

Feminization of Agriculture in China? Myths Surrounding Women's Participation in Farming

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ABSTRACT The goals of this article are to help build a clear picture of the role of women in China's agriculture, to assess whether or not agricultural feminization has been occurring, and if so, to measure its impact on labour use, productivity and welfare. The article uses two high quality data sets to explore who is working on China's farms and the effects of the labour allocation decisions of rural households on labour use, productivity and welfare. It makes three main contributions. First, we establish a conceptual framework within which to define the different dimensions of agricultural feminization and its expected consequences. Second, as a contribution to the China literature and contrary to popular perceptions, we believe we have mostly debunked the myth that China's agriculture is becoming feminized; it is not. We also find that even if women were taking over farms, the consequences in China would be mostly positive – from a labour supply, productivity and income point of view. Finally, there may be some lessons for the rest of the world on what policies and institutions help make women productive when they work on and manage a nation's agricultural sector. Policies that ensure equal access to land, regulations that dictate open access to credit, and economic development strategies that encourage competitive and efficient markets all contribute to an environment in which women farmers can succeed.

The feminization of agriculture is a phenomenon reported to be occurring throughout the world. Researchers have documented increasing participation by women in farming in many parts of the world, including Latin America, India and Africa.¹

Scholars are concerned about several potential effects that agricultural feminization can have on women's welfare. Yiching Song is concerned that women are being forced to work more hours and take on increased

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1 Carmen Diana Deere, "The feminization of agriculture? Economic restructuring in rural Latin America," Occasional Paper 1 (2005), United Nations Research Institute for Social Development; Anuradha Talwar Swapn Ganguly, "Feminization of India's agricultural workforce," *Labor Education*, No. 131–32 (2003), pp. 29–33; International Fund for Agricultural Development, *Syrian Arab Republic – Southern Agricultural Development Project (Phase II)*, Mid-Term Evaluation, Vols. I and II, Rome, 1999.

responsibilities, presumably reducing their welfare level.² Elizabeth Katz worries that there could be negative effects on the income of women since women are likely to have less access to resources such as high quality land and credit.³ If women are being denied opportunities to participate in the “modern” wage-earning sector and are relegated to working on the farm, the indirect link between effort and income from farm activities reduces their status.⁴ The UNDP raises the concern that as women take over farming, productivity may decrease, which can threaten national food security.⁵

In part a result of the perception that these concerns are valid, agricultural feminization has become an important topic in the literature on China’s drive for modernization. Despite the absence of large-scale studies, published and unpublished studies of the role of gender in China’s agriculture argue that agricultural feminization is occurring.⁶ Tamara Jacka, for example, quotes county officials in Sichuan as saying that agriculture is being feminized.⁷ Thomas Rawski and Robert W. Mead produce aggregate trends at the provincial level suggesting that women are taking over farm work in China.⁸

And as elsewhere in the world, there is a debate on the effect of agricultural feminization in China. On one hand, some scholars say that when women are being left to tend the fields and have poor access to off-farm employment, they earn less than men for their on-farm work and have lower welfare.⁹ Xiaoxian Gao suggests that women’s contribution to household income has declined as their role on the farm has emerged.¹⁰ On the other hand, given the sustained, statistically significant increase in agricultural yields and total factor productivity during the past 15 years, it is difficult to believe that agricultural feminization could have had a large, negative effect on productivity.¹¹

In fact, the literature on agricultural feminization in China reveals little about either the nature of the trend towards feminization or its effects. Most analyses

2 Yiching Song, “‘New’ seed in ‘old’ China: impact of CIMMYT collaborative program on maize breeding in south-western China,” PhD thesis, Wageningen University and Research Centre, 1998.

3 Elizabeth Katz, “The changing role of women in the rural economies of Latin America,” in *Current and Emerging Issues in Economic Analysis and Policy Research (CUREMIS II)*, FAO, Rome, 2000.

4 Xiaoxian Gao, “Rural labor migration and agricultural feminization in China,” *Sociological Studies*, No. 2 (1994).

5 UNDP, *Overall Report China’s Accession to WTO: Challenges for Women in the Agricultural and Industrial Sector*, collaborative research report by UNDP, UNIFEM, All China Women’s Federation, National Development and Reform Commission and Center for Chinese Agricultural Policy, Beijing, 2003.

6 Yiching Song and Janice Jiggins, “Feminization of agriculture and related issues: two case studies in marginal rural areas in China,” working paper presented at the European Conference on Agricultural and Rural Development in China (ECARDC VI), Leiden, 2000; Yiching Song and Linxiu Zhang, “Gender assessment report: impacts of IFAD’s commitment to women in China 1995–2003, and insights for gender mainstreaming,” Beijing: IFAD Working Report, 2004; UNDP, *Overall Report*.

