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Do Secure Land Use Rights Reduce Fertility? The Case of Meitan County in China

James Kai-sing Kung

ABSTRACT. *Based on the belief that collective landownership is pro-natalist, the Chinese government experimented in a remote southwestern county (Meitan) in 1987 with the practice of freezing land reallocations in response to demographic change for twenty years. Premising on the norm of a two-children family in rural China, evidence suggests that demand for the third child is attributable to strong son preference. Neither secured land rights nor family planning policy can curb such a proclivity. The experiment has, however, stimulated an active land rental market, which may have long-term profound implications for the development of private land rights and fertility behavior. (JEL J13, Q15, P48)*

I. INTRODUCTION

After existing for roughly a quarter of a century, China eventually dismantled her collective farms in the early 1980s and restored the household as the primary unit of farm organization. Despite this individualization of agriculture, farmers in China are entitled to only use and income rights; they do not legally own the land on which they farm. Under what is essentially a regime of collective ownership, land is subject to periodic reallocations in response to the claims of new members of the village community for an equal share of this common resource, where membership is acquired either at birth or through cross-village marriages. Although the frequency and magnitude with which reallocations occur vary across villages, and that on the whole they have been less intense than critics have alleged, the majority have indeed reallocated land since decollectivization (Kung 2000; Kung and Liu 1997; Liu, Carter, and Yao

1998). In exploring the crucial link between land tenure policy and fertility behavior in rural China—a much neglected topic,¹ the late Professor D. Gale Johnson (1994) criticizes this institutional arrangement as having a *pro-natalist* tendency.² In his own words, “(t)he practice of land reallocation upon a birth increases the desired number of children without regard to sex, and the loss of land upon a death increases the desired number of sons to provide for old-age security for the surviving spouse” (Johnson 1994, 510).³

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¹ Most of the studies on China’s current land tenure system have revolved around its effect on farm investment (see also Li, Rozelle, and Brandt 1998; Prosterman, Hanstaad, and Li 1996; Wen 1995; Zhou and Liu 1994). Rarely do these studies make the connections with fertility behavior.

² His argument is thus somewhat reminiscent of the “land-security” hypothesis in the fertility literature, according to which there exists a negative relationship between ownership or tenure security and childbearing. According to this view, the demand for children falls as ownership increases, as land is considered an effective substitute for children as a security asset (Schutjer and Stokes 1984).

³ It is quite true that the pro-natalist tendency would persist even where a fine, which typically assumes the form of a one-time, lump-sum payment, is imposed on above-quota births. Hence, even though the fine may discount the benefits accrued to the full per capita share of land entitlement, “any land reallocation provides a positive benefit from having an additional child” (Johnson 1994, 511).

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The allegation of China's family farming system being inefficient because of communal ownership has indeed found a sympathetic ear among the Chinese policy-makers. Fearing that farmers will not invest optimally in their contracted plots because of insecure tenure and may have been tempted to have more children, if by doing so they could have access to more land, a "natural experiment" of sort was conducted in 1987 in a Chinese county whose aim was to ascertain if the above undesirable tendencies could be arrested (it was assumed that they already existed). The essence of this experiment is this: beginning from 1987, and for a period of 20 years, villagers in Meitan County of Guizhou Province, a poor province in southwestern China,⁴ were prohibited from reallocating land in response to demographic change.⁵ The objectives of this experiment were two-fold. First, enunciating land reallocations would render land tenure more secure, thereby attracting more land-specific investments. Second, by removing the subsidy henceforth provided to farm households in the form of equal land use rights, they would be discouraged from having more children. According to the officials-in-charge, this experiment has been enormously successful in terms of the foregoing policy objectives (Li and Ding 1994). After comparing the crude birth rates between Meitan County and Guizhou Province for the years 1989, 1990, and 1992, the late Professor Johnson concurred that "the assignment of land use rights for long periods (had) a major negative effect on birth rates" (512).

In principle, the idea that reducing the subsidy provided to households in raising children will dampen the demand for children is an intuitively plausible and thus appealing one. Upon deeper reflection, however, it is too sweeping a generalization, as fertility behavior is unlikely deter-

mined by the costs of raising children alone. Most notably, the strong preference for sons in developing countries in general and in rural China in particular, among other considerations, complicates a household's decision with respect to the desired number of children that they may want to have. Adding to the complexities of fertility decisions in rural China are the varying policy—most notably family planning—constraints with which farm households of different cohorts in the respective course of their fertility cycles faced, and as such it will likely "contaminate" the effect of the land tenure experiment on fertility behavior. In view of these complexities, assessing the effect of a land tenure experiment on fertility outcomes requires controlling also for these other factors that may bear upon fertility behavior—the object of this paper.

Based on a small but unique farm survey conducted in Meitan County in 1999, this paper attempts to provide an empirical test of the proposition that halting land reallocations will effectively deter rural families from having more children. Specifically, in view of the Chinese preference for having two children and the current family planning policy that basically permits rural couples to have two, we will test the effect of this experimental land tenure policy on the marginal fertility decisions pertaining to the *third* child. In doing so, we control for both the possible effect of family planning policy and a number of factors that may bear upon a household's fertility decisions; some of the more important determinants being son preference, whether a spouse has been assigned land, and female (the mother's) education attainments.

The remainder of this paper is organized as follows. In Section 2, we will provide a background on both the land tenure experiment and also the family planning policy as it was implemented in Meitan, whereas Section 3 introduces the data source. The key hypothesis of linking land tenure policy to fertility behavior and the overall empirical strategy are then spelled out in Section 4, and the empirical results discussed in Section 5. In Section 6, the effect of the experiment on land rental markets

⁴ Guizhou was the poorest province after Xizang in terms of per capita net income in 1998—the year before the survey used in this paper was conducted.

⁵ For further details on the background of this experiment, see Kung (2002a).

development is addressed. A brief conclusion is provided in Section 7.

II. THE LAND TENURE EXPERIMENT AND FAMILY PLANNING IN MEITAN

Before we proceed to the empirical analysis it is necessary to provide a brief background on the land tenure experiment in Meitan. Additionally, given that villagers in Meitan faced also the simultaneous constraint of family planning policy, we also provide a brief introduction to changes in this policy during the same period in question. In particular, we will point out how local implementation during 1979–1983 had deviated from national standards, and the likely effect of such a deviation on fertility outcomes. We begin with the land tenure experiment.

