DOES THE PROVISION OF PUBLIC GOODS CORRESPOND TO LOCAL DEMAND?

HONGMEI YI, DENISE HARE and LINXIU ZHANG

Recently China's central government has promoted public goods investment in pursuit of rural development and poverty reduction. However, the top down nature of investment planning may lead to mismatches between public goods projects and the demands of local residents. Using village- and household-level survey data, this study seeks to identify the determinants of project implementation, focusing on investments in roads, drinking water, and irrigation. Contrary to some popular perception, our results suggest symmetry between farmers' reported demand and the types of projects implemented in their villages. The relative contribution of local demand to project implementation is seen to vary, however, across different types of public goods. (*JEL* D71, H41, H77, P35)

I. INTRODUCTION

In recent years, China's central government has emphasized public goods investment in pursuit of rural development and poverty reduction in rural areas. More than 310 billion *yuan*[1] from central government sources was invested in the agricultural sector and rural areas between 2001 and 2005 (National Development and Reform Commission, Department of Rural Economy 2006). Leadership has signaled new commitment to the support of rural China through investment projects and other programs (World Bank 2007), and results of recent survey research support the validity of these claims (Zhang et al. 2007).

However, substantial components of public goods investment decision-making are top down, potentially leading to mismatches between investment projects and the demands of local residents. For instance, Rozelle et al. (2005, p. 19) assert that in many cases, investment projects initiated by transfers from national and provincial governments "... do not meet the real needs of the villagers" and that "... one of the main problems of fiscal transfers today is a lack of clear governance process that gets the right amount of funding to the right project." Misallocation of public good investment resources may severely hinder achievement of the economic and social goals that motivate those transfers. As the 1994 *World Development Report* argues, "Infrastructure can deliver major benefits in economic growth, poverty alleviation, and environmental sustainability—but only when it provides services that respond to effective demand and does so efficiently" (World Bank 1994, p. 2).

Prior to the reform era, public goods investment decisions were almost entirely under the command of brigade, commune, and higher levels of government, well removed from the communities in which final project implementation occurred (Ye 1997). Beginning with the household responsibility system introduced in the late 1970s, policy reforms have generated significant increases in various facets of local autonomy, giving local leaders a greater say in fiscal affairs and local economic development (Oi 1999). This move toward greater decentralization could

Yi: Center for Chinese Agricultural Policy, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China 100101. Phone 86-10-6488-8985, Fax 86-10-6485-6533, E-mail yihm.ccap@igsnrr.ac.cn

Hare: Economics Department, Reed College, 3203 SE Woodstock Blvd., Portland, OR 97202. Phone 503-517-7463, Fax 503-777-7769, E-mail dhare@reed.edu

Zhang: Center for Chinese Agricultural Policy, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China 100101. Phone 86-10-6488-9834, Fax 86-10-6485-6533, E-mail lxzhang.ccap@igsnrr.ac.cn

1. For the period of our study, one Chinese *yuan* is equivalent in value to about 12 U.S. cents.

ABBREVIATION

SUR: Seemingly Unrelated Regression

Contemporary Economic Policy (ISSN 1465-7287)
Vol. 29, No. 1, January 2011, 115–137
Online Early publication June 17, 2010
doi:10.1111/j.1465-7287.2010.00207.x

improve the efficiency of public good resource allocation (Tiebout 1956). However, Tiebout's argument relies critically on a few key assumptions, including perfect mobility and information (in order that citizens may choose to live in the communities that best meet their particular preferences), as well as a democratic decision process guiding taxation and spending outcomes. Whether these assumptions are appropriate to the case of most developing countries has been challenged by Bardhan (2002). In the case of China, the household registration system is a critical impediment to population mobility. Although the rural migrant workforce may seem massive relative to that of any other country, it nonetheless constitutes only a moderate portion of the rural population. Moreover, many migrants leave family members behind, and living on the margins of their destination communities, often lack access to even the most basic provisions of public goods and services there (Li 2008). However, village elections offer some proximate opportunity for citizen input to local resource allocation decisions. For instance, the advent of local elections seems to have increased at least the volume of public good investment according to Luo et al. (2007a) where it is reported that the democratic election of village leaders is positively correlated with the level of public good provision.

To be sure, the central government's role in rural public goods' investment decisions remains strong in rural China. For instance, upper level officials continue to maintain a strong hand in local decision-making through their involvement in the appointment of local cadres (Oi and Rozelle 2000), and the performance evaluation structures create incentives for local cadres to give considerable weight to the objectives of their upper level counterparts (Liu and Tao 2007). At the same time, local interests and resources are not completely divorced from public goods investment outcomes, even in the face of a top-heavy decision-making apparatus. As shown by Zhang et al. (2007), local resources contribute significantly to project implementation. Consideration of the recent tax for fee reform provides insight into why local leaders need to pay attention to villagers' demands for public goods and services. The reform actually places limits on unauthorized fee collections by village leaders, and to that end may have impaired village capacity for project self-finance (Luo et al. 2007b). At the same time, however, the changed terms of revenue collection and spending, coupled with the pressure generated by elections, may have increased the responsiveness of leaders to the preferences of local residents. Under the terms of the tax for fee reform, according to the principle of "one affair, one discussion" (*yi shi yi yi*), a ceiling is placed on the amount that may be collected from each villager annually—it is determined according to local conditions but most commonly set at 20 *yuan* (Ministry of Agriculture 2000, 2007). In this context, identification of the project most worthy of pursuit, and taking steps to fully fund it, has become a more important responsibility of leaders at the village level.

Amidst the progression of fiscal reforms, no one has examined the specific question that our study asks, that is, how well does the observed pattern of across-village allocation of public goods investment correspond to variations in local public goods demands? The overall goal of this paper is to examine the determinants of village public goods investment projects, focusing in particular on the correspondence between local demand and project implementation and investment. To meet this goal, we have three specific objectives: (1) to describe recent patterns of public goods investment in China, (2) to measure local demand for a few specific public goods, and (3) to assess the impact of this demand on the public goods projects undertaken. We are mindful that within the category of public goods, some goods are more public (i.e., have higher spillovers) than others, and we bring this distinction to bear in the discussion of our findings. Finally, we examine villagers' political participation as a mechanism for revealing their public goods' demands and consider the impact of participation on project outcomes across the spillover dimension.

The rest of the paper is organized as follows. Section II describes in further detail current policy and practice regarding public goods investments in rural China. Section III introduces the data used in the analysis, summarizing villagers' responses to our questions about their public goods' demands and reporting on some ways in which they reveal these demands to village leaders. Section IV provides the results of our empirical estimations. Section V concludes the paper.

II. PUBLIC GOODS PROVISION IN RURAL CHINA—POLICIES AND PRACTICES

Responsibility for provision of most public goods and services in China is diffused

across a remarkably wide array of government levels. For instance, the center, province, prefecture, county, and township all engage in spending for items such as education, health care, cultural development, support for agriculture, public security, and social welfare (Qiao and Shah 2006). Moreover, the village, a community rather than government unit in China, also plays an important role not only in terms of expenditure share, but also in the final implementation, management, and monitoring of projects (Zhang et al. 2007). Although a rather notable burden of delivery responsibility falls on lower levels of government and the village, much of the decision-making power rests much higher. The central government determines the fiscal capacity of local government through its policy on tax rates and assignment shares. At the same time, minimum levels of service delivery often are mandated at the central level, such as compulsory education through middle school.

Much of the recent published scholarship on China's fiscal system has been relatively critical of its effectiveness. The fundamental ability of local government to operate effectively is called into question, given the incentives and constraints built into the current fiscal system. For one, the bloated size of local government, largely proportional to population, and resulting from the higher level government mandates, creates considerable financial burden in poor regions (Zhang 2006). Moreover, upper level interventions to finance the payroll of cash-strapped local governments only facilitates the maintenance of excess staff whose wages come at the expense of local service provision in the long run (Wong 2007). Instead of enabling local governments to better meet the public goods and service demands of their communities, transfers are reported to distort patterns of local spending and to create incentives for rent-seeking behavior among local officials (Liu and Tao 2007). Further compounding the problem, cadre evaluation systems may lead resources to be applied where they will score the most reward points rather than the greatest social benefit (Lin, Tao, and Liu 2006). Mechanisms that reward local governments for their good performance in public goods and services delivery are lacking and have been recommended as a way to increase accountability and compliance (World Bank 2007).

Furthermore, the inability of many local governments to support the menu of services mandated from above is a persistent problem, and hits poor areas especially hard (Wong 2007; World Bank 2007). Service gaps between regions are reported to be wide (Park et al. 1996), corresponding to increasing disparities in private incomes (Fan 2005; Wong 2007). In fact, the current system of decentralization of service responsibility may further exacerbate regional differences in economic growth prospects (Lin, Tao, and Liu 2006; Zhang 2006). Certainly, the regional disparity that characterizes China's rural public goods allocation cannot be fully explained as the outcome of a Tiebout (1956) efficient matching mechanism as described in the previous section.