7 Tamara Jacka, *Women’s Work in Rural China: Change and Continuity in an Era of Reform* (Cambridge: Cambridge University Press, 1997).

8 Thomas Rawski and Robert W. Mead, “On the trail of China’s phantom farmers,” *World Development*, Vol. 26, No. 5 (1998), pp. 767–81.

9 Song and Jiggins, “Feminization of agriculture and related issues.”

10 Xiaoxian Gao, “Rural labor migration and agricultural feminization.”

11 Songqing Jin, Scott Rozelle, Jikun Huang and Ruifa Hu, “The creation and spread of technology and total factor productivity in China’s agriculture,” *American Journal of Agricultural Economics*, Vol. 84, No. 4 (2002), pp. 916–30.

focus on only part of the country. Others only consider one dimension of agricultural feminization. The studies tend to treat rural women as if they all belong to a single group, instead of considering that agricultural feminization might affect women in different cohorts or members of different families in heterogeneous ways. Few studies have attempted to quantify certain key issues, such as how much women have participated in on-farm activities, especially relative to men. Have women taken more responsibilities in managing the farm? There are almost no statistical studies that either seek to understand how the changes in the participation rate of women in farming are associated with the participation rate of women in the labour force or try to measure the relative productivity effects of a woman-managed farm and a man-managed one. In general, one can conclude that the bits and pieces found in the literature are sometimes inconsistent and often incomplete.

The overall goal of this article is to contribute to the ongoing discussion on the changing status of women in China's rural labour markets and the role of women in agricultural production by trying to answer the questions posed above. It has three specific objectives. First, we develop an analytical framework for studying agricultural feminization. Second, we seek to answer the question, is agriculture in China being feminized? Third, we attempt to quantify the effect, if any, that agricultural feminization has on the labour supply of women, the income of women-headed households and the productivity of women-managed farms.

The first section introduces the datasets used for analysis. The next one briefly discusses the conceptual and measurement issues related to feminization. The following two sections investigate whether agriculture is being feminized in rural China and measure its impact. We primarily explore the welfare impacts on rural households, especially on women themselves, in terms of income, access to markets and credit, as well as on agricultural productivity.¹²

Data

The data for this study come from two sources. The first data set was collected in a randomly selected, nearly nationally representative sample of 60 villages in six provinces of rural China during November and December 2000 (China National Rural Survey or CNRS). The provinces are Hebei, Liaoning, Shaanxi, Zhejiang, Hubei and Sichuan.¹³ To ensure broad coverage within each province, one

12 Although we examine many aspects of potential agricultural feminization in this article, we cannot address all of them. For example, we do not seek to analyse changes in relative wages between men and women, partly because we do not have the necessary data. Additionally, we seek to characterize broadly whether feminization is occurring, rather than whether it is occurring in specific areas or even villages. Although the primary data set shows no regional differences in patterns, it is too small to give firm conclusions at the regional level.

13 The data collection effort involved students from the Center for Chinese Agricultural Policy of the Chinese Academy of Sciences, Renmin University, and China Agricultural University. It was led by Loren Brandt of the University of Toronto, Scott Rozelle of Stanford University, and Linxiu Zhang of the Center for Chinese Agricultural Policy. Households were paid 20 yuan and given a gift in compensation for the time that they spent with the survey team.

county was randomly selected from within each income quintile for the province, as measured by the gross value of industrial output.¹⁴ Two villages were randomly selected within each county. The survey teams used village rosters and a census of households not included in the village's list of households to select the 20 households randomly; households both with and without residency permits (*hukou* 户口) in the village were included. In total, 1,199 households were surveyed.

The CNRS gathered information on household demographics, labour allocation, agricultural production and non-farm activities. Several parts of the survey were designed to find out about the household's participation in labour markets over time. For roughly half the households surveyed (610 out of 1,199), a 20-year employment history form was completed for each household member and each child of the household head.¹⁵ For each year between 1981 and 2000, the questionnaire tracked individuals' participation in farm and off-farm employment, the main type of off-farm work performed, the place of residence while working (within or outside the village), the location of off-farm employment, and whether or not they were self-employed or wage earning. Time spent in rearing small amounts of livestock (such as one pig or a small flock of fowl) was counted as time spent doing housework rather than as time spent farming.