A unique feature of China's family farming system is that, although farming is done on an individualized basis, farmers do not legally own the land they farm. Under what is essentially a communal property rights system, members of a village community may be regarded as having an "embedded right" and as a corollary equal access to the commonly-owned resources—an institutional arrangement that provides the basis for land reallocation practices. To be sure, the central government did try to discourage farmers from reallocating their holdings too frequently; for fear that it may weaken their incentives to invest in their temporarily assigned farm plots.⁶ Moreover, there is also the concern that land may become too small and fragmented to farm if the process of reallocation continues unabated (Fleisher and Liu 1992; Zhou and Liu 1994). The slowing

down of crop output growth after 1984 provides some basis for these concerns; indeed, many critics see China's system of property rights as the main culprit behind the stagnant agricultural output growth after the initial growth spurts ended in 1984 (Wen 1995). A less common criticism, and one that concerns us here, is the charge that the equal entitlement ethos that underlies land reallocation practices has a pronatalist effect. This hypothesized reasoning is straightforward: operating on the premise that the family of a newborn child will be assigned use rights of an equal share of the village's land, some families will tend to have more children (Johnson 1994).

The Meitan experiment came about because, despite government policy encouraging farm households not to reallocate land, the vast majority has indeed reassigned land on a periodic basis—the only difference is how frequently they do so, and the magnitude of reallocations (Kung 2000). While policymakers are concerned with the insecure tenure problem that these practices may generate, nonetheless they are constrained by ideology and concerns for an adverse distributive outcome that may result from outright privatizing land. Hence the compromise; under the "Meitan experiment," land will not be readjusted in response to family demographic change for a period of up to 20 years (dubbed "zengren bu zengdi, jianren bu jianti").⁷

A relevant issue that needs to be addressed at the outset is whether the policy choice of Guizhou in general and Meitan in particular may be endogenous. Stated differently, was Meitan chosen because villagers there, for reasons to be explained below, have a preference for not reallocating their holdings on a full-scale basis? If the answer lies in the positive, the intended effect on fertility behavior would likely be limited, contrary to the experiment's objective. Let us therefore ascertain briefly if the policy choice may indeed be endogenous.

⁶ The practice of periodic reallocations of land allegedly discourages farm households from undertaking land-augmenting investments, most notably the use of organic fertilizers; investments considered essential for enhancing long-term soil fertility. In an endeavor to pacify the peasants that family farming was not merely a transient arrangement so as to induce them to invest in their contracted plots, the government decreed in 1984 (Document No. 1) that farmer's tenure or land contracts be extended for 15 years (see Kueh 1985).

⁷ In 1998, the policy of halting land reallocations was extended to the entire Guizhou Province for a total period of 50 years.



FIGURE 1
GEOGRAPHICAL LOCATION OF MEITAN COUNTY, GUIZHOU PROVINCE, CHINA

We start from resource endowment. Located in the southwestern region of China, Meitan has a rather complex geomorphology that is made up primarily of a chain of undulating hills and fluvial plains, with only about a third of its arable land—mainly rice paddies—lying on the well-irrigated lowlands (see Figure 1). As land was basically divided on a highly egalitarian basis upon agricultural decollectivization, the more complex the resource endowment—especially small and irregular-shaped plots on the hilly terrain—the greater the resulting degree of land fragmentation. Indeed, in their

visit to Meitan County, Zhou and Liu (1994) found that farm households there have had far too many plots of miniscule sizes to cultivate. Their finding is subsequently confirmed by Kung (2002a), whose survey found that a “representative” household in Meitan has on average 12 scattered plots, about 30% more than the national average as of 1987 (8.5 plots).⁸

⁸ This is according to a 1991 survey conducted by China’s Ministry of Agriculture (see Kung 1994, note 37).

TABLE 1
THE YEAR WHEN LAND REALLOCATIONS WERE
HALTED IN MEITAN ($N = 252$)

Year	Number of Households Reporting	Percentage Share (%)
1979	22	8.73
1980	20	7.94
1981	10	3.98
1982	16	6.35
1983	21	8.33
1984	122	48.40
1987	41	16.27
Total	252	100.00

Source: Meitan Household Survey (1999).

Adding to the scattered nature of farm plots in Meitan is the small plot size: even with the inclusion of dry land per capita farm size in Meitan is only roughly one *mu* or 0.0667 hectare—only about half of the national average of 2.24 *mu* (SSB 2000, 5 and 95).⁹ What these may imply for land reallocation is that the transaction costs of unscrambling the existing allocations and reassigning the land from scratch would be much higher on the small and scattered rice paddies, than in villages with a flat terrain on which larger and more homogeneous landholdings lie, as is the case of the north China plains, for instance. For this reason, many villages in Meitan had, perhaps not surprisingly, already ceased reallocating land as early as the 1980s (Table 1). From this vantage point, the choice of Meitan raises the question of why policymakers did

⁹ Dry land per capita is 0.36 *mu*, which amounts to a little more than half the size of rice paddy—0.67 *mu* (Kung 2002a, 796).

¹⁰ It is conjectured that Meitan was chosen for two reasons. The first has to do with its location, whereas the second concerns the ease of policy implementation. As a rural village community located remotely in the south-western part of China, any success of the experiment can be easily generalized to the entire region. More important, perhaps, is the consideration that its geographical isolation would better contain any possible adverse effects resulting from the experiment. Second, by volunteering itself to be the site for the land tenure experiment, the Guizhou provincial authorities have had strong incentives to make this experiment work. See Kung 2002a, 797–98, for a more detailed discussion.

not choose a county with inherently lower costs of reallocation and accordingly a history of more frequent, thoroughgoing reallocations.¹⁰ In other words, the fact that many Meitan villages had halted the practice of land reallocations even before the experiment was officially implemented raises the question of whether the so-called experiment is merely just an official sanction of what may be essentially *customary* practices in Meitan. To the extent that such a characterization indeed approximates the reality, the policy itself is not sufficiently exogenous to warrant the intended outcome—an important factor to bear in mind when we interpret the empirical findings.

We now turn to examine the evolution of the family planning policy over the same period as the land tenure experiment was introduced. For reasons to be explained below, Meitan had not adhered closely to the national family planning policy during the initial phase of the policy change, circa 1979–1983, and we will point out the hypothesized effect of such a deviation on the fertility behavior of the Meitan villagers.

In an attempt to curb population growth the new Chinese leadership decidedly pursued the one-child policy in 1979—a time coincided with agricultural decollectivization. Such a policy however violates the Chinese preference of having at least two children.¹¹ In enforcing the one-child policy, some officials were so overzealous that they generated a great deal of resistance from, or social tensions with, the peasantry. To allay such tensions, the state backed down on its draconian stance. The compromise, reflected in Document No. 7 of 1984, officially sanctioned rural couples with “real difficulties”—referring to couples whose first child was a girl—to have a second one. In many provinces, many leaders simply went further by allowing rural couples to have two children regardless of the sex of the first child, provided they are adequately

¹¹ According to Li Yongping of the Institute of Population Research at Peking University, “there is an average of 3 children for every 2 families” (*South China Morning Post*, August 8, 2004, 11).

spaced. An increasing number of provinces are noted to have sanctioned just such a practice (Zeng 1991, 34). However, the relaxation of the one-child policy had led to an appreciable rise in the fertility rates after 1984, and reached a peak in 1987 (23.3%), at which point the Chinese government became panicked and began to clamp down on the number of births in the rural areas once again. The result of this new endeavor to tighten population growth meant that, at least for some provinces, rural couples can no longer take a second child for granted; only under the stipulated “difficult circumstances”—such as where the first child is a girl plus appropriate spacing—would a second child be permitted. But with rising rural incomes on the one hand and the growing acceptance of the practice of paying fines for an above-quota child on the other, those who could afford an extra child are quite prepared to have more child(ren), as long as the additional child is considered a “normal good.” In any case, renewed attempts to curb population growth had been successful in bringing down crude birth rates for the nation as a whole, from 23% in 1987 to 18.09% in 1993 (SSB 1994, 59).

