristics variables:			
AGE (Age of household head, years)	0.002	(0.66)	0.001
EDU (Education of household head, years)	0.075	(7.01)**	0.030
OFFFARM (Off-farm days of household head , 100 days)	-0.087	(2.90)**	-0.035
CADRE (Whether family is village cadres; Yes=1 ,No=0)	0.672	(6.63)**	0.245
HSIZE (Household size, persons)	0.029	(1.24)	0.012
LABOR (Proportion of non-family labor force)	0.000	(0.47)	0.000
HSIZE (Residential area, 100 square meters)	0.118	(2.81)**	0.047
LAND (Arable land, hectare)	-0.029	(1.41)	-0.011
Year dummies (2005=0):			
2007	0.210	(2.35)*	0.083
2006	0.053	(0.59)	0.021
Observations	2730		2730

Note: Values in bracket are t-ratios. * and ** represent the levels of significance at 5% and 1%, respectively