The CNRS also collected detailed information about each household member's on-farm work in 2000. After asking whether or not they worked on the farm, each household member was asked about the number of weeks they worked there during the busy and slack seasons, the number of days they worked in each season, and the hours spent working on the farm on a typical day in each season. By adding up the number of hours they worked overall in the busy and slack seasons, we can calculate the number of hours each individual in the household worked on the farm in 2000. Enumerators also asked men and women how much housework they typically did during the busy and slack seasons.

In this article – and during the survey – we mostly focused on enumerating work associated with formal employment, which we define as tasks that are performed for a cash payment: work on the farm, for a wage or stipend or from the earnings of a family enterprise. We tried to avoid “value-laden” terms, such as “work” or *gongzuo* (工作).¹⁶ Instead, we trained our enumerators carefully

14 GVIO was used on the basis of the conclusions of some studies that it is one of the best predictors of standard of living and development potential and is often more reliable than net rural per capita income. See for examples, Scott Rozelle, “Rural industrialization and increasing inequality: emerging patterns in China's reforming economy,” *Journal of Comparative Economics*, Vol. 19, No. 3 (1994), pp. 362–91; Scott Rozelle, “Stagnation without equity: changing patterns of income and inequality in China's post-reform rural economy,” *China Journal*, No. 35 (1996), pp. 63–96.

15 The survey asked these questions about all children of the household head, even if they were no longer considered household members. The subsample asked about employment history was randomly chosen.

16 Gail Henderson, Barbara Entwisle, Li Ying, Yang Mingliang, Xu Siyuan and Zhai Fengying, “Re-drawing the boundaries of work: views on the meaning of work (*gongzuo*),” in *Re-drawing Boundaries: Work, Households, and Gender in China* (Berkeley: University of California Press, 2000), pp. 33–50, analyse the meaning of work in China, including how individuals view working for a wage differently from working in a family-run enterprise, and how different people view work on household chores. This article avoids this problem by defining categories of labour allocation and asking individuals to place themselves in the categories by saying if they had participated in any of the included activities or not.

and created our survey instrument in such a way that the respondents understood the categories they were being asked about. For example, in connection with farming, we asked: did <household member> farm during 2000? We then explicitly described the activities that should be included in “farming” (*wunong* 务农). For example, we excluded gardening in the family compound or small garden plot (*caiyuan limiande shucai* 菜园里面的蔬菜), but included activities involved with the cultivation of vegetables that were produced as a field crop (*datian limiande shucai* 大田里面的蔬菜). We also excluded care of the household livestock (pigs, cattle, goats or poultry) when the activity was on a small-scale basis, where small scale was defined to be fewer than ten pigs or fewer than 100 chickens or ducks.¹⁷

When collecting data on allocation of labour off the farm, we were equally careful. First, we asked each household member if they were involved in activities outside farming (*wunong zhiwai* 务农之外).¹⁸ We then divided such activities into two major categories: wage-earning employment and self employment. To ensure proper classification, the enumerator would read a list of activities that were counted in each sub-category, including: working in a factory for a wage locally (*zai dangdi na gongzi* 在当地拿工资); working as a migrant for a wage (*chuqu dagong, na gongzi, buzhu zai jiali* 出去打工拿工资、不住在家里); working as a casual labourer for a wage (*da xiaogong* or *da zagong* 打小工或打杂工), either off the farm or on the farm of others (but not on one’s own farm); participating in a family-run business (*ziying gongshang ye* 自营工商业), including running a shop, trading, engaging in transportation, construction or the service sector. Enumerators took time to run through a checklist to pick up easily forgotten petty entrepreneurial activities, such as collecting and processing non-timber products from the forest (such as mushroom collecting), small-scale manufacturing (such as making firecrackers or embroidering), small-scale trading (such as buying neighbours’ crops and reselling them in the local market) and working as a tradesman doing contract work.

The second data source is a subset of the China Health and Nutrition Survey (CHNS), collected by researchers at the University of North Carolina at Chapel Hill and their domestic collaborators in 1991, 1993, 1997 and 2000.¹⁹ We use data that were collected in over 2,000 households in rural areas of seven provinces: Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu and

17 We also excluded large-scale livestock activities (e.g. when the household slaughtered more than ten pigs during 2000) from farming activities. We counted these as family enterprises, in order to enumerate more accurately the investments, assets, liabilities, revenues, expenses and profits (which we did by collecting the data to create a household-specific balance sheet and income statement for each enterprise).

18 During the interviews we tried to elicit labour allocation information from each household member. This was not always possible, however. If a family member was not home, we asked one of the others. Because China’s rural households are relatively small (on average, fewer than four members per household in these data), most members understood quite clearly the employment situation of the others. If the respondent did not know, we would return later and interview another family member, or someone close to the family elsewhere in the village.