Perhaps Meitan County is geographically remote from the center so that policy enforcement is costly, or perhaps the entire Guizhou Province has a substantial proportion of ethnic minorities in her population who are subject to a much less stringent population policy, interviews with officials in Meitan indicate that they had hardly enforced the one-child policy even during 1979–1983—a period of tight draconian control for the rest of the nation. But when the state allowed rural couples to have two children in 1984, Meitan followed suit, and from 1988 onwards, Meitan further tightened its policy by imposing fines on those couples that have given birth to a second child, but without fulfilling the stipulated conditions. Interviews with officials in Meitan suggest that many “unqualified” rural couples nowadays are indeed quite prepared to pay fines in order to have the second or even the third child, should their rise in income permit them to do so

(Author’s interview in Chaole, 2004, see also McElroy and Yang 2000).

III. THE DATA

The data underlying this study are obtained from a farm survey organized during the late summer of 1999 with the assistance of personnel from the Development Research Center, the State Council of the People’s Republic of China, after two years of planning and initial field research. Moreover, in order to better understand how changes in family planning policy may have impacted fertility decisions in Meitan, we returned to the county in the summer of 2004 for further research. For the survey itself, of the 15 townships in Meitan, Chaole, and Yuquan were selected for primarily two reasons. First, locating on the fluvial plains, they are representative of the resource characteristics of Meitan. Second, per capita net income in these two townships is about average to slightly above average, and so they are representative of the level of economic development in Meitan. Two villages each were in turn chosen from the two selected townships for conducting the survey, with 75 households being drawn from each of the four villages. Altogether 299 households were selected for interview. Subtracting those without any child(ren) a total of 232 households were retained for analysis.

The basic questionnaire was designed to obtain detailed information on the socioeconomic characteristics of all individual members of the surveyed family, household resource endowments and production conditions, including costs and revenues. While the primary goal of the survey was to unveil household preferences regarding land tenure arrangements, nonetheless the detailed enumeration of individual family members provides a good measure of the fertility rate of the surveyed households—our dependent variable (see the next section).

Ideally it would be best to evaluate the effect of the policy of enunciating land reallocations by comparing the fertility behavior of farm households in Meitan with those in a county with similar endowment

characteristics, but without the implementation of this exogenous land tenure policy. That, unfortunately, is being ruled out. As an alternative, we divide our sample into three distinct cohorts based on the *timing* of their fertility cycle, followed by comparing their respective fertility behavior based on family fertility history. For example, the first group would consist of those households that already completed their fertility cycle before the policy of enunciating land reallocations came into effect (BEFORE), whereas the AFTER cohort comprises those that did not yet begin childbearing prior to the experiment. A third group, which may be regarded as serving the purpose of control, straddles in between. These are the households that have started childbearing under the old land tenure regime (of periodically reallocating land) and continued with it even after the change (BETWEEN). Calibrating data this way enables us to have three sets of comparisons (BEFORE/AFTER, BETWEEN/AFTER, and BEFORE/BETWEEN). While ideally the pertinent exercise should entail comparisons of family fertility history of these cohorts, the survey failed to enumerate this crucial piece of information. As a compromise, we resort to using the number of children living in the household as a measure of fertility. This is admittedly less perfect a measure, as adult children are likely to have moved away, whereas infant mortality is also not counted. As our subsequent analytical results show, that even if we had under-enumerated the fertility rate of the older cohorts our estimations remain quite robust.

In addition to using the year of policy implementation, that is, 1987, as a basis for assigning households into different cohorts, we repeat the same exercise using the actual year when the villages ceased reallocating land, namely, 1984 or earlier, as in the majority of instances (see Table 1).¹²

¹² In Maolibao village, for example, a decision was reached in early 1984 that a full-scale land reassignment was to be held at the end of the year based on headcount in September, after which there were to be no more

TABLE 2
THE ASSIGNMENT OF HOUSEHOLDS INTO COHORTS
BASED ON FERTILITY CYCLE

Fertility completed:	Number of Observations (Households)		Percentage Share (%)	
	Reported Year	1987	Reported Year	1987
BEFORE land reallocations were frozen	85	106	37.95	46.09
BETWEEN land reallocations were frozen	30	32	13.39	13.91
AFTER land reallocations were frozen	109	92	48.66	40.00
Total	224	230	100.00	100.00

Source: Meitan Household Survey (1999).

Doing so enables us to test if the aforementioned possibility of an endogenous policy may render the official policy less effective than it otherwise intended. Thus, in our estimations to follow we will use both calibrations—one based on the actual, reported year (MODEL 1), whereas the other on 1987 (MODEL 2). The distributions of households based on these two alternative calibrations are summarized in Table 2.

IV. HYPOTHESIS TESTING AND EMPIRICAL STRATEGY

Based on the premise that two children is the norm for families in rural China, an appropriate test of the effectiveness of the land tenure experiment is to ascertain whether it has discouraged those farm families who want a third child from doing so after the practice of halting land reallocations became effective—be it 1987 or earlier.¹³ This postulate is consistent with

reallocations. Such a decision had prompted many male villagers of marrying age to register on the marriage roll before the specified cut-off date so that their spouses would still be eligible for a share of the village's land (Author's interview in Maolibao 1999).

¹³ Our sample shows that two-thirds of the households do in fact have two or more children.

the secure land use rights hypothesis, according to which total fertility should be reduced as the cost of childbearing is no longer being subsidized. Following this logic, we thus expect the probability of a *third* child among families of the AFTER cohort to be smaller than those of the BEFORE cohort, as some members of the former (spouses, children, etc.) no longer have access to land. There is also empirical support for such a hypothesis: for the county as a whole the percentage of families in Meitan with three children or more reached a staggering 43% in 1981, but had been reduced to barely over 10% in 1988 (MCFPB 2004). By the same rehearsed logic, we also expect the probability of families having a third child to be smaller among the BETWEEN than the BEFORE cohorts. Last, we expect fertility to be lower among the AFTER households than their BETWEEN counterparts, for the simple reason that the latter have already started having children before the new land tenure regime came into being. In short, provided it was effective, the land tenure variable is postulated to effectively lower the fertility rate of those households affected by it, that is, $f'_{tenure} < 0$. In the estimation, the postulated effect of *tenure* will be represented by a dummy variable.¹⁴

Our hypothesis, reasoned above, can be stated more specifically as follows:

Fertility_{After} < Before;

After < Between; and

Between < Before

As noted earlier, we need to control for the possible effect of family planning policy on fertility behavior, as both this policy and the land tenure experiment occurred simultaneously in the period in question. In view of the fact that the one-

child policy had not been rigorously enforced in Meitan before 1983, we expect fertility rate there to be higher before 1983, holding constant other conditions. According to this logic, the proportion of families with a third child should be smaller after than before 1983. In addition, given that a rural couple either has to fulfill certain stipulated conditions or pay a fine after 1988 in order to be eligible for a second child, we expect fertility rate to further drop after 1988.