In spite of these concerns, however, there also exists some evidence to suggest encouraging trends in China's rural public goods provision. First, rural public service expenditures are increasing (World Bank 2007). Moreover, at the local level, public resources are increasingly directed toward public goods rather than enterprise investment (Zhang et al. 2007). Finally, reforms are being introduced across government levels and service sectors in an effort to improve the administrative capacity for delivery of public goods and services (World Bank 2007). Hence, policy will continue to be an important lever for improving rural standards of living through the provision of more and better quality public goods and services.

Policy also contributes to variation in investment spending across different types of public goods. Roads, for instance, have become a priority item of central government in recent years (Zhang et al. 2007). As Table 1 indicates, expenditure for road construction exceeds investment in other project types, and the gap between roads and irrigation, the next largest item, is growing wider. Recent efforts have been directed most critically toward two kinds of rural road projects, including *tong chang gong cheng*, which aim to increase the carrying capacity of existing roads and *tong da gong cheng*, which are intended to increase the coverage of the road network (Ministry of Communication 2005). Although road construction depends importantly on local funding sources as well as those from above, its priority position at the central level has certainly contributed to its dominant share of total investment spending. In contrast, items such as drinking water and irrigation constitute smaller shares of total investment spending in recent years. With respect to central funding, drinking water received somewhat greater attention in the 1980s and 1990s, with funding to

TABLE 1
Annual Investments in Rural Public Goods by Year, 2001–2006 (Billion Yuan)

	Roads[a]	Primary Schools[b]	Village Clinics[c]	Drinking Water[d]	Irrigation[d]
2001	35.8	7.57		3.50	7.04
2002	49.5	13.21		8.10	10.00
2003	81.8	9.87		3.91	10.46
2004	124.2	12.05	0.79	3.89	8.76
2005	139.9	13.31	0.76	3.27	10.66
2006	159.7		0.76	12.9	6.88

[a]Investment in rural roads includes fund from all sources. Data are taken from the 2001–2006 *Nian Gonglu Shuilu Jiaotong Hangye Fazhan Tongji Gongbao* (*Annual Public Statistics on Roadway and Waterway Transportation*).

[b]Investment in rural primary schools is derived by multiplying the rural share of government appropriations for primary schools to the total amount of primary school capital investment, and therefore represents budgeted capital investment in rural primary schools. Capital investment data are taken from 2002 to 2007 *Zhongguo Jiaoyu Tongji Nianjian* (*China Education Statistical Yearbook*) and government appropriation data are from the 2003–2007 *Zhongguo Tongji Nianjian* (*China Statistical Yearbook*).

[c]Data are taken from the 2005–2007 *Zhongguo Weisheng Tongji Nianjian* (*China Health Statistical Yearbook*).

[d]Investment in rural irrigation and drinking water includes funds from all sources. Data for 2001–2005 are taken from the 2001–2005 *Nian Shuili Tongji Nianjian* (*Annual Statistical Yearbook for Water Resources*). Data for 2006 irrigation investment are from the 2006 *Nian Shuili Fazhan Tongji Gongbao* (*Annual Public Statistical Report on Water Resource Development*). Data for 2006 drinking water investment are from the *2007 Nian Zhengfu Zhinong Touzi Zhinan* (*2007 Guidelines for Government to Support Agriculture*).

alleviate severe deficiencies in access, targeted mostly at inland regions. However, since 1984, the central government has maintained the position that drinking water is primarily the responsibility of villages themselves and subsidies are to be provided only in special circumstances (Ministry of Water Resources 1984). Similarly, construction of irrigation facilities has been a rather low priority for central government in the post-reform period, with farmers and villages taking the main role. Recent central government efforts have been directed toward water conservancy projects in areas with large-scale irrigation already in place.[2] That investment spending on clinics is especially low does not imply that central government has abandoned rural health services, but it may have focused more attention toward financing services—through programs such as the New Rural Cooperative Medical Scheme, for instance (World Bank 2007), rather than building infrastructure for health care providers.

Increasingly, the funds available from upper level governments are offered as a supplement to local resources, and so, as our data will show, the number of jointly funded projects is increasing, relative to projects funded by a single source, whether it is village or other levels. Recent fieldwork[3] also suggests that an investment reward is displacing the investment grant as a means of upper level government subsidy for small-scale infrastructure construction in at least some areas of rural China. That is to say that the upper level funds are not made available until the project is completed, and has been checked and approved by the relevant upper level government agency. Taken together, these trends imply a greater tendency for final directions of spending to be set at lower levels, taking local needs and preferences into account, while upper level governments serve in a guiding but not leading capacity—using their resources to augment those raised locally and to encourage but not mandate particular kinds of infrastructure construction.

III. DATA AND PUBLIC GOODS INVESTMENTS IN SAMPLE VILLAGES

The main data to be utilized in this paper are drawn from the latter two rounds of a sample survey initiated in 2003, conducted by the Center for Chinese Agricultural Policy, Chinese Academy of Sciences. The 2003 sample included 2,459 villages in six provinces,[4] while the 2005 and 2006 follow-up focused on a 101 village subsample, selected randomly from among the villages surveyed in five of the original six provinces. The five provinces included are Jiangsu, representing the southeast, Sichuan, representing the southwest, Shaanxi, representing the northwest, Hebei, representing the north central region, and Jilin, representing the northeast.

2. *Zhonggong Zhongyang Guowuyuan Guanyu Tuijin Shehuizhuyi Xinnongcun Jianshe de Ruogan Yijian* (*Several Suggestions of the CPC Central Committee and the State Council on Promoting the Construction of a New Socialist Countryside*), December 31, 2005.

3. Field studies were conducted by co-authors Yi and Zhang in Shaanxi, Jiangsu, and other provinces in 2007 and 2008.

4. More information on the 2003 sample is available in Luo et al. (2007a).

The data used in this paper were collected through surveys of households and village leaders carried out in two rounds. In the 2005 household survey, eight household respondents selected randomly from within each village were asked to self-report their investment priority rankings and willingness-to-pay for five public goods that are closely related to villagers' production and consumption—roads, primary schools, clinics, drinking water,[5] and irrigation. Rankings were made by an ordinal assignment of the numbers 1–5 across the five goods, representing the highest to lowest priority for investment, should the village be given 50,000 *yuan* to invest in a single public good. Willingness-to-pay was coded as a yes or no response to the question, "Were each villager asked to contribute 20 *yuan* to this project, are you willing to make the contribution?"

In the 2005 village leader survey, the enumerators interviewed one village cadre in each village. The cadre was selected from among the party secretary, the village head, or the village accountant and was queried regarding village socioeconomic characteristics, the existing stock of public goods, and the leader's public goods demand. The set of questions used to elicit public goods demand from village leaders was the same as that for households except that in the case of village leaders, one additional public good (sanitation services) was added to the list. In 2006, the 101 villages were contacted by telephone to obtain information on the most recent round of public works projects. The respondents answered detailed questions about the purpose, starting time, completion time, total investment, funding sources (including any matching funds or labor supplied locally), the implementing institutions, and the intended beneficiaries for every public goods project undertaken between 2005 and 2006.

For the purpose of getting the most consistent information, the 2006 questions were taken from a module of the survey form used in 2005 and the respondents in the 2005 and 2006 surveys are the same in most cases. The two rounds of surveys facilitate our study of how local demand for public goods, measured at their end-of-2004 levels, correspond to the projects implemented between the beginning of 2005 and the end of 2006, controlling for other relevant variables.

Information about 184 public goods projects implemented between 2005 and 2006 in the sample villages is provided in Table 2. Road and bridge construction account for better than 40% of the total, and other dominant projects include drinking water facilities and irrigation. Together, these three types account for more than 70% of projects undertaken. They also account for a considerable share of total investment spending across villages. Eighty-three of the sampled villages had at least one public goods project within our five categories of main interest: road, school, clinic, drinking water, or irrigation facilities.

In recent years, there is a clear trend in the direction of villages partnering with upper level governments to fund public goods projects, as Table 3 demonstrates. The share of projects

TABLE 2
Number and Size of Public Goods Projects in 101 Surveyed Villages, 2005–2006

Project Type	Number of Projects	Project Size (1,000 Yuan)	Project Size Including Corvee Labors (1,000 Yuan)
Roads and bridges	80	299.07	322.56
Irrigation facilities	32	108.15	118.27
Drinking water facilities	25	268.01	273.31
Recreation centers	16	64.10	64.15
Eco-forest	7	26.71	50.17
School construction	6	143.83	147.82
Beautify environment	6	78.95	78.95
Drainage facilities	4	9.38	9.46
Biogas/methane	3	93.00	93.00
Clinic construction	1	18.00	18.00
Sanitation	1	30.00	30.00
Land improvement	1	18.12	18.12
Construct terrace	1	240.00	288.00
Elderly care center	1	120.00	120.00
Total/average	184	203.14	217.13

Source: Authors' sample survey data.

Notes: Three reported projects are omitted here because of extreme or missing project size values. In addition, five projects implemented in the model stage of the New Countryside Construction Project are omitted as all of these projects exhibit characteristics that make them appear to be more private than public goods.