19 We omit the data collected in 1989, because the questions on time allocation are not comparable to the questions asked in the following three periods.

Shandong.²⁰ Although the data include a panel of households, we work with the repeated cross-section, to avoid biases related to attrition and cohort, as the panel ages over time. Regarding agriculture, the CHNS asked how many hours per day, days per week and months per year each individual worked in the garden (vegetable plots near the house), on the farm, on livestock and in fishing.

Measuring Agricultural Feminization

Perhaps one reason that facts about agricultural feminization and its impact are ambiguous and possibly contradictory is that the literature often fails to offer a clear definition of agricultural feminization. This article assumes that there are two distinct types. First, the feminization of agricultural labour (or labour feminization) occurs when women perform an increasing share of on-farm work within the household. While there are two possible definitions – that women have increasingly higher participation rates in farm work, and that the women’s share of agricultural labour shifts from less than half to more than half – this article uses the first definition. To measure increasing participation, we use three metrics: first, an increasing number of women who at some time in the past did not participate in on-farm work and now do (participation measure); second, a rising number of hours worked by women on the farm (hours measure); and third, a rising share of hours of farm work done by women within the household relative to men (household share measure). To measure feminization, measures are needed over time (or need to be thought of as time varying) and, in many cases, trends of participation and hour measures among women should be interpreted relative to trends among men.

The second type of feminization is the feminization of farm management (or managerial feminization). Managerial feminization occurs in one of two ways: when women increasingly become the primary decision maker on the farm; or when they gain greater access to agricultural income (or dominate the execution of specific agricultural activities in which income is collected, such as marketing the crop). Measuring managerial feminization is more difficult than measuring labour feminization, which simply involves counting heads or days/hours, because neither survey we use explicitly asked about who made agricultural decisions within the household. Therefore, we test several different imperfect measures of managerial feminization.

First, we use a count of households that describe themselves as “women-headed.” In China, women typically become the head of a household when the husband of the family is no longer formally a member of the village – through death, being chronically sick or having shifted his formal household registration permit outside the village (such as by obtaining an urban *hukou*). The weakness

20 The CHNS is conducted in both rural and urban areas; we include data both from rural areas that can be considered suburban and more rural villages (but not county capitals in rural districts). Although there are only two provinces in the CHNS data that overlap with the CNRS data, since both sets of provinces were randomly selected from different regions in China, the data from each can be considered representative of the country.

of this definition is that it undercounts the number of women-managed farms. Even if the husband is a long-term out-migrant and the day-to-day operations of the farm are handled by the wife, when the formal *hukou* of the husband is still in the village he is frequently still considered the household head. We call this measure the nominal farm manager measure.

Since the nominal farm manager measure undercounts women managers, we use a question on the employment history form to create an alternative measure of woman-managed farms, called the primary farm manager measure. For each individual for each year since 1981 (or since they entered the labour force) we have a measure of the amount of time that they spent farming. Each working person is coded as working full time off the farm, principally working off-farm but working on the farm in the busy season, working part time on the farm, and working full time on the farm. We isolated the primary couple in each household to find those in which the man did little work on the farm (for example, he worked full time off the farm or worked on the farm only in the busy season) and the woman primarily worked on the farm (she worked either part time or full time on the farm).²¹ These households are characterized as women-managed farms. Since we do not observe which farms are truly women managed, this measure is also imperfect, but certainly captures more women-managed farms than the nominal farm manager measure.

Finally, it is also important to understand whether or not the woman has control over the earnings generated by farming. Regardless of the number of total hours that a woman puts in and regardless of whether she or her husband lives at or away from home, we examine whether women actually handle crop sales within the household, which we call the earnings access measure. Women may be taking over either labour or managerial tasks on the farm, but if they do not have direct access to the crop income their welfare level is more likely to be lower.²²

Debunking the Myth: Are Women Taking over the Farm?

If anything, the tremendous push of labour into the off-farm market – which, as Scott Rozelle and his co-authors find, is composed mostly of men, especially in the early years – is one of the motivating forces behind the rise of concerns about agricultural feminization.²³ According to Klaus Deininger and Songqing Jin, by 2004 nearly 125 million people were in the migrant labour force.²⁴ When

21 In most cases, there was only one primary relationship in the household.

22 It is important to note that this article does not try to assess if women are better off if there is increased managerial feminization. The assessment of the net impact on the welfare of women is complicated by the fact that there are many different, sometimes offsetting, effects. Some of the consequences are also difficult, if not impossible, to measure.