The postulated effects of both the land tenure experiment and family planning policy are graphically mapped out in Figure 2, where time is represented along the X-axis and fertility rate on the Y-axis. First, the hypothesized effect of the land tenure experiment is represented by the line *pqr* (line A). In the absence of a policy of enunciating land reallocations fertility rate is assumed to be everywhere higher—the assumed pro-natalist effect (*pq*), which should be the case before 1987. Alternatively, we may expect the effect of an institutional change on fertility to occur even earlier, like in 1984, were villagers already convinced that the authorities would not reallocate land, an effect graphically represented by the dotted line *mn* (corresponding to the year 1984, or earlier). If the policy or practice of enunciating land reallocation is indeed effective, we should expect a drop in fertility, measured by the portion *qr*; from then onwards (be it 1987, or earlier), the assumed pro-natalist effect would be eradicated (policy neutrality), as represented by the thickened line along the horizontal axis.

Compared with land tenure policy, the postulated effect due to changes in family planning policy is more straightforward. With an upper limit placed upon the number of children that a family is allowed to have from 1983 onwards (line B), it is assumed that fertility will decline since then, and becomes lower still when even the second child is no longer unconditional. The horizontal line C represents desired fertility, which we assume to be higher than the actual level—levels negatively impacted by both land tenure and family planning

¹⁴ Depending on which two groups we are comparing, in the comparison between BEFORE/AFTER, for instance, we assign 0 to the BEFORE cohort and 1 to AFTER. By the same token, in the BETWEEN/AFTER comparison we assign 0 to the former and 1 to the latter, and so on.

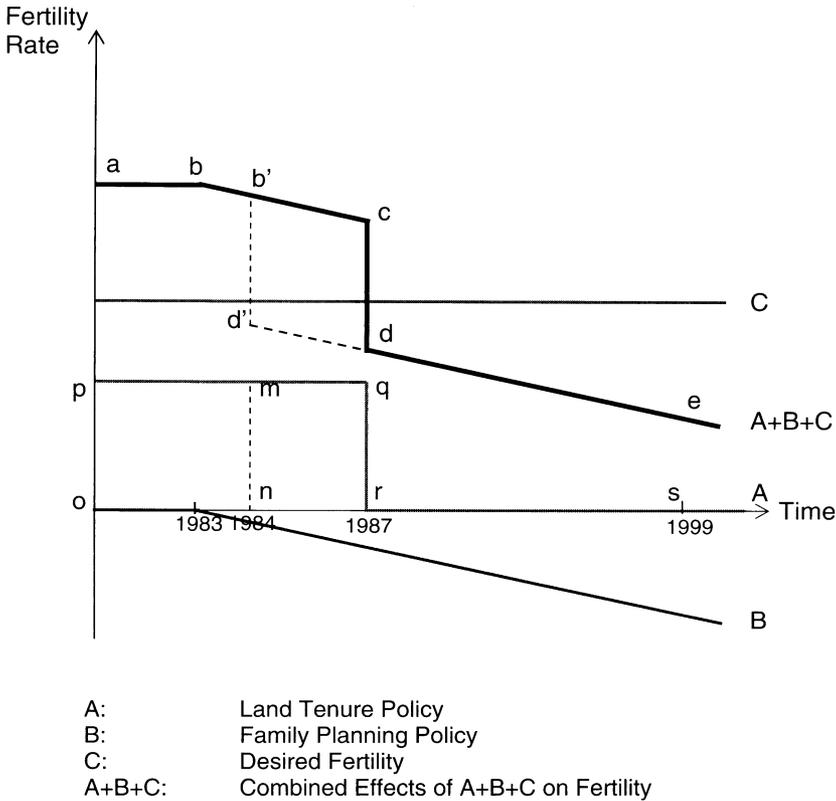


FIGURE 2
 POSTULATED EFFECTS OF LAND TENURE AND FAMILY PLANNING POLICIES ON FERTILITY RATE, MEITAN COUNTY, GUIZHOU PROVINCE.

policies (assuming they are effective). We assume, reasonably, that C will remain constant over a short period of time. We then combine these three effects (A + B + C) and redraw them in the upper part of Figure 2 to obtain what may be regarded as the *total* effects of the two policies combined, plus desired fertility, as represented by the line *abcde* (or *ab'd'e*, depending on the point of land “policy” effectiveness). It should be noted that after 1987 (or perhaps even earlier) it is possible for actual fertility to fall below desired fertility.

To test the respective effects of these two policies or more specifically to control for the effect of changes in family planning policy on fertility behavior we have to do

the following. As with land tenure policy, we first assign households into three groups based on their fertility cycles and the timing of the family planning policy. For instance, households in the *BEFORE* group are those that completed their fertility cycle before 1983, whereas those in the *AFTER* group did not start having children after 1988, and the ones in *BETWEEN* are those that have already started having child(ren) before 1983 and continued with having children afterwards. We then create two dummy variables for the empirical test: the first, *family planning₁*, is constructed to compare the fertility of the *BETWEEN* group with the *BEFORE* group, whereas the second dummy variable, *family plan-*

ning_2, compares the fertility decisions between the AFTER and the BEFORE cohorts. As with land tenure policy the family planning policy is hypothesized to have the effect of lowering fertility, or specifically reducing the proportion of families having a third child over time; that is, $f'_{planning} < 0$.

In addition to controlling the effect of family planning policy it is necessary to control for other factors that may bear upon fertility behavior. These pertinent factors include:

1. *Sex composition.* For a long time, the Chinese are known to have a strong preference for sons. The lack of an old-age security system, the dependence and emotional needs of the elderly, and the social pressure of continuing one's ancestral lineage are among the primary reasons of why sons are preferred (Arnold and Liu 1986; Banister 2001; Li 1993; Zeng 1991). Given this preference, the marginal fertility decision will hinge crucially on the sex or gender ratio of the existing child/children, which is basically an indexed dummy variable constructed by assigning a value to a child based on his/her gender, for example, male = 1, female = 0, followed by dividing the sum total of this value with the number of children in a household. For example, a household with both children being boys receives a value of 1 ($[1 + 1]/2$), zero where both are daughters ($[0 + 0]/2$), 0.5 in the instance of a son and daughter each, and so forth. Ranged between 0 and 1, we assume the larger the index, the lower the marginal fertility rate would be. Thus, like the postulated effects of both land tenure and family planning policies, the effect of sex preference is also assumed to be smaller than zero ($f'_{gender} < 0$).¹⁵