5. Drinking water projects refer specifically to public construction of individual household wells to provide water for consumption uses (as opposed to production use of water, such as irrigation). The main advantage to the households to whom wells are provided is the reduction of time and energy spent in fetching water.

TABLE 3
Share of Projects by Funding Source (Percent), 1998–2006

Years	Funded Fully by Village	Funded Fully by Upper Governments	Funded Jointly	Total
1998–2002	50.16	25.90	23.93	100
2003–2004	49.69	24.69	25.62	100
2005–2006	35.94	10.94	53.13	100
Average	46.63	21.91	31.46	100

Source: Authors' sample survey data.

TABLE 4
Five Types of Public Goods by Funding Source (Percent), 2005–2006

Project	Funded Fully by Village	Funded Fully by Upper Governments	Funded Jointly	Total
Roads and bridges	38.27	11.11	50.62	100
School construction	0.00	33.33	66.67	100
Clinic construction	0.00	0.00	100.00	100
Drinking water	24.00	4.00	72.00	100
Irrigation	34.38	9.38	56.25	100

Source: Authors' sample survey data.

funded solely by the village, as well as those that rely entirely on upper level government sources, is declining. By 2005–2006, more than half of all projects are funded by the village in tandem with resources from above. The majority of the road, school, clinic, drinking water, and irrigation projects are jointly funded, though in the cases of both roads and irrigation, better than one-third of these projects are funded by village resources alone (Table 4).

Our descriptive analysis shows that the stock of public goods in 2004 varies by areas, and the pattern of regional variation revealed by the survey data and published statistics is roughly similar (Table 5). Villages in Jiangsu appear to enjoy the highest accessibility to public goods, with the possible exception of primary schools. That many villages lack their own primary school here may reflect school mergers across villages (which may improve the quality of the education offered there) rather than a deficiency in coverage. Leaving primary schools aside, Shaanxi is the province where village public good stocks are the lowest according to the published data. These findings are in agreement with the survey data for the cases of roads, clinics, and irrigated land. According to the survey data, however, rural households in Sichuan, Shaanxi, and Jilin all have notably low rates of access to tap water.

IV. LOCAL DEMAND AND POLITICAL PARTICIPATION IN SAMPLE VILLAGES

Priority rankings of and willingnesses to pay for public goods results from households and village leaders are tabulated separately and presented in Table 6. While leaders were systematically less willing to pay for additional service than their village constituents, in fact

TABLE 5
The Stock of Public Goods by Sample Province (Percent), 2004

	Villages with a Tar Road		Villages with a Primary School		Villages with a Clinic		Households with Access to Tap Water		Effectively Irrigated Cultivated Land	
Jiangsu	90.0	n.a.	45.0	30.3	90.0	89.5	88.5	92.5	84.2	75.8
Sichuan	50.0	n.a.	65.0	41.0	90.0	85.7	26.5	66.0	56.5	27.3
Shannxi	40.0	n.a.	90.0	79.6	80.0	77.8	55.8	28.5	17.4	25.2
Jilin	66.7	n.a.	61.9	72.7	95.2	92.6	20.5	47.9	32.7	28.6
Hebei	70.0	n.a.	80.0	44.6	90.0	92.8	79.9	80.3	76.4	64.8
China	63.7	n.a.	68.3	53.1	89.1	80.7	53.9	60.0	53.6	41.9

Source: For each category of public good, the left column is calculated using authors' sample survey data, while the right column presents data from national published sources. Published statistics for percent of villages with a primary school were unavailable for 2004 and so values presented here represent 2003 and are drawn from the 2004 *Zhongguo Tongji Nianjian* (*China Statistical Yearbook*). Clinic and tap water figures are from the 2005 *Zhongguo Weisheng Tongji Nianjian* (*China Hygiene Statistical Yearbook*). Irrigated land statistics are from the 2005 *Zhongguo Tongji Nianjian* (*China Statistical Yearbook*).

some similarities between leaders and villagers are apparent across the five goods under inspection. Very clearly, the highest willingness-to-pay and greatest priority is accorded to roads relative to any of the other four goods. Each of schools, drinking water, and irrigation facilities received moderate support, with the vast majority of households and village leaders willing to pay for additional investment in these areas, and votes cast more or less evenly across these three in terms of priority.

Clinics fared the worst in the rank orderings, even though a high percentage of households and leaders were willing to pay for additional clinic investment. It may be surprising that both schools and clinics did not achieve higher rankings, given their important contribution to development of human capital and well-being. However in recent years, the central government has taken greater initiative to ensure the provision of schooling in rural China (World Bank 2007), perhaps weakening villagers' sense of own-responsibility for this item. With respect to clinics, though the quality of health care services is variable and exhibits serious deficiencies in at least some villages, however, most clinics are operated privately and therefore may be seen as less suitable targets for the investment of public resources. The rather high proportion of willingness-to-pay reported across all goods for both households and villagers indicates perhaps that setting the bar at 20 *yuan* is too low. However, the 20 *yuan* level was selected for questioning as it represents the maximum amount that may be collected from villagers under the tax for fee reform discussed in the introductory section. To that end, our findings reflect a substantial appetite for a variety of different public goods and therefore the rank orderings may serve as a better indicator of underlying priorities.

To attend a meeting is the most common way for villagers to participate in village management and express their demand for public goods. Generally, villagers classify these meetings into six types: party branch meeting, village committee meeting, village committee and party branch meeting, small group meeting, village representative assembly, and village general assembly. Of these, the last three types offer the broadest opportunities for participation by villagers because only members of the Communist Party or village cadres will be eligible to attend the first three types. Typically, attendance at small group meetings includes members of all resident households in the small group (or natural village). There may be an elected or appointed small group leader to facilitate the discussion and carry forward the collective response, perhaps even implementing a group project of their own. The village representative assembly is a meeting of the representatives elected by the villagers to make decisions about issues concerning the whole village (rather than just one group) or to raise questions for broader village discussion. The village general assembly includes members of all resident households in the village, focusing mainly on the issues that require village-wide participation. The meetings serve as an opportunity for ideas and opinions to coalesce, ultimately informing leadership of common sentiments or complaints. Although upper level government representatives normally do not attend or participate, they would likely be informed about meeting outcomes through subsequent applications for resources or other requests. Leaders at any level cannot ignore completely the preferences and

TABLE 6
Measures of Survey Respondents' Demand for Five Types of Public Goods, 2004

	Type of Project				
Respondent	**Roads**	**Schools**	**Clinics**	**Drinking Water**	**Irrigation**
Percentage of respondents willing to pay 20 *yuan* for this type of project					
Household	90.47	77.35	72.12	82.71	80.56
Village leader	82.18	65.98	58.00	76.24	71.29
Percentage of respondents who rank this type of project as first priority					
Household	42.76	17.83	6.43	16.35	17.29
Village leader	50.50	17.35	5.00	12.87	11.88

Source: Authors' sample survey data.

demands of the villagers as they depend on their support—including contributions of labor and financial resources—for project implementation. Lack of local support for a project will make it difficult or impossible to proceed.

In 2004, among the 808 households sampled, 536 (or about 66%) attended at least one small group meeting, village representatives meeting, or village general assembly. Broken down more finely, 364 households participated in at least one small group meeting; 164 households participated in at least one village representatives meeting; and 334 households participated in at least one village general assembly (Table 7). The purpose of these meetings varies, though public goods projects and elections are reported to be the most frequent topics of discussion summed across different meeting types. That elections are high on the agenda is no surprise as two-thirds of the villages conducted an election that year when the term of their current head expired. That frequency of public goods projects discussion was nearly equally as high as elections illustrates the high level of interest villagers take in these projects, and the efforts they make to voice their preferences. While villages generally convened general assemblies in the case of elections, in contrast, public goods projects headlined (or were the most frequently reported discussion topic, in any case) at both small group meetings and village representative meetings.

V. DETERMINANTS OF PUBLIC GOODS IMPLEMENTATION AND INVESTMENT

To further examine the impact of local demand on the provision of public goods projects during 2005–2006, we now turn to multivariate regression analysis. Our basic regression framework is as follows:

$$y_i = \alpha + \beta_{\text{villagers}} * \text{local villagers' demand}_i + \beta_{\text{leaders}} * \text{difference in demand between villagers and village cadre}_i + \beta_X * X_i + \beta_Z * Z_i + \varepsilon_i$$

The dependent variable y_i represents alternatively the dichotomous project implementation variable, estimated using a linear probability model, or the project investment level, estimated using the Heckman 2-stage procedure to correct for selection bias. Implementation takes a value of one if implementation of a project

TABLE 7
Villagers' Participation in Meetings, 2004

Type of Meeting	Number of Attending Households in Sample	Total Number of Meetings Attended	Meeting purpose or topic							
			Taxes and Fees	Public Goods Projects	Land Adjustment and Use	Family Planning	Elections	Financial Reporting	Information Reporting	Agricultural Extension	Other
Party branch meeting	80	423	3	20	1	8	15	7	49	1	4
Village committee meeting	33	155	2	22	6	9	11	2	4	1	4
Village committee and party branch meeting	20	84	4	15	2	7	7	1	4	1	3
Small group meeting	364	1337	58	225	63	56	127	17	22	31	26
Village representative assembly	164	547	20	89	25	16	77	17	9	8	11
Village general assembly	334	517	9	82	15	12	251	10	5	10	12
Total	995	3063	96	453	112	108	488	54	93	52	60

Source: Authors' sample survey data.
Notes: For each type of meeting attended, households report one or more meeting purpose or topic. Therefore, the total number of topics reported is greater than the total number of attending households for each meeting type.

of the specified type was begun in 2005 or 2006. Investment measures the total amount of funds (in units of 10,000 *yuan*) spent on the project during the 2005–2006 period. Each variable is measured at the village level (i) and we estimate both implementation and investment models using a system of equations (seemingly unrelated regression [SUR]) approach, with a separate equation for each of three project types (roads, drinking water, and irrigation).