23 Scott Rozelle, Guo Li, Minggao Shen, Amelia Hughart and John Giles, “Leaving China’s farms: survey results of new paths and remaining hurdles to rural migration.” *The China Quarterly*, No. 158 (1999), pp. 367–93.

24 Klaus Deininger and Songqing Jin, “Dynamics of temporary migration in China: exploring the changing role of networks,” World Bank Policy Research Working Paper (Washington DC: World Bank, 2006).

significant numbers of men are observed moving out of rural communities, a natural question arises: who is doing the work on the farm? Since the time endowment of a household/individual is fixed, if individuals are spending more (less) time off the farm, *ceteris paribus*, they will spend less (more) time on the farm.

Moreover, in their study using the CNRS data, Linxiu Zhang and her co-authors find that although in recent years women in the youngest age group (16–20) move to the off-farm sector as frequently as men in the same cohort, more middle-aged women (36–50) remain in rural source communities despite the fact that the rise in off-farm employment for middle aged women is not trivial.²⁵ This finding almost certainly has implications for their participation in farm work.

Although some hypothesize that participation in farm work decreases welfare because of the disutility of increased effort and absence of a linkage between effort and income, one of the most important trends that appear in our data is that total hours spent per household on farming activities fell sharply during the 1990s. According to the repeated cross-section of households in the CHNS, between 1991 and 2000 this total fell from more than 3,500 hours in 1991 to just over 2,000 hours in 2000 (Table 1, row 1).²⁶ Furthermore, the proportion of households reporting spending any time on the farm dropped dramatically, from almost 89 per cent in 1991 to 72 per cent in 2000 (row 2). These recorded decreases – which were occurring at the same time that off-farm employment was rising rapidly – are consistent with the findings of Songqing Jin and his co-authors and Alan de Brauw, Jikun Huang and Scott Rozelle, who find the hours spent on the farm fell during the 1980s and early 1990s as the reforms allowed rural households increasing access to off-farm activities.²⁷ This decline is also reported by Chenguang Li and her co-authors, who use panel data collected in approximately 100 households in northern Jiangsu.²⁸

Labour feminization

In an environment in which a considerable amount of labour is moving off the farm, it is not surprising that there should be growing attention to the study of those left behind. However, while other factors (such as composition of the labour force) are not held constant, the CHNS and CNRS data demonstrate that according to the hours measure there is little support for the labour feminization hypothesis. During the 1990s, the average number of hours worked

25 Linxiu Zhang, Alan de Brauw and Scott Rozelle, “China’s rural labor market development and its gender implications.” *China Economic Review*, No. 15 (2004), pp. 230–47.

26 The CHNS follows split households and replaces households that disappear between rounds, in order to reflect the demographic composition of each community. The patterns are similar if we omit these households and only report the panel of households, although these households are ageing.

27 Songqing Jin *et al.*, “The creation and spread of technology.” Alan de Brauw, Jikun Huang and Scott Rozelle, “The sequencing of reforms in China’s agricultural transition,” *Economics of Transition*, Vol. 12, No. 3 (2004), pp. 427–66.

28 Chenguang Li, Chengfang Liu, Susan Olivia and Wensi Zhang, “Is feminization of agriculture happening in China? Evidence from rural Jiangsu,” course paper, Department of Agricultural and Resource Economics, University of California, Davis, 2005.

Table 1: Participation in Farm Work by Men and Women, China Health and Nutrition Survey, 1991–2000

	Year			
	1991	1993	1997	2000
Average total reported hours of farm work	3,682 (3,211)	2,851 (2,510)	2,420 (2,207)	2,023 (2,177)
Share of households reporting positive hours of farm work	0.89	0.87	0.80	0.72
Average hours of farm work done by women	1,943 (1,868)	1,487 (1,481)	1,220 (1,208)	1,081 (1,237)
Number of observations	2,149	2,105	2,216	2,314

Notes:

Standard deviations in parentheses. Year refers to the year survey was completed. Farm work is defined to include time spent "gardening" and "cropping," and omits time spent tending livestock or fishing.

Source:

CHNS.