¹⁵ Although there is anecdotal evidence to suggest that rural couples nowadays may not necessarily want two sons, as some consider sons to be costly when it comes to marriage and unreliable to depend on (e.g., Greenhalgh, Zhu, and Li 1994, 381), it is almost certain that a couple with two daughters will try to have a son by

2. *Land entitlement.* Access to land is considered an important determinant of fertility decisions because land entitlement is seen as a subsidy provided to the recipient household for raising a child.¹⁶ Under the regime of periodic land reallocations, access to land is guaranteed. This allegedly encourages families to have more children. As newborn children and women who married into a Meitan village after a certain stipulated date are denied access to land, these disadvantaged families may be discouraged from having an extra child. With a value of one assigned to those who have obtained land and two otherwise, this value has increased over time, from one for the BEFORE cohort to 1.28 for the BETWEEN, and reached a peak of 1.82 for the AFTER (see Table 3 below).¹⁷ Given the subsidizing nature of land access, we may assume that the effect of a mother's land entitlement on fertility to be positive; that is, where other factors are held constant it is more likely for a mother with land assigned to her to have an extra child, that is, $f'_{entitlement} > 0$.

having a third child, than another couple who also has two children but with one of them being a son instead. In point of fact, the one-child family has never been the norm in rural China, not even during the period when the one-child policy was rigorously implemented, as was in 1979–1984.

¹⁶ This explains why we do not include farm size in our model. True, according to the "land-labor supply" hypothesis larger holdings are compatible with higher fertility in labor-intensive agriculture because family labor can be more effectively utilized on large farms, the Chinese practice of allocating land to farm households based on their size renders the farm size variable endogenous, however. Although land reallocations have been halted in Meitan since the mid-to-late 1980s and that farm size does begin to vary across households as a result (this is confirmed by an *F*-test), this particular problem cannot be completely corrected for. Indeed, when we regress farm size on land entitlement (controlling for a number of pertinent variables), the latter is highly significant (at the 1% level) and with the expected positive sign (results not shown here but available upon request).

¹⁷ Shao (2000, 21–22) similarly shows that the proportion of families with new members not eligible for land assignment has grown from a mere 8% in 1988 to 24.5% in 1998.

TABLE 3
SUMMARY STATISTICS OF THE EXPLANATORY VARIABLES

	BEFORE ^a				BETWEEN ^b				AFTER ^c			
	Reported Year		1987		Reported Year		1987		Reported Year		1987	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Number of children	1.72	0.72	2.00	0.63	2.91	0.93	1.84	0.73	1.71	0.61	2.82	0.95
Mother's land entitlement	1.01	0.11	1.67	0.52	1.06	0.25	1.00	0.00	1.72	0.45	1.27	0.45
Mother's age	51.95	7.80	33.50	6.63	43.29	5.85	50.49	7.77	32.17	4.91	39.27	5.48
Father's education	2.41	0.81	3.33	0.82	2.56	0.67	2.49	0.80	2.72	0.65	2.94	0.72
Mother's education	1.98	0.85	2.67	0.82	1.97	0.66	1.90	0.81	2.45	0.75	2.61	0.70
Gender ratio	0.66	0.33	0.40	0.22	0.48	0.37	0.64	0.34	0.49	0.33	0.39	0.35
Father is cadre	0.20	0.40	0.33	0.52	0.19	0.40	0.20	0.40	0.07	0.25	0.25	0.44
Family planning 1	0.02	0.15	0.17	0.41	0.78	0.42	0.15	0.36	0.02	0.13	0.42	0.50
Family planning 2	0.06	0.24	0.67	0.52	0.16	0.37	0.07	0.25	0.96	0.19	0.58	0.50
Income 1998 (log)	7.19	0.84	6.89	1.00	6.90	0.71	7.23	0.79	6.63	0.98	6.42	0.86

^a These are families that completed their fertility cycle before land use rights have become more secure.

^b These are families that continued to have children after land use rights have become more secure.

^c These are families that started having children only after land use rights have become more secure.

The remaining control variables pertain to mainly household characteristics, such as:

3. *Mother's age.* Holding constant other factors, we expect an older married woman to have more children ($f'_{\text{age_mo}} > 0$).
4. *Parents' education.* For mothers the effect of education on fertility is strictly dominated by one of "substitution"; that is, the more educated a mother, the fewer children will be desired. This is because children are more "intensive" in terms of mother's time, who, in order to take care of her children, may be forced to forgo working and accordingly her earnings (Schultz 1997).¹⁸ In addition, mothers who are better educated are considered more knowledgeable about, and receptive to, contraceptive use, both of which help to lower the demand for children. The effect of

father's education is less unambiguous, however. While the same substitution effect (of preferring fewer but more educated children) may predominate as is the case of the mother,¹⁹ it is counterbalanced by a conceivable "income" effect in the instance where the additional child is considered a "normal good." In the case of the father, the ultimate effect of education on fertility behavior is thus difficult to predict a priori, depending on the relative strengths between these two effects. Thus we have $f'_{\text{edu_fa}} = 0$, $f'_{\text{edu_mo}} < 0$.

5. *Whether father is a cadre.* As gatekeepers of the family planning policy, we expect households headed by cadres (local officials) to be less likely to have a third child, that is, $f'_{\text{cad_fa}} < 0$.

¹⁸ There is anecdotal evidence to bear upon this postulation. Couples in rural Shaanxi Province prefer not to have the third child, Greenhalgh, Zhu, and Li (1994, 381) claim, principally because this would entail "the loss of the labor power of the mother," a choice considered "too costly."

¹⁹ Greenhalgh, Zhu, and Li (1994, 380) show how the Chinese perception of an "ideal" family has changed with economic prosperity. For example, they found that well-off parents in rural Shaanxi not only emphasize the pragmatic value that education brings; more radically, some view their children not merely as free labor resources for parents, "but as investment items to be indulged to the extent family resources permit."

6. *Per capita income in 1998 (in logarithm)*. This is to control for the effect that may be caused by differences in income in the surveyed year on fertility decisions. Depending on whether the third child is considered “normal good,” the effect of income is also assumed to be indeterminate a priori, that is, $f'_{\text{income}1998} = 0$.