Although we have consistently focused attention on five types of public goods until now (roads, schools, clinics, drinking water, and irrigation), at this point we drop schools and clinics for practical purposes. Only one village in the sample engaged in a clinic project in the survey year. Meanwhile, implementation of a school construction project is conditional on whether the village already had a school, and as noted in Table 5, a substantial portion of villages in the sample do not, and may not be in the running to get one if their school has already been merged with other villages. Moreover, only six school projects were conducted during the surveyed interval. Therefore, small numbers of positive responses in both cases, coupled with the smaller data set for school projects, preclude meaningful estimation for both schools and clinics.

Our main variable of interest in each model is the local demand for the project type. As we introduced in Section IV, we will use the willingness-to-pay for and rank ordering of public goods responses to measure local demand. Willingness-to-pay lends itself easily to the formulation of a dichotomous independent variable, taking a value of one in cases, as previously discussed, where the respondent was willing to contribute 20 *yuan* toward a project. We construct village level averages that report, respectively, the willingness of surveyed households and willingness of surveyed leaders to contribute toward investment in each of the public goods.[6] Specification of the ranking variable is somewhat more complex, as we have calculated a rank index that serves to standardize responses across respondents:

$$\text{Rank Index} = \left(1 - \frac{n_i - 1}{N}\right) \times 100\%$$

where n_i denotes the raw rank of project i which was given by respondent and N denotes the number of projects on the option list. The resulting rankings are averaged separately for households and for leaders within a village over the five public goods. As a check of the robustness of our results, we offer a third measure of local demand—derived from a question about satisfaction with existing public goods and services on the household survey questionnaire. This variable measures the percentage of households in the village reporting the binary response of "dissatisfied" with the status quo. Measurement of the village median presents an alternative to using the mean village demand. We use the mean rather than the median because we have an even number of villager respondents, so often there are two medians for each village. Using a series constructed of medians (when there is one) and means of medians (when there are two) yields results that are very similar to those presented here.

To compare the influence of common villagers' demand relative to that of village leaders, we follow the approach of Bardhan and Mookherjee (2005) and construct a variable to represent the difference between households' demand for the good and that reported by the leader. A positive value reflects higher relative valuation by households, whereas a negative value implies higher relative valuation by the leader. Hence, a negative and significant coefficient on this variable would suggest that village leaders might use their influence to override the demands of local residents. There is no village leader counterpart for the satisfaction measure of demand as this question was not included on the village leaders' questionnaire.

To shed light on how villagers' reveal their public goods' demand to local leaders, we construct a variable to proxy for household participation in local politics. Political participation is measured as the average number of small group meetings, representative assemblies, or general assemblies attended by village households in 2004. We construct an average measure of attendance across the three different meeting types because there is substantial provincial variation in the types of meetings held most frequently. We consider attendance in any one of these meeting to be a valid measure of participation and therefore sum attendance across the three types to avoid confounding the results with other sources of (unobserved) provincial variation. Although frequency of meeting attendance measures only one dimension of local political participation, we feel that it is a meaningful

6. Calculation of the household-based measures of public good demand exclude any household in which at least one member was a village cadre in 2004 to avoid confounding villagers' demand with that of village leaders.

proxy for the degree to which villagers are engaged in local affairs. In a similar vein, Oi and Rozelle (2000) use the frequency of village representative assemblies to proxy for the development of local representative politics. Our measurement includes small group meetings and village general assemblies as well, to capture the full range of meetings at which common villagers might be in attendance. This variable, as well as its interaction with the demand variable, are added to the regressions after a first set of baseline estimates have been established. The null hypothesis we test is whether greater political participation increases the influence of villagers' demand on project outcomes.

Other variables (X) included in the model are intended to control for variation in current village resources (encompassing measures of natural resources as well as financial and political capital), past access to investment for public good infrastructure,[7] and per capita tax collections. Finally, a set of province dummy variables (Z) is included (with Jiangsu omitted) to control for any unobserved province effects.

Our analysis now proceeds to measure determinants of road, irrigation, and drinking water project implementation (linear probability models) and road, irrigation, and drinking water project investment (Heckman 2-stage models) across the 101 villages in the sample. Means and standard deviations of all regression variables are provided, for reference, in Table 8. Variables measured at the household level (such as demand for the public good and income) are entered into our regressions as averages across all the households surveyed within the village.

Discussion will turn first to the results of the baseline model presented in Tables 9–11. The system of linear probability implementation regressions is run six times, including a baseline model for each of the three specifications of the demand variables, and a second expanded model to include the meeting attendance and demand interaction variables. Results are grouped by project type to facilitate comparison across the different demand specifications. In Table 9, we observe that neither households' nor leaders' demand is significant in explaining road project implementation in five of the six specifications, nor is meeting attendance or household income. Presence of a collective enterprise in the village may increase project implementation by as much as 34 percentage points, but this result is statistically significant (with p-value of .07) only in the dissatisfied specifications of demand.[8] A 10 point increase in the percentage of cultivated land that is hilly or mountainous raises the probability of road project implementation by about 5 percentage points. A 10-km increase in the village distance from the township seat reduces project implementation likelihood by about 24 percentage points. These results are consistent with the notion that road projects may be most heavily guided by planning at higher levels of government, as might be most logical for a good such as roads for which network effects are an especially important consideration. The extent of the spillover will naturally vary with the type of road built, and unfortunately our data do not give sufficient detail to distinguish between, for instance, roads that connect small groups within villages versus national highways. However, the available information suggests that most road projects probably create or improve links from villages to townships and therefore can be seen to offer village-wide benefits, in addition to generating positive externalities beyond the village because of increased facilitation of communication, commerce, and other activities.

Drinking water presents a very different sort of public good, where most of the final benefit accrues directly to the recipient household, with those households who gain wells enjoying quicker and easier access to their household water supply. Accordingly in Table 10, we observe that local demand is significant in all three of the baseline specifications of local demand. There is no evidence to suggest that the demands of local leaders override those of households in the implementation of drinking water projects. However, columns 4 and 6 of Table 10 provide support for the role of local political participation (meeting attendance) in facilitating projects. Using the rank index specification and holding demand for drinking water projects constant, a one meeting per household increase in average meetings attendance raises the probability of implementing a water project

7. The past access to investment variable is measured as the percentage of investment coming from outside the village made in projects of that type (road, drinking water, or irrigation) between 1998 and 2003. This percentage is meant to proxy for the village's past success in getting upper level government funding for a particular project type, and therefore may reflect villagers' best information about likelihoods of current funding.

8. Controls for presence of private enterprises were included in earlier model specifications and found to be insignificant in both the implementation and investment regressions for all three of the public goods we analyze.

TABLE 8
Descriptive Statistics of Regression Model Independent Variables (101 Villages)