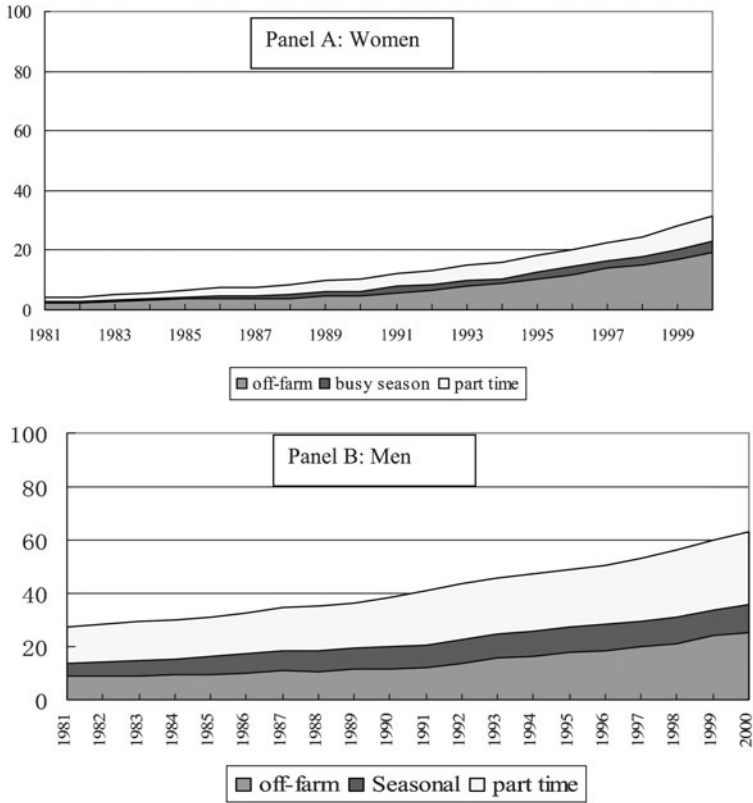
by women surveyed in the CHNS fell at a slightly faster rate than the number of hours worked per household (Table 1, row 3). In 1991, women worked an average of 1,943 hours on the farm. In 2000, however, their hours fell to only 1,081. Clearly, according to this criterion, there is not any evidence of agricultural feminization.

The participation of women in agriculture – especially as full-time farm workers – also declined faster than that of men according to the CNRS employment history data. This can be seen by measuring the shaded white part of the graph between the upper trend line and the 100 per cent line in Figure 1 (panel B). While the participation rates of men working full time on the farm is lower throughout the 1980s and 1990s (ranging from 39 to 73 per cent), because of their earlier and larger shift into the off-farm sector, the participation rate of women as full-time farm workers declines faster. Since this measure of participation is the complement of the off-farm participation rate, this finding is not surprising, as the off-farm participation rate rises faster for women during the 1990s.

Similarly, examination of the proportion of farm work done by women over time in the CNRS does not reveal evidence of labour feminization. Using the employment history data, we created a measure of the proportion of farm work done by women in years prior to 2000. To do so, we estimated the fraction of a full-time worker that a part-time or busy season worker represents, for both men and women.²⁹ By aggregating the data up to the household level and measuring the proportion of farm work done by women in each household, we can estimate

29 In order to extrapolate the percentage of farm work done in each household by women in the past, we make some assumptions. First, we assume that men and women work equal numbers of hours if they work full time on the farm. If they work part time on the farm, we assume that they are equivalent to two-thirds of a full time worker, regardless of their gender (which is the fraction that is worked by part-time workers in 2000). Finally, if they work only in the busy season they are assumed to be equivalent to one-third of a full-time worker (also based on the 2000 labour allocation data in the CNRS sample). We further assume that the fractions do not change over time.

Figure 1: **Increase in Off-farm Employment by Gender, 1981–2000**



Source:

Linxiu Zhang, Alan de Brauw and Scott Rozelle, "China's rural labor market development and its gender implications," *China Economic Review*, No. 15 (2004), pp. 230–47.

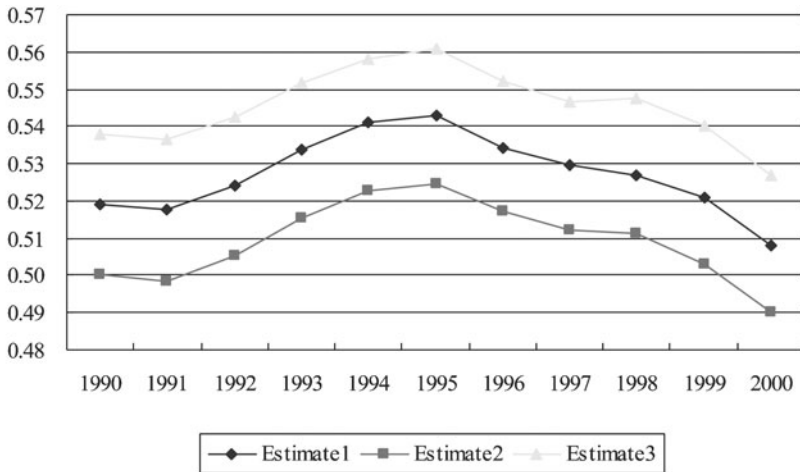
how the share of farm work done by women changed between 1990 and 2000.³⁰ We account for households that are formed after 1990 and for members of the household alive in 2000 that leave or return to the household. To generate a confidence interval around the mean, each point was estimated using a simple bootstrap 1,000 times.