The summary statistics of both the key explanatory and control variables for each of the three cohorts, sorted on the basis of their fertility cycles, are presented in Table 3. To the extent that fertility decisions are made on a *sequential* manner as contingent upon the realizations of past decisions (such as the sex composition of existing children and child mortality) and to new information unfolded since the last decision (most notably the land tenure experiment and changes in the family planning policy), the sequential logistic model is an appropriate choice of estimation strategy (Barmby and Cigno 1990; Zhang 1994), which is specified in equation [1] below

$$C(2/3) = \alpha + \beta T + \gamma F + \lambda X + \varepsilon \quad [1]$$

Where C stands for the dependent variable that represents a family's decision of having a third child, T stands for the land tenure policy, F the family planning policy, X the list of aforementioned variables included as control, ε the error term, and α , β , γ , and λ are the coefficients we estimate. The rationale for estimating the marginal fertility decision of the third instead of the second child can be justified by the fact that the two children is the norm for at least the rural families in China.²⁰

V. ESTIMATION RESULTS

Table 4 presents our estimation results. In each panel, (a) to (c), we take turns to

compare the marginal fertility decisions of two cohorts using both the reported year (Model 1) and the official year of 1987 (Model 2). First, the key hypothesis of the land tenure experiment (*tenure*) leading to fewer families in Meitan with a third child is not substantiated; the difference in fertility behavior between the BEFORE and the AFTER cohorts is simply not significant.²¹ More specifically, should the marginal fertility decision of a third child really hinge importantly upon whether one—the spouses especially—has access to land, we would expect the variable *entitlement* to be significant, but it is not. Taken together, these evidences do not bode well for the hypothesis that stresses an intimate link between equal access to land and fertility behavior—at least not in the contemporary Chinese context.

A similar verdict is reached when we compare the results of the BEFORE/BETWEEN cohorts. While the pertinent variable (*tenure*) is significant at the 5% level (column 2), it has a positive instead of the hypothesized negative effect (i.e., $\textit{tenure} > 0$). This suggests that fertility is actually higher among the cohort that started having children before 1987 (MODEL 2) and continued to have more children after-

²¹ This is reflected in the tiny difference in the mean number of children between the BEFORE and AFTER cohorts—1.84 versus 1.60, respectively. That the mean number of children was less than two among families of the BEFORE cohort may be accounted for by two factors. First, by failing to ask the BEFORE cohort whether they have any married or adult children who now live separately, it is possible that our survey has underenumerated the actual number of children that these families may have. Second, even without the one-child policy total fertility during the 1970s had actually trended downwards. For the nation as a whole, total fertility in fact, declined markedly from more than 6 in 1971 to roughly only 2.7 in 1981. This precipitous drop in fertility during the period in question was the result of a policy that disallowed women below a certain age to get married (McElroy and Yang 2000; Zeng 2001). It is only with the introduction of the New Marriage Law in January 1981 that effectively removed the restrictions formerly placed upon women with regard to the age of first marriage. With this major policy change, a marriage boom occurred in 1980–1982, and was followed by a higher total fertility.

²⁰ Since none of the explanatory variables are significant in the set of regressions on why families may have two children, we do not report them here. These empirical results strongly corroborate with the premise that the one-child family is hardly the norm in rural China.

TABLE 4
DETERMINANTS OF THE ABOVE-QUOTA (THIRD) CHILD IN MEITAN

	Panel A		Panel B		Panel C	
	BEFORE-BETWEEN		BETWEEN-AFTER		BEFORE-AFTER	
	Model		Model		Model	
	(1)	(2)	(1)	(2)	(1)	(2)
Mother's age	-0.362 (0.15)	-1.386 (0.94)	-0.272 (0.29)	-0.049 (0.04)	-0.349 (0.37)	17.293*** (14.21)
Mother's land entitlement	-0.050 (0.69)	-0.048 (0.72)	0.026 (0.28)	0.149 (0.92)	0.064 (1.01)	0.025 (0.42)
Father's education	-0.244 (0.41)	-0.835 (1.51)	-0.080 (0.15)	-0.093 (0.12)	-0.332 (0.68)	-0.227 (0.48)
Mother's education	-0.922* (1.77)	-1.271*** (2.60)	-0.139 (0.32)	-1.005* (1.83)	-0.660 (1.54)	-0.654 (1.62)
Gender ratio	-0.128 (0.15)	-1.116 (1.31)	-2.153** (2.19)	-3.206** (2.01)	-1.919** (1.99)	-0.998 (1.23)
Father is cadre	1.904** (2.23)	1.370* (1.69)	0.986 (1.04)	1.160 (1.01)	0.336 (0.36)	0.363 (0.44)
Land tenure policy	2.038 (1.44)	2.897** (2.30)	-2.003* (1.83)	-1.325 (1.11)	0.880 (0.44)	-0.373 (.)
Family planning 1	-0.714 (0.49)	0.751 (0.99)	-0.340 (0.21)	2.918** (1.98)	#	0.772 (1.07)
Family planning 2	-2.677 (1.53)	-1.687 (1.22)	-1.209 (0.66)	#	-0.952 (0.45)	-17.602 (.)
Income 1998 (log)	-0.774 (1.56)	-0.415 (0.93)	-0.874** (1.97)	-0.559 (0.83)	-0.488 (1.22)	-0.025 (0.06)
Constant	9.402 (1.37)	10.460* (1.93)	9.634* (1.77)	2.517 (0.34)	2.852 (0.63)	-16.965*** (3.15)
Pseudo R^2	0.221	0.296	0.310	0.473	0.187	0.176
Number of observations	67	84	84	72	96	104

Note: Absolute value of z-statistics are in parentheses.

= Variable dropped due to multicollinearity.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

wards, when we predict it to be lower, on grounds that the new land tenure regime should have impacted negatively on the subsequent fertility decisions of these households. This conclusion holds even if we take into account the possibility of having under-enumerated the fertility rate of the BEFORE cohort;²² the fact that the BETWEEN cohort has on average one child more than their BEFORE counterparts (2.82 versus 1.84) suggests that the

former have not been sufficiently deterred by the new land tenure regime from having a third child. Finally, while fertility of the AFTER cohort is indeed lower than that of their BETWEEN counterparts (the coefficient is negative) and which is therefore consistent with our prediction, the pertinent variable is significant at only the 10% level. On the whole, the econometric evidences fail to support the postulated benign effect of a seemingly secure land use rights regime on fertility behavior.

Turning to the effect of family planning policy, we have noted earlier that the two dummy variables, *family planning_1* and *family planning_2*, are constructed for comparing the fertility behavior of the BETWEEN cohort with the BEFORE

²² If we take the difference between the national average (of 2.7) and our survey (1.84) we would have under-enumerated the fertility rate of the BEFORE cohort by about one child for the families in this group.

and AFTER cohorts (the BEFORE cohort is not shown in the table), respectively. It is necessary to point out that the criterion for assigning households to these different categories is based not on the timing of the land tenure experiment, but instead according to how the family planning policy has evolved in Meitan County.²³ When interpreting the coefficients of these two dummy variables, one should therefore focus on only the two rows that correspond to these variables. For example, whereas *family planning_1* compares the fertility behavior of the BETWEEN cohort with BEFORE cohort, *family planning_2* compares AFTER with BEFORE, respectively. As one can see, the difference is significant (at the 5% level) in only the BEFORE/BETWEEN comparison. As before, the positive coefficient suggests that fertility is in fact higher among families of the BETWEEN cohort. Similar to the effect of land tenure policy, these findings similarly suggest that the family planning policy has not been effective in discouraging some households from having a third child. This takes us to the heart of the question of why some families prefer three children.