Variable	Mean	SD	Min	Max
Household average rank index for road projects at the beginning of 2005	0.79	0.13	0.43	1.00
Difference between villagers' average and village cadre's rank index for road projects at the beginning of 2005	−0.04	0.21	−0.46	0.68
Percentage of households willing to pay for road projects at the beginning of 2005 (100%)	0.91	0.12	0.50	1.00
Difference between villagers' and village cadre's willingness-to-pay for road projects at the beginning of 2005	−0.04	0.39	−0.57	0.95
Percentage of households dissatisfied with existing roads at the beginning of 2005 (100%)	0.46	0.29	0.00	1.00
Percentage of investment in road projects between 1998 and 2003 from outside the village (100%)	0.65	0.29	0.05	1.00
Length of muddy/gravel road per *mu* of cultivated land area in 2004 (km/*mu*)	0.006	0.010	0.000	0.058
Length of tar/cement road per *mu* of cultivated land area in 2004 (km/*mu*)	0.001	0.004	0.000	0.033
Household average rank index for drinking water projects at the beginning of 2005	0.57	0.15	0.28	0.93
Difference between villagers' average and village cadre's rank index for drinking water projects at the beginning of 2005	−0.09	0.21	−0.53	0.47
Percentage of households willing to pay for drinking water projects at the beginning of 2005 (100%)	0.83	0.18	0.25	1.00
Difference between villagers' and village cadre's willingness-to-pay for drinking water projects at the beginning of 2005	−0.19	0.43	−0.73	0.77
Percentage of households dissatisfied with existing drinking water infrastructure at the beginning of 2005 (100%)	0.27	0.26	0.00	1.00
Percentage of investment in drinking water projects between 1998 and 2003 from outside the village (100%)	0.54	0.40	0.00	1.00
Percentage of households with access to tap water in 2004 (100%)	0.54	0.43	0.00	1.00
Household average rank index for irrigation projects at the beginning of 2005	0.61	0.16	0.23	0.88
Difference between villagers' average and village cadre's rank index for road irrigation at the beginning of 2005	0.002	0.271	−0.625	0.658
Percentage of households willing to pay for irrigation projects at the beginning of 2005 (100%)	0.81	0.19	0.25	1.00
Difference between villagers' and village cadre's willingness to pay for irrigation projects at the beginning of 2005	−0.10	0.43	−0.77	0.85
Percentage of households dissatisfied with existing irrigation infrastructure at the beginning of 2005 (100%)	0.33	0.27	0.00	1.00
Percentage of investment in irrigation projects between 1998 and 2003 from outside the village (100%)	0.50	0.39	0.00	1.00
Percentage of effectively irrigated cultivated land in 2004 (100%)	0.53	0.38	0.00	1.00
Net per capita income (*yuan*/person)	2608.47	1474.16	300.00	6596.00
Percentage of households who mainly engaged in industry or commerce in 2004 (100%)	0.06	0.10	0.00	0.66
Number of fellow villagers employed by township or higher level governments in 2004 (persons)	6.98	7.63	0.00	35.00
Per capita cultivated land in 2004 (*mu*/person)	1.73	1.53	0.00	8.10
Whether the village had a collective enterprise in 2004 (0 = no, 1 = yes)	0.08	0.27	0.00	1.00
Percentage of cultivated land with a slope higher than 25 degrees (100%)	0.15	0.23	0.00	0.90
Distance from village committee to township seat (km)	5.18	4.05	0.00	19.00
Average number of meetings attended per household	2.67	2.15	0.00	9.50

TABLE 9

Village Road Project Implementation Results—SUR Linear Probability Model

	Baseline			With Participation and Demand * Participation		
	(1) Rank Index Measure of Local Demand	(2) Willingness-to-Pay Measure of Local Demand	(3) Dissatisfaction Measure of Local Demand	(4) Rank Index Measure of Local Demand	(5) Willingness-to-Pay Measure of Local Demand	(6) Dissatisfaction Measure of Local Demand
Local villagers' demand	0.28	−0.30	0.30*	0.42	−0.71	0.24
	(0.47)	(0.49)	(0.08)	(0.49)	(0.33)	(0.36)
Difference in demand between villagers and village cadre	0.09	−0.03	—	0.10	−0.04	—
	(0.70)	(0.79)		(0.68)	(0.78)	
Average number of meetings attended per household	—	—	—	0.06	−0.11	−0.00
				(0.72)	(0.50)	(0.96)
Average number of meetings × local villagers' demand	—	—	—	−0.07	0.13	0.02
				(0.74)	(0.48)	(0.76)
Net per capita income (1,000 *yuan*/person)	−0.13	−0.12	−0.13	−0.13	−0.13	−0.12
	(0.38)	(0.40)	(0.37)	(0.38)	(0.37)	(0.43)
Square of net per capita income	0.02	0.02	0.02	0.02	0.02	0.02
	(0.29)	(0.30)	(0.26)	(0.28)	(0.30)	(0.31)
Number of fellow villagers employed by town or higher level government (ten persons)	−0.02	−0.03	−0.00	−0.02	−0.04	−0.00
	(0.75)	(0.62)	(0.97)	(0.77)	(0.59)	(0.99)
Percentage of investment in road projects between 1998 and 2003 from outside the village	−0.08	−0.05	−0.02	−0.08	−0.06	−0.03
	(0.66)	(0.80)	(0.90)	(0.64)	(0.74)	(0.89)
Per capita cultivated land (*mu*/person)	0.03	0.02	0.01	0.03	0.01	0.01
	(0.54)	(0.70)	(0.76)	(0.53)	(0.76)	(0.75)
Whether there is a collective enterprise in the village (0 = no, 1 = yes)	0.25	0.27	0.34*	0.24	0.28	0.34*
	(0.17)	(0.16)	(0.07)	(0.18)	(0.14)	(0.07)
Percentage of cultivated land with a slope steeper than 25°	0.50**	0.50**	0.53**	0.50**	0.51**	0.50**
	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
Distance from village committee to township seat (10 km)	−0.24**	−0.25**	−0.22*	−0.23*	−0.26**	−0.22*
	(0.05)	(0.05)	(0.08)	(0.07)	(0.04)	(0.08)
Per capita tax—village revenue from retained fee and additional agricultural tax in 2004 (*yuan*/person)	0.00	0.01	0.01	0.00	0.01	0.01
	(0.64)	(0.57)	(0.51)	(0.65)	(0.56)	(0.57)

continued

TABLE 9
Continued

	Baseline			With Participation and Demand * Participation		
	(1) Rank Index Measure of Local Demand	(2) Willingness-to-Pay Measure of Local Demand	(3) Dissatisfaction Measure of Local Demand	(4) Rank Index Measure of Local Demand	(5) Willingness-to-Pay Measure of Local Demand	(6) Dissatisfaction Measure of Local Demand
Sichuan province	−0.15	−0.19	−0.12	−0.16	−0.25	−0.13
	(0.50)	(0.38)	(0.57)	(0.47)	(0.29)	(0.54)
Shannxi province	0.13	0.03	0.09	0.13	−0.02	0.09
	(0.56)	(0.88)	(0.68)	(0.58)	(0.95)	(0.67)
Jilin province	−0.27	−0.31	−0.23	−0.27	−0.34	−0.25
	(0.20)	(0.15)	(0.27)	(0.22)	(0.13)	(0.25)
Hebei province	−0.04	−0.06	−0.07	−0.04	−0.08	−0.06
	(0.81)	(0.73)	(0.68)	(0.85)	(0.67)	(0.76)
Constant	0.67	1.19**	0.68*	0.53	1.62*	0.68*
	(0.18)	(0.03)	(0.07)	(0.40)	(0.06)	(0.09)
Mean of dependent variable	0.66	0.66	0.66	0.66	0.66	0.66
Regression chi-squared	16.77	16.35	19.28	16.93	16.97	19.50
p-value	0.33	0.36	0.15	0.46	0.46	0.24
Observations	101	101	101	101	101	101

Note: p-values are given in parentheses.
*$.05 < p < .10$; **$.01 < p < .05$; *** $p < .01$.

TABLE 10

Village Drinking Water Project Implementation Results—SUR Linear Probability Model

	Baseline			With Participation and Demand * Participation		
	(1) Rank Index Measure of Local Demand	(2) Willingness-to-Pay Measure of Local Demand	(3) Dissatisfaction Measure of Local Demand	(4) Rank Index Measure of Local Demand	(5) Willingness-to-Pay Measure of Local Demand	(6) Dissatisfaction Measure of Local Demand
Local villagers' demand	0.85***	0.77***	0.62***	0.30	0.87**	0.39**
	(0.00)	(0.00)	(0.00)	(0.44)	(0.03)	(0.05)
Difference in demand between villagers and village cadre	−0.10	0.02	—	−0.17	0.02	—
	(0.53)	(0.84)		(0.31)	(0.87)	
Average number of meetings attended per household	—	—	—	−0.10	0.04	−0.01
				(0.11)	(0.64)	(0.73)
Average number of meetings × local villagers' demand	—	—	—	0.21**	−0.03	0.11*
				(0.05)	(0.77)	(0.10)
Net per capita income (1,000 *yuan*/person)	0.06	0.11	0.08	0.08	0.12	0.11
	(0.61)	(0.35)	(0.47)	(0.49)	(0.30)	(0.32)
Square of net per capita income	−0.00	−0.01	−0.00	−0.00	−0.01	−0.00
	(0.82)	(0.59)	(0.86)	(0.74)	(0.52)	(0.69)
Number of fellow villagers employed by town or higher level government (ten persons)	0.07	0.04	0.05	0.08	0.04	0.06
	(0.15)	(0.45)	(0.28)	(0.10)	(0.41)	(0.21)
Percentage of investment in drinking water projects between 1998 and 2003 from outside the village	0.16*	0.15	0.18**	0.17*	0.16	0.21**
	(0.09)	(0.13)	(0.05)	(0.06)	(0.10)	(0.02)
Per capita cultivated land (*mu*/person)	0.07**	0.09***	0.08**	0.08**	0.09***	0.08**
	(0.03)	(0.00)	(0.01)	(0.02)	(0.00)	(0.01)
Whether there is a collective enterprise in the village (0 = no, 1 = yes)	0.33**	0.27*	0.28**	0.36***	0.28**	0.31**
	(0.02)	(0.06)	(0.03)	(0.01)	(0.05)	(0.02)
Percentage of cultivated land with a slope steeper than 25°	0.29*	0.38**	0.42**	0.34*	0.35*	0.47***
	(0.10)	(0.04)	(0.01)	(0.05)	(0.07)	(0.01)
Distance from village committee to township seat (10 km)	0.01	−0.01	0.02	−0.00	−0.00	0.03
	(0.94)	(0.91)	(0.83)	(1.00)	(0.98)	(0.77)
Per capita tax—village revenue from retained fee and additional agricultural tax in 2004 (*yuan*/person)	0.01	0.00	0.01	0.00	0.00	0.01
	(0.54)	(0.68)	(0.30)	(0.78)	(0.71)	(0.53)
Sichuan province	0.55***	0.54***	0.50***	0.51***	0.53***	0.41***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)