Figure 2 shows the estimated change in the proportion of the household farm workforce that is female over time. As suggested by the literature, the proportion of farm work done by women appears to increase slightly during the early 1990s.³¹ However, it peaks in 1995 and then declines, falling by nearly

30 We only analyse the percentage of farm work done by women between 1990 and 2000, instead of over the whole period (1980–2000), because some individuals who worked on family farms during the 1980s may have died. Since the share of respondents that were alive and for whom data were reported in 1990 is higher than 1980 (since there was more time for an individual to have died), this problem is not as substantial during the 1990s.

31 See Rawski and Mead, "On the trail of China's phantom farmers."

Figure 2: **Estimated Proportion of Household Farm Labour Force that is Female, 1990–2000**



Source:
CNRS.

five percentage points between 1995 and 2000. This is certainly not consistent with a story of agricultural feminization in China. In fact, contrary to the common perception, according to this household share measure of labour feminization, agriculture has been gradually defeminized since 1995.

Determinants of farm work done by females

Although the analysis of retrospective labour histories in the previous subsection suggests that agricultural feminization is not occurring in China, it does not control for household level factors that may affect the proportion of farm work done by women. To explore the determinants of the proportion of household farm work done by women (μ_h), we regress μ_h on the proportion of women in the household labour force P_h , a vector of household characteristics Z_h and a vector of demographic characteristics X_h to give equation (1):

$$\mu_h = a + P_h\alpha + Z_h\beta_1 + X_h\beta_2 + \varepsilon_h$$

The dependent variable in equation (1) is a proportion, so predictions after estimation may exceed the variable's boundaries (0 and 1). Therefore we estimate it using both OLS and a logistic transformation of the dependent variable ($Y_h = \ln(\frac{\mu_h}{1-\mu_h})$). Since women do no farm work in about 10 per cent of the sample and all of the farm work in about 6 per cent of the sample, we use an estimating algorithm that can deal with those observations.³²

32 The algorithm is contained in the GLM procedure in Stata.

To execute this algorithm and estimate the determinants of women’s work, we first use the CNRS cross-section to estimate equation 1 (Table 2).³³ Both estimation procedures give the same general results; coefficients have the same

Table 2: **Determinants of the Proportion of Farm Work Done by Women, 2000**

Explanatory variable	OLS	Logistic
	(1)	(2)
Proportion of labour, female	0.69 (8.11)**	2.96 (6.10)**
<i>Household characteristics</i>		
Female head (1=yes)	0.073 (1.82)*	0.287 (1.69)*
Experience of head	-0.002 -1.57	-0.007 (2.14)**
Log, household wealth (total assets in yuan)	0.015 (1.84)*	0.066 (2.79)**
Responsibility land (mu)	-0.002 (1.88)*	-0.009 -1.6
Mean education, household (years)	0.009 (2.10)**	0.038 (2.53)**
<i>Household demographics</i>		
Number males, aged 16–25	0.048 (2.27)**	0.215 (2.53)**
Number females, aged 16–25	-0.054 (3.74)**	-0.235 (2.95)**
Number males, aged 26–35	0.014 -0.53	0.067 -0.57
Number females, aged 26–35	0.016 -0.61	0.051 -0.43
Number males, aged 36–45	0.038 (1.81)*	0.194 -1.52
Number females, aged 36–45	0.042 -1.4	0.147 -1.13
Number males, aged 46–55	-0.015 -0.63	-0.038 -0.34
Number females, aged 46–55	0.025 -0.95	0.083 -0.68
Number males, over 55	-0.001 -0.02	0.016 -0.15
Number females, over 55	-0.06 (3.11)**	-0.267 (2.83)**
<i>Summary statistics</i>		
N	1,131	1,131
Adj. R ²	0.221	

Notes:

t-ratios in parentheses; standard errors calculated correcting for clustering at the village level. * significant % level. Provincial fixed effects are included in all equations but OLS, and column (2) reports results after transforming the dependent at the 10% level; ** significant at the 5 not reported. Column (1) reports results using variable using the logistic transformation.