The sex ratio of existing children helps shed light on this puzzle. The negative and significance of the *gender* coefficient supports the son preference hypothesis; it is families with higher gender ratios, presumably 0.5 or above (i.e., at least one son), that are less likely to have a third child. The implication of this result is even more striking when placed in the context of the two policies in question. Compared with the penalties associated with above-quota births and the removal of a subsidy in the form of land provision, the age-old tradition of son preference is in reality a much more powerful determinant of fertility behavior.

In view of this strong preference for many Chinese families to have more sons on the one hand, and the tradeoff between the quantity and quality (provision of more education, for instance) of children on the other hand, a relevant question is whether there exist any socioeconomic forces to help reduce the desired number of children in the Chinese culture. As it has been the case in other large agrarian economies (e.g., Indonesia), the key appears to lie in the mother's (but not father's) education (Breierova and Duflo 2004). The significance of the former suggests that a more educated mother is more likely to cap the number of her children to only two (coefficient is negative). An equally if not more important observation is that there appears to be a negative trend over time in the relationship between mother's education and the number of children desired (witness the diminishing coefficient of the various cohorts). As the developed economies have similarly experienced, the negative relationship found between *income 1998* and the number of children suggests that households do not necessarily consider the third child a "normal good"; that when income reaches a certain level they may begin substituting quality (like providing better education) for quantity (Becker and Lewis 1973).

Of the various control variables, "whether father is a local official" has the most unanticipated outcome. Contrary to the expectations that cadre-headed households would be less likely to violate the family planning policy by having a third child, the probability of these families with a third child turns out to be higher (the coefficient is positive and significant). That this variable is significant in only the BEFORE/BETWEEN comparison is consistent with the previous findings that fertility is highest among the BETWEEN cohort. It also hints at the possibility that, while one can of course still have three children after 1988, the monetary costs of doing so are likely higher to the extent that fines will be levied on those who have violated the policy. In addition, the explicit use of such punitive measure is also likely to cause greater embarrassment

²³ The mean number of children of the BEFORE (1983), BETWEEN (1983 and 1999), and AFTER (1988) cohorts are, respectively, 1.73, 2.9, and 1.73, which in fact are very similar to the numbers classified according to the land tenure policy (1.84, 2.82, and 1.60, respectively).

to those cadres who fail to adhere to a policy with which they are supposedly responsible for enforcement.²⁴

VI. THE MEITAN EXPERIMENT AND LAND RENTAL MARKETS

Although our findings indicate that the policy of enunciating land reallocations does not have a seeming effect on household fertility behavior, it is quite another thing to say that it has no effects on other aspects of economic behavior of the farm households. In particular, it would be interesting to ascertain if farm households consider the alternative institutional practice to be more secure that some may begin to generate an income stream that otherwise would not accrue to them under the original regime. After all, the land security hypothesis is based on the idea that secure land tenure rights help generate several possible income streams: (1) a return to labor, (2) a return to (rental) management, and (3) a return to equity that can only be captured by landowners. In the absence of *de jure* private property rights, as in the case of China, farm households who choose to lease out their land, thanks to the experiment in question, will be able to capture (2). *Ceteris paribus*, the thicker that a land rental market develops in response to this enhanced security, the greater the predicted effect of this alternative institutional practice on the security of this particular income stream would be.

To what extent has such a market developed in Meitan, and how does it compare with other provinces where land rental activities have experienced the most rapid development? Table 5 provides some clues. We can see that close to one-third of the surveyed households have leased in land, an incidence that is comparable to, or even

TABLE 5
LAND RENTAL MARKET ACTIVITIES IN MEITAN

5a. Incidence of Participation		
	Have You Leased Land?	
	In	Out
Yes	32.4%	19.3%
No	67.6%	80.7%
<i>N</i>	238	259
5b. Reasons for Participation		
	%	
<i>Lease In</i>		
Family has surplus labor	61.0	
To expand scale of farm operation	7.8	
To cultivate cash crops	15.6	
Others	15.6	
<i>N</i>	77	
<i>Lease Out</i>		
Primary labor has off-farm work	38.0	
Family is short of labor	52.0	
Others	10.0	
<i>N</i>	50	

higher than that found in Zhejiang, a province according to a number of surveys has seen the most active land rental market development in China in recent years (Kung 2002b; Zhang, Ma, and Xu 2004).²⁵ When asked of the primary reason for leasing in land, 61% indicated that they do so because of "surplus labor," a condition that must have been caused to a large degree by the policy of halting land reallocations. Consistent with the above observation, fully 24% of the households have leased out land, out of which over half, 52%, said it was due to a shortage of labor.²⁶ Quite simply, a predominant reason behind households' participation in land rental market has to do

²⁴ While this is clearly an interesting finding, the variable serves more as a control than is intended as a key determinant of the dependent variable in question. Further research is required to ascertain if local officials may have different preferences regarding the number of children.

²⁵ According to a survey conducted in Zhejiang in 2001, the percentage of rural households involved in land rental transactions was 20.8% (Zhang, Ma, and Xu 2004, 1054; see also Kung 2002b).

²⁶ These households are not to be confused with those whose primary laborers have left the farms for off-farm pursuits.

with the growing “disequilibrium” in land-labor ratios among farm households, which in turn is attributable to the policy of halting land reallocations in response to demographic change. To see if this is indeed the case, we ascertain the determinants of leasing activities, using the number of family members with assigned land to proxy for the policy of halting land reallocations, while controlling for a number of household characteristics, most notably the number of children, farm size, and parents’ socioeconomic profiles.²⁷ The results are reported in Table 6. As expected, land entitlement is significant in the lease-in estimation; the negative sign suggests that the greater the ratio of family members with assigned land the less likely a family will resort to the rental market as recipient. Indeed, under the regime where land will be reverted to the village authorities in the event of demographic change, land will be reallocated administratively instead of rationed through the market. However, since in Meitan households with inadequate labor supply to farm are allowed to keep their surplus land, they are accordingly assigned the right to lease their surplus land for an income.

Consistent with this finding is the significance of the number of children variable in both leasing equations, with predictably opposite signs. For instance, the negative coefficient in the lease-out equation suggests that families with more children are less likely to participate in this factor market as suppliers. Conversely, families with more generous arable endowment are more likely to lease out land. It is also interesting to note that parents’ socioeconomic characteristics are not significant in determining land rental activities, reflecting the singularly important roles played by policy and household demographics in shaping land rental market behavior. Summing up, there is sufficient evidence to show, first, that a relatively active land rental market has developed in response to the experimental

²⁷ The Tobit model is favored because of the obvious censoring nature of the data.