continued

TABLE 10
Continued

	Baseline			With Participation and Demand * Participation		
	(1) Rank Index Measure of Local Demand	(2) Willingness-to-Pay Measure of Local Demand	(3) Dissatisfaction Measure of Local Demand	(4) Rank Index Measure of Local Demand	(5) Willingness-to-Pay Measure of Local Demand	(6) Dissatisfaction Measure of Local Demand
Shannxi province	0.07	0.19	0.11	0.12	0.19	0.12
	(0.68)	(0.28)	(0.48)	(0.49)	(0.27)	(0.46)
Jilin province	−0.10	−0.04	−0.07	−0.14	−0.06	−0.11
	(0.53)	(0.80)	(0.63)	(0.40)	(0.72)	(0.47)
Hebei province	−0.04	−0.07	0.04	0.00	−0.06	0.05
	(0.74)	(0.61)	(0.79)	(0.99)	(0.70)	(0.69)
Constant	−0.81***	−1.06***	−0.61**	−0.61*	−1.22***	−0.65**
	(0.01)	(0.00)	(0.02)	(0.07)	(0.01)	(0.02)
Mean of dependent variable	0.25	0.25	0.25	0.25	0.25	0.25
Regression chi-squared	65.04	63.31	77.72	72.99	64.35	85.25
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Observations	101	101	101	101	101	101

Note: p-values are given in parentheses.
*$.05 < p < .10$; **$.01 < p < .05$; *** $p < .01$.

TABLE 11

Village Irrigation Project Implementation Results—SUR Linear Probability Model

	Baseline			With Participation and Demand * Participation		
	(1) Rank Index Measure of Local Demand	(2) Willingness-to-Pay Measure of Local Demand	(3) Dissatisfaction Measure of Local Demand	(4) Rank Index Measure of Local Demand	(5) Willingness-to-Pay Measure of Local Demand	(6) Dissatisfaction Measure of Local Demand
Local villagers' demand	0.71**	0.34	−0.31*	0.66	0.30	−0.22
	(0.02)	(0.17)	(0.06)	(0.13)	(0.42)	(0.34)
Difference in demand between villagers and village cadre	−0.39**	−0.09	—	−0.38**	−0.11	—
	(0.01)	(0.39)		(0.02)	(0.29)	
Average number of meetings attended per household	—	—	—	−0.04	−0.05	−0.01
				(0.60)	(0.54)	(0.74)
Average number of meetings × local villagers' demand	—	—	—	0.02	0.03	−0.04
				(0.84)	(0.80)	(0.56)
Net per capita income (1,000 *yuan*/person)	0.11	0.06	0.01	0.09	0.03	0.00
	(0.40)	(0.62)	(0.93)	(0.51)	(0.79)	(0.97)
Square of net per capita income	−0.04**	−0.03*	−0.03	−0.03*	−0.03	−0.03
	(0.04)	(0.08)	(0.14)	(0.06)	(0.12)	(0.17)
Number of fellow villagers employed by town or higher level government (ten persons)	−0.01	−0.01	0.01	−0.02	−0.01	0.01
	(0.85)	(0.91)	(0.85)	(0.76)	(0.80)	(0.93)
Percentage of investment in irrigation projects between 1998 and 2003 from outside the village	−0.40***	−0.33***	−0.31***	−0.40***	−0.32***	−0.29**
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.02)
Per capita cultivated land (*mu*/person)	−0.02	−0.01	0.00	−0.02	−0.01	−0.00
	(0.68)	(0.82)	(0.97)	(0.67)	(0.80)	(1.00)
Whether there is a collective enterprise in the village (0 = no, 1 = yes)	−0.17	−0.14	−0.13	−0.19	−0.16	−0.14
	(0.26)	(0.38)	(0.38)	(0.21)	(0.31)	(0.35)
Percentage of cultivated land with a slope steeper than 25°	−0.12	−0.14	−0.10	−0.09	−0.11	−0.10
	(0.60)	(0.50)	(0.64)	(0.65)	(0.61)	(0.64)
Distance from village committee to township seat (10 km)	−0.17	−0.16	−0.17	−0.18*	−0.17	−0.18
	(0.10)	(0.14)	(0.11)	(0.09)	(0.11)	(0.10)
Per capita tax—village revenue from retained fee and additional agricultural tax in 2004 (*yuan*/person)	−0.01	−0.01	−0.01	−0.01	−0.01	−0.01
	(0.27)	(0.26)	(0.25)	(0.33)	(0.31)	(0.32)
Sichuan province	−0.39**	−0.46**	−0.41**	−0.36*	−0.41**	−0.31
	(0.03)	(0.01)	(0.03)	(0.06)	(0.03)	(0.11)

continued

TABLE 11
Continued

	Baseline			With Participation and Demand * Participation		
	(1) Rank Index Measure of Local Demand	(2) Willingness-to-Pay Measure of Local Demand	(3) Dissatisfaction Measure of Local Demand	(4) Rank Index Measure of Local Demand	(5) Willingness-to-Pay Measure of Local Demand	(6) Dissatisfaction Measure of Local Demand
Shannxi province	−0.39**	−0.50***	−0.65***	−0.40**	−0.50***	−0.62***
	(0.04)	(0.01)	(0.00)	(0.04)	(0.01)	(0.00)
Jilin province	−0.46***	−0.48**	−0.62***	−0.41**	−0.42**	−0.56***
	(0.01)	(0.01)	(0.00)	(0.03)	(0.03)	(0.00)
Hebei province	−0.31**	−0.37**	−0.39**	−0.34**	−0.42***	−0.41***
	(0.04)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)
Constant	0.58*	0.80**	1.29***	0.71*	0.95**	1.29***
	(0.10)	(0.03)	(0.00)	(0.10)	(0.04)	(0.00)
Mean of dependent variable	0.27	0.27	0.27	0.27	0.27	0.27
Regression chi-squared	37.50	29.55	30.40	39.26	31.93	32.58
p-value	0.00	0.01	0.01	0.00	0.02	0.01
Observations	101	101	101	101	101	101

Note: p-values are given in parentheses.
*$.05 < p < .10$; **$.01 < p < .05$; *** $p < .01$.

by 2.2 percentage points. As drinking water projects tend to have lower spillover—both within and beyond the community—than the other two projects we examine, perhaps meetings serve to facilitate the negotiation and coordination needed to come to agreement on project plans.[9] Resources matter as well, with previous outside funding in drinking water projects, land endowments, and the existence of a collective enterprise all demonstrating a positive influence. Again, we find that hilly or mountainous areas implement more water projects, all else equal, suggesting that the central government maintains some role in project placement.

The final good, irrigation (Table 11), perhaps lies between roads and drinking water in terms of its mix of public versus private benefits. For instance, in ground water irrigation systems, neighboring households most often share a single electric well, to spread high fixed construction costs across more users. There is evidence that local demand is important in project outcomes (in the rank index and willingness-to-pay specifications, though only the former findings are statistically significant at conventional levels). These findings also lend support for the importance of village leaders' demand. The greatest rise in the likelihood of project implementation stems from the simultaneous increase of both villagers' and leaders' priority ranking (or reported willingness-to-pay). In contrast, projects are less likely to be implemented when villagers are dissatisfied with the current irrigation infrastructure, perhaps suggesting that irrigation is an unsuitable choice for the region. Projects seem to be directed toward villages where little outside investment in irrigation has been made recently, and compared to the other public goods we considered, irrigation projects seem especially concentrated in a single province—Jiangsu (the omitted province). Villages located closer to their township seat may have some advantage in getting projects, though the effect is significant at less than 10% in only one of the six specifications. One might expect that implementation of irrigation projects is influenced by local perceptions about land tenure security, and omission of this variable potentially introduces bias into the estimated coefficients. However, including a variable that measures the extent of village land readjustments between 1999 and 2004 yields results that are little different from those reported here.

Our regression framework treats local demand as determined exogenously to project implementation. For various reasons, the assumption of exogeneity may be problematic. For instance, under perfect population mobility, village residence, and therefore the demand response, may be selected on the basis of the array of public goods offered there. Perhaps more appropriate to the Chinese case, rumors or information leaks about possible future projects may shape informants' responses about the kinds of public goods they desire. Therefore, we conduct endogeneity tests of demand, utilizing the village's existing stock of public goods infrastructure and its labor force characteristics (percent of village residents who work outside the village as migrant laborers and percent of village residents who work inside the village in nonfarm jobs) as instruments. Application of a Hausman test fails to reject the hypothesis (at any conventional significance level) that demand is determined exogenously for all three specifications of the demand variables, given the available instruments. Absent any other information about factors that may influence demand for public goods without contributing toward project outcomes, we are unable to perform any further tests or corrections for endogeneity.

Table 12 presents the results of estimating project investment, using a 2-stage Heckman selection procedure. The first stage of the procedure is a probit equation in which the dependent variable represents project implementation and the independent variables are all those included in the expanded linear implementation estimations. An inverse Mills' ratio is constructed from the probit coefficients and included in the second stage equations, in which only observations with positive investment values are included, and the dependent variable measures the project investment level. The second stage investment equations for each of the three types of public goods are once again run as a system of equations to exploit any correlations in their disturbances. The meetings variable and its interaction with demand are excluded from the investment equations because we expect that the main impact of local political participation is on the selection of project type. Once the project is selected, fundraising is the responsibility of local leaders and their superiors.

9. Thanks to an anonymous referee for suggesting this point.

TABLE 12a
Village Road Project Volume of Investment Results—SUR Heckman 2-Stage Selection Model

	(1) Rank Index Measure of Local Demand	(2) Willingness-to-Pay Measure of Local Demand	(3) Dissatisfaction Measure of Local Demand
Local villagers' demand	−97.92	−23.25	27.43
	(0.22)	(0.81)	(0.59)
Difference in demand between villagers and village cadre	−61.15	10.22	—
	(0.28)	(0.67)	
Net per capita income (1,000 *yuan*/person)	38.94	71.29**	31.91
	(0.23)	(0.02)	(0.35)
Square of net per capita income	−4.66	−9.66**	−2.8
	(0.35)	(0.04)	(0.59)
Number of fellow villagers employed by town or higher level government (ten persons)	4.61	14.14	5.95
	(0.74)	(0.33)	(0.66)
Percentage of investment in road projects between 1998 and 2003 from outside the village	−56.48	−49.01	−67.29
	(0.20)	(0.24)	(0.12)
Per capita cultivated land (*mu*/person)	24.72**	27.14**	26.72**
	(0.03)	(0.01)	(0.02)
Whether there is a collective enterprise in the village (0 = no, 1 = yes)	−2.45	−39.21	37.65
	(0.96)	(0.40)	(0.51)
Percentage of cultivated land with a slope steeper than 25°	−33.22	−133.56*	32.70
	(0.70)	(0.07)	(0.70)
Distance from village committee to township seat (10 km)	41.79	77.89**	11.86
	(0.30)	(0.04)	(0.75)
Per capita tax—village revenue from retained fee and additional agricultural tax in 2004 (*yuan*/person)	−2.90	−4.46**	−2.40
	(0.11)	(0.02)	(0.22)
Selection correction	−80.92	−217.72***	−21.49
	(0.42)	(0.01)	(0.82)
Sichuan province	80.22	144.25***	72.42
	(0.14)	(0.01)	(0.17)
Shannxi province	55.17	85.89**	88.87*
	(0.26)	(0.05)	(0.06)
Jilin province	55.25	104.61*	32.01
	(0.38)	(0.08)	(0.58)
Hebei province	8.38	16.96	5.96
	(0.84)	(0.65)	(0.88)
Constant	49.05	−8.92	−69.25
	(0.68)	(0.94)	(0.50)
Mean of dependent variable (10,000 *yuan*)	38.51	38.51	38.51
Number of uncensored observations	67	67	67

Note: p-values are given in parentheses.
*.05 < p < .10; **.01 < p < .05; ***p < .01.

Turning to investment results for road projects (Table 12a), only the village land endowment, per capita, is significant consistently across all three specifications of the model. This result may suggest some importance of local resources toward project funding, which is further supported by the positive (but declining) effect of per capita income on road investment (though this result is significant only for the willingness-to-pay specification). Results on hilly land and distance from the township seat are similar to those from the road project implementation regressions—investments are greater when village land is more hilly and village location is more distant. Interestingly, higher per capita tax collections seem to decrease road project spending, though only the willingness-to-pay specification is significant at better than 10%. Although higher tax collections may give rise to higher levels of public resources, perhaps they also reduce the capacity of leaders to raise additional funds locally for incremental

TABLE 12b
Village Drinking Water Project Volume of Investment Results—SUR Heckman 2-Stage Selection Model

	(1) Rank Index Measure of Local Demand	(2) Willingness-to-Pay Measure of Local Demand	(3) Dissatisfaction Measure of Local Demand
Local villagers' demand	223.82*	472.84**	106.58
	(0.06)	(0.02)	(0.24)
Difference in demand between villagers and village cadre	−58.19	−5.25	—
	(0.30)	(0.90)	
Net per capita income (1,000 *yuan*/person)	93.88**	140.07***	88.41**
	(0.03)	(0.01)	(0.05)
Square of net per capita income	−15.5**	−19.2***	−13.3**
	(0.02)	(0.01)	(0.05)
Number of fellow villagers employed by town or higher level government (ten persons)	73.44***	74.39***	78.16***
	(0.00)	(0.00)	(0.00)
Percentage of investment in drinking water projects between 1998 and 2003 from outside the village	79.98**	102.43***	110.86**
	(0.02)	(0.01)	(0.01)
Per capita cultivated land (*mu*/person)	30.57	92.92***	44.63*
	(0.12)	(0.00)	(0.05)
Whether there is a collective enterprise in the village (0 = no, 1 = yes)	141.02**	215.29***	146.81**
	(0.02)	(0.00)	(0.02)
Percentage of cultivated land with a slope steeper than 25°	−54.92	−14.30	−69.16
	(0.47)	(0.86)	(0.48)
Distance from village committee to township seat (10 km)	30.02	17.97	61.15**
	(0.33)	(0.58)	(0.02)
Per capita tax—village revenue from retained fee and additional agricultural tax in 2004 (*yuan*/person)	−4.54	−5.96	−4.26
	(0.24)	(0.14)	(0.31)
Selection correction	27.30	87.35	45.97
	(0.42)	(0.12)	(0.23)
Sichuan province	103.37	243.48**	174.15*
	(0.25)	(0.04)	(0.06)
Shannxi province	145.45*	303.47***	207.84**
	(0.09)	(0.00)	(0.02)
Jilin province	−94.86	−235.71*	−86.91
	(0.29)	(0.06)	(0.39)
Hebei province	−53.48	−71.42	−20.96
	(0.56)	(0.52)	(0.82)
Constant[a]	−452.15**	−1, 060.32**	−472.87**
	(0.02)	(0.01)	(0.03)
Mean of dependent variable (10,000 *yuan*)	27.33	27.33	27.33
Number of uncensored observations	25	25	25

Note: *p*-values are given in parentheses.
*.05 < *p* < .10; **.01 < *p* < .05; ***$p < .01$.

projects. The signs of the demand variables are inconsistent across specifications and insignificant, corroborating our earlier conclusions about local demand and project implementation—that for a high spillover public good like roads, upper level government planning trumps local desire for the project. The negative coefficient on the selection correction term suggests that factors which predict project implementation may, if anything, be negatively correlated with project funding.

As in the case of project implementation, results on drinking water investment (Table 12b) offer some interesting contrasts to those we observe for road projects. The role of local villagers' demand is firmly established both in the rank index and willingness-to-pay specifications of demand. Drinking water project investment also is positively influenced by a wide variety of local resources—financial (per capita income), political (fellow villagers employed in upper level governments), and natural (per

TABLE 12c
Village Irrigation Project Volume of Investment Results—SUR Heckman 2-Stage Selection Model[a]

	(1) Rank Index Measure of Local Demand	(2) Willingness-to-Pay Measure of Local Demand	(3) Dissatisfaction Measure of Local Demand
Local villagers' demand	−177.03***	−134.88***	−14.51
	(0.00)	(0.00)	(0.55)
Difference in demand between villagers and village cadre	97.40**	26.36***	—
	(0.01)	(0.00)	
Net per capita income (1,000 *yuan*/person)	−23.10	−31.89***	1.01
	(0.24)	(0.01)	(0.96)
Square of net per capita income	5.8	7.52**	−2.59
	(0.26)	(0.02)	(0.61)
Number of fellow villagers employed by town or higher level government (ten persons)	0.47	1.41	2.05
	(0.93)	(0.64)	(0.71)
Percentage of investment in irrigation projects between 1998 and 2003 from outside the village	45.14	22.44	−21.87
	(0.10)	(0.14)	(0.43)
Per capita cultivated land (*mu*/person)	−1.31	−11.33***	−2.70
	(0.77)	(0.00)	(0.62)
Percentage of cultivated land with a slope steeper than 25°	4.40	−0.07	−24.23
	(0.82)	(1.00)	(0.26)
Distance from village committee to township seat (10 km)	31.61*	37.00***	−11.67
	(0.09)	(0.00)	(0.55)
Per capita tax—village revenue from retained fee and additional agricultural tax in 2004 (*yuan*/person)	1.46*	2.02***	0.30
	(0.06)	(0.00)	(0.76)
Selection correction	−69.65**	−58.27***	−2.80
	(0.02)	(0.00)	(0.93)
Sichuan province	37.44	52.03**	−28.17
	(0.23)	(0.02)	(0.38)
Shannxi province	38.26	51.49*	−24.44
	(0.32)	(0.06)	(0.64)
Jilin province	76.37**	92.07***	−13.59
	(0.04)	(0.00)	(0.79)
Hebei province	30.79	40.05**	−38.22
	(0.31)	(0.04)	(0.26)
Constant	140.30***	154.64***	78.7*
	(0.00)	(0.00)	(0.05)
Mean of dependent variable (10,000 *yuan*)	15.14	15.14	15.14
Number of uncensored observations	25	25	25

Note: *p*-values are given in parentheses.
[a]Whether the village has a collective enterprise is dropped because of colinearity.
*.05 < p < .10; **.01 < p < .05; ***p < .01.

capita land), in addition to the presence of one or more collective enterprises. Higher levels of past outside investment in drinking water projects is correlated with higher current levels. Finally, positive (though largely insignificant) coefficients on the selection term suggests that likelihoods of project implementation and levels of investment move in the same direction—villages which are more likely to implement drinking water projects also tend to invest more in their projects.