TABLE 6
DETERMINANTS OF LAND RENTAL MARKET
ACTIVITIES IN MEITAN

	Rent In	Rent Out
Father's education	0.241 (0.55)	0.256 (0.48)
Father's age	-0.007 (0.19)	-0.008 (0.21)
Mother's education	-0.036 (0.08)	0.773 (1.37)
Number of children	1.150** (2.31)	-1.999*** (3.04)
Household size	-0.032 (0.08)	0.441 (1.08)
Land entitlement	-0.735** (1.99)	0.078 (0.17)
Farm size	0.098 (0.63)	0.494*** (3.00)
Constant	-1.953 (0.83)	-5.983** (2.09)
Pseudo R ²	0.025	0.073
Number of observations	225	225

Note: Absolute value of *t*-statistics are in parentheses.

*Significant at 10%; ** significant at 5%; *** significant at 1%.

policy of enunciating land reallocations. This may be taken to reflect the confidence in which farm households in Meitan have for this alternative institutional practice, as well as the practical need for doing so. Second, if it is indeed the case that participants in the land rental market on the supply side belong to mainly those who lack the necessary labor to either farm or earn alternative income opportunities, they are now able to obtain a managerial income stream conferred by this more secure tenure regime via leasing arrangements.²⁸ A relevant question is whether such a development may have inadvertently widened intra-village inequality by “overcompensating” households with both off-farm and rental incomes—households who lease out their land because their primary laborers are engaged in off-farm employment (38%, see Table 5).²⁹ The remaining question is whether 20 years are long enough to confer the kind of security required for the continuing development of land rental markets.

²⁸ Elsewhere we have computed that average rental payments in Meitan amount to roughly 25% of the farm output excluding agricultural taxes and local government levies, which is clearly not negligible (Kung 2002a).

²⁹ While this is clearly an important welfare issue worth pursuing, it goes beyond the scope of this paper.

Specifically, might such a market wane as the experiment approaches its end? In anticipation of this possible adverse effect, the central government already deliberated in 1998 that the policy of freezing land reallocations in Meitan was to be extended for another 50 years, thereby reinforcing its commitment to the farmers there of the exceptionally secure tenure (Kung 2002a).³⁰

VII. SUMMARY AND CONCLUSION

To many parents in large agrarian economies, children are considered investments for guarding against old age. This is especially the case where old age reduces one's laboring capacity, among other considerations (like emotional support). To the extent that secure land rights are considered an effective substitute of asset for children, it is intuitively logical to think that, as land rights become more secure the demand for children would correspondingly fall. This may explain why the idea behind strengthening land ownership via land reforms in developing economies is a popular one espoused by many. Because of the nature of land ownership and accordingly the practice of periodic land reallocations in rural China, many consider land rights to be insecure, and as such serves as a powerful force that predisposes many rural couples to have children beyond the sanctioned number, or has a pro-natalist tendency, in short. It was indeed against this line of reasoning that the Meitan land tenure experiment came about. In addition to its other objective of encouraging the farmers there to invest more in their contracted plots via the extension of land use rights, another explicit goal was to curb population growth. Given the tremendous policy implications that this experiment can have, a careful assessment of its results in terms of the stated objectives is thus a very important exercise. While the Chinese authorities should be lauded for having started the experiment, ongoing assessments of the results have

been lacking. Based on a unique (and admittedly small) farm survey undertaken in the county where the experiment was conducted, this paper represents a modest attempt to assess the effect of changing property rights in land on fertility behavior.

As we have pointed out, that while the idea of linking tenure security to fertility behavior is an intuitively appealing one, any sound empirical verification requires such an effect to be separated from those of other pertinent factors, as fertility decisions are unlikely to be based on tenure security consideration alone. In the Chinese context, the family planning policy has since the 1980s onwards posed a constraint for many rural couples who want to have more than two children—the maximum sanctioned number under the most generous of circumstances. For this reason it is important to control also for this exogenous factor in undertaking the empirical analysis. In addition, there are other endogenous but equally powerful factors that, like family planning policy, their possible effects should also be accounted for. These include, most notably, the strong cultural preference of the Chinese for sons, whether the spouse has received subsidy in the form of land provision, and the effect of education and the opportunity costs of parents—the mother especially. Although data limitations do not permit us to compare the fertility outcomes of the Meitan villagers with those facing similar resource endowments but different policy constraints, we do manage to test the proposition regarding the fertility effects of secure land use rights in a multivariate framework in which many of the pertinent factors such as the ones enumerated above are held constant. On the whole, our empirical analysis fails to substantiate the postulated effect of land tenure policy on fertility behavior. After controlling for the pertinent factors that may also bear upon fertility decisions, we found that there are no significant differences in fertility outcomes between the cohort of families that are not subject to the experimental regime of halting land reallocations (BEFORE) and the affected cohort (AFTER). Likewise, the variable employed to capture the

³⁰ For the nation as a whole, the new policy calls for land reallocations to be frozen for 30 years.

difference in subsidy provision in the form of land entitlement is also not significant. While there is indeed a significant difference in the fertility outcome between the BEFORE and BETWEEN cohorts, the sign of the coefficient contrasts the hypothesis; literally interpreted, it is families affected by the land tenure policy in the course of their fertility cycles (BETWEEN) that have given birth to more children. In short, these families have been undeterred by the experimental policy from having more children.

What about family planning policy? Was it more or less effective than the land tenure policy? The analytical results suggest that its effect is rather mixed. Although, as hypothesized, that the fertility rate of the AFTER cohort is lower than their BETWEEN counterparts, the fact that the latter has had the highest fertility rate fails to support the hypothesis that fertility of this particular group should be lower than the (BEFORE) group that seemingly had not been restricted by the family planning policy of having at most, two children.

As is consistent with the findings on fertility research in China, it is strong son preference that powerfully explains why some families want a third child (Ahn 1994; Arnold and Liu, 1986; Qian 1997); the only counteracting force from our evidence is mother's education. An important policy lesson to be drawn from this analysis is that the most effective if indirect way to curb population growth in the long term is to ensure that girls are not being discriminated in their access to educational opportunities before a certain age. As the females become better educated and accordingly, more accessible to better remunerated jobs, their opportunity costs of having more children will certainly become higher. To put our findings in perspective, we are not suggesting that institutions do not matter; what the concerned farmers are weighing at the margin here is the reduction in subsidies provided to their third or "marginal" child, on the one hand, and the paramount need to extend one's ancestral line and to seek old age support on the other hand. Clearly, the perceived "cost" of the latter may be so

colossal (if quantifiable) that only a radical change in ideology would persuade these families from adopting what essentially is the "boy-stopping" rule.

Can our analytical results be taken to imply that the experimental land tenure policy is not a credible institution in the eyes of its subjects? While the experiment was certainly not as effective in terms of its intended effect on fertility behavior, it has importantly stimulated the development of a land rental market, thereby allowing the labor deficient household to earn a rental income that they are otherwise not entitled under the periodic reallocation rule. This certainly helps subsidize the genuinely demographically weak families, to say the least. Moreover, in the longer run the maturing of a land rental market may in turn facilitate the development of private property rights in land, with potentially profound implications for fertility behavior.

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