In the case of irrigation projects (Table 12c), many factors that predict project implementation contribute negatively toward investment—this is true of the selection correction which controls for unobservables, in addition to a number of the observed variables. For instance, if both villagers and leaders express high demand for irrigation projects, investment levels tend to be lower. Perhaps communities with uniform high demand tend to implement irrigation projects frequently, but on a smaller scale. A larger

volume of investment is predicted by lower incomes, lower land endowments, and greater distance from townships. These findings suggest there may be some intervention on the part of upper government in funding selected irrigation projects that would fail to achieve equivalent local support. Higher local tax receipts also contribute to higher irrigation investment. Finally, while villages in Jiangsu, the omitted province, enjoy higher likelihoods of project implementation, the reported project investment tends to be lower there than in other provinces, often significantly so.

VI. CONCLUSION

Local governance and public goods provision in rural China has been the subject of growing attention, with emphasis on ensuring that delivery of services is sufficient for sustained economic growth. Several concerns about the status quo have been noted, including inefficient matching of projects to communities, provision deficiencies because of shortfalls in funding, and severe regional disparities. Our findings speak most directly to the first of these issues. We find evidence to suggest that, contrary to some popular opinion, local demand seems to exhibit a varied pattern of influence on project implementation, with a stronger role for local demand the lower is the spillover associated with the good. Furthermore, our findings suggest that village level participatory bodies (such as small group meetings, village representative assemblies, and village general assemblies) provide opportunities for households to voice their preferences and leverage public goods outcomes better suited to their needs. Consistent with Putnam (1993), our results suggest some prescriptive antidote to the problem of mismatching—that civic engagement gives rise to better government and more effective public service. Moreover, our assessment of public goods investment patterns suggests that the current system of coordination between local and upper governments demonstrates some awareness of how and where the payoffs to investment are generated, with local resources being a more important determinant of investment in low spillover public goods. Meanwhile, we do not deny the concerns expressed elsewhere concerning the potential inequities associated with fiscal decentralization, as local resources are shown to contribute significantly, albeit to varying degrees, in the project investment levels of each of the public goods types that we analyze.

REFERENCES

Bardhan, P. "Decentralization of Governance and Development." *Journal of Economic Perspectives*, 16(4), 2002, 185–206.

Bardhan, P., and D. Mookherjee. "Decentralizing Anti-Poverty Program Delivery in Developing Countries." *Journal of Public Economics*, 89(9), 2005, 675–704.

Fan, S. "Investment or Subsidies: Where Should China be Heading?" ch. 1.3 in *China's Agricultural and Rural Development in the Early 21st Century*, edited by H. Bernard, J. Huang, S. Rozelle, and J. Skerritt. Monograph 116, Canberra: Australian Centre for International Agricultural Research, 2005.

Li, S. Rural Migrant Workers in China: Scenario, Challenges and Public Policy. Working Paper No. 89, Geneva: Policy Integration and Statistics Department, International Labour Office, 2008.

Lin, J., R. Tao, and M. Liu. "Decentralization and Local Governance in China's Economic Transition", ch. 10 in *Decentralization and Local Governance in Developing Countries*, edited by P. Bardhan and D. Mookherjee. Cambridge: MIT Press, 2006.

Liu, M., and R. Tao. "Local Governance, Policy Mandates and Fiscal Reform in China," ch. 8 in *Paying for Progress in China: Public Finance, Human Welfare and Changing Patterns of Inequality*, edited by V. Shue and C. Wong. New York: Routledge, 2007.

Luo, R., L. Zhang, J. Huang, and S. Rozelle. "*Village Elections, Public Goods Investments, and Pork Barrel Politics, Chinese-style*." Unpublished manuscript, 2007a.

———. "Elections, Fiscal Reform and Public Goods Provision in Rural China." *Journal of Comparative Economics*, 35(3), 2007b, 583–611.

Ministry of Agriculture. 2000. *Cunji Fanweinei Chouzi Choulao Guanli Zanxing Guiding (Temporary Regulations on Raising Money and Labor at the Village Level)*. July 6, available at http://www.agrigx.gov.cn/zcfg/bmgzwj/nyjcjfwnczclllzxbf.htm

———. 2007. *Cunmin Yi Shi Yi Yi Chouzi Choulao Guanli Banfa (Regulations on Raising Money and Labor by the way of "One Affair, One Discussion")*. January 16, available at http://www.gov.cn/zwgk/2007-01/26/content_509904.htm

Ministry of Communication. 2005. *Nongcun Gonglu Jianshe Guihua (National Rural Road Construction Plan)*. Available at http://jtyss.ndrc.gov.cn/fzgh/t20050714_35929.htm

Ministry of Water Resources. 1984. *Shuili Dianli Bu Guanyu Nongcun Renchu Yinshui Gongzuo de Zanxing Guiding (Provisional Regulations on Drinking Water for Humans and Domestic Animals in Rural Areas)*. August 13, available at http://www.sxwater.gov.cn/oldweb/zcfg/NCJSYSFLFG/NCJSYSFLFG1024.htm

National Development Reform Commission, Department of Rural Economy. 2006. *2006 Nian Zhengfu Zhinong Touzi Zhinan (Shibian), (2006 Guidelines for Government to Support Agriculture (trial edition))*. July 4, available at http://zys.ndrc.gov.cn/xwfb/t20060704_75341.htm

Oi, J. *Rural China Takes Off*. Berkeley: University of California Press, 1999.

Oi, J., and S. Rozelle. "Elections and Power: The Locus of Decision-Making in Chinese Villages." *China Quarterly*, 162, 2000, 513–539.

Park, A., S. Rozelle, C. Wong, and C. Ren. "Distributional Consequences of Reforming Local Public Finance in China." *China Quarterly*, 147, 1996, 751–778.

Putnam, R. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton: Princeton University Press, 1993.

Qiao, B., and A Shah. "Local Government Organization and Finance: China," ch. 4 in *Local Governance in Developing Countries*, edited by A. Shah. Washington, D.C.: World Bank, 2006.

Rozelle, S., J. Huang, and L. Zhang. "Rural Fiscal Policy: The Key to China's Development in the 21st Century," ch. 1.2 in *China's Agricultural and Rural Development in the Early 21st Century*, edited by B. H. Sonntag, J. Huang, S. Rozelle, and J. H. Skerritt, Monograph 116, Canberra: Australian Centre for International Agricultural Research, 2005.

Tiebout, C. "A Pure Theory of Local Expenditures." *Journal of Political Economy*, 64(5), 1956, 416–424.

Wong, C. "Can the Retreat from Equality be Reversed? An Assessment of Redistributive Fiscal Policies from Deng Xiaoping to Wen Jianbao," ch. 1 in *Paying for Progress in China: Public Finance, Human Welfare and Changing Patterns of Inequality*, edited by V. Shue and C. Wong. New York: Routledge, 2007.

World Bank *World Development Report: Infrastructure for Development*. Washington, D.C.: World Bank, 1994.

———. *China Public Services for Building the New Socialist Countryside*. Rural Development, Natural Resources and Environmental Sustainable Development Department, East Asia and Pacific Region. Report No. 40221-CN, 2007.

Ye, X. "Lun Nongcun Gonggong Chanpin Gongji Tizhi de Gaige (A Study on the Reform of Rural Public Goods Provision System)." *Jingji Yanjiu*, 5, 1997, 57–62.

Zhang, L., R. Luo, C. Liu, and S. Rozelle. "Investing in Rural China: Tracking China's Commitment to Modernization," ch. 6 in *Paying for Progress in China: Public Finance, Human Welfare and Changing Patterns of Inequality*, edited by V. Shue and C. Wong. New York: Routledge, 2007.

Zhang, X. "Fiscal Decentralization and Political Centralization in China: Implications for Growth and Inequality." *Journal of Comparative Economics*, 34(4), 2006, 713–26.