Source:

CNRS.

33 We include provincial-level fixed effects in estimating equation (5). The primary results are robust to the inclusion of village fixed effects. We use provincial fixed effects in lieu of village-level effects to measure potential cultural differences in household organization across provinces.

signs and generally coefficients on the same variables are significant. Referring to the OLS estimate, the point estimate indicates that an increase of 10 per cent in the females in the household labour force leads to about a 7 per cent increase in the amount of farm work done by women (column 1, row 1). The signs on coefficients on the household characteristics are mostly as expected as well. When households are headed by females, women do more farm work (row 2), while they do less farm work in households with more experienced, older heads (column 3). Women are likely to do more farm work in wealthier (or households with more assets measured in yuan) and more educated households, *ceteris paribus* (rows 4 and 6).

The most interesting coefficient estimates are found on some of the demographic variables. The presence of 16 to 25 year-olds in the household has significant effects on the proportion of farm work done by women. This finding is not in itself surprising; if farming was the major source of income for most households, we would expect the addition of a new male labourer to the household (upon turning 16) to decrease the share of farming done by women, and the addition of a female labourer to increase the share of farming done by women. In fact, we find exactly the opposite (rows 7 and 8).

Using the results from the logistic transformation, we created a hypothetical household with parents between the ages of 46 and 55, at the mean level of all other variables in the sample. The addition of a 16 to 25 year-old male or female to the household changes the percentage of farm work done by women by about 20 per cent. In other words, if half the household farm work was done by the woman without the child, 70 per cent was done by the woman if the child was male and 30 per cent if the child was female. The result was similar if a sibling of the opposite sex also existed. The findings are consistent with a story that robust off-farm labour markets are available to younger workers, and they seem available to both men and women. Younger workers tend to be more educated, an important factor for finding off-farm work in China.³⁴ However, if a gender wage gap existed, one would expect the presence of 16 to 25 year-old women to have a smaller effect on the proportion of farm work done by women than 16 to 25 year-old men have. Finding estimated coefficients of opposite sign and almost equal magnitude implies that off-farm labour markets work roughly equivalently for young men and women.

The second interesting finding regarding household demographics is that the presence of older women in the household has a negative effect on the amount of farm work done by women. According to both specifications' estimates, an additional woman over 55 in the household decreases the amount of farm work done by women (Table 2, row 15). However, the same is not true for men; the estimated coefficient on the men over 55 variable is positive, but statistically insignificant. The finding can be explained as follows. When women get older,

34 Dennis T Yang, "Education and off-farm work," *Economic Development and Cultural Change*, No. 45 (1997), pp. 613–32.

they either stop working altogether or shift their time into providing household goods. Men do not stop working; rather, they continue to work in the fields. The finding is consistent with research on labour allocation patterns among the elderly found by other researchers.³⁵

Managerial feminization

Just as there is little evidence of the occurrence of agricultural feminization, there is little evidence of managerial feminization in agriculture. Unfortunately, China's national statistical bureau does not report the proportion of households in which a woman is the household head (defined above), so we do not have a national measure of the change in female-headed households over time. However, according to the CNRS data, only 3.2 per cent of households in 2000 reported that they were headed by women. Even if the proportion of women-headed households was increasing, in absolute terms the increase could not be that significant. So by the nominal household head measure, there is little evidence of managerial feminization in agriculture.

Nor is there much evidence of a rise in women-managed farms by the primary farm management measure. According to this measure, in the 1980s only 13.5 per cent of households reported that farm activities were managed by the head's wife or the head (when female). In these households, the husband worked either part- or full-time off the farm and lived away from home (at most returning for a few weeks a year to work on the farm), while the wife lived at home and worked most of her time on the farm. Somewhat surprisingly, even after the high rate of migration out of rural China to its urban areas, women-managed farms rose from 13.5 per cent between 1990 and 1995 to 15 per cent between 1995 and 2000, by only 1.5 percentage points. Moreover, whereas averages over five-year periods increased, the point estimate for 1990 (15.3 per cent of farms managed by women) is higher than the point estimate for 2000 (13.1 per cent). Clearly, the primary farm management measure does not suggest a rapid increase in managerial feminization.

However, to the extent that women are taking over managerial tasks, our data suggest that they lack proportional access to the income earned from sales of agricultural commodities. According to the earnings control measure in the CNRS, women only marketed crops in 42 per cent of households, while doing 50 per cent of the farm work. These averages suggest women may not always control proceeds from their agricultural work.

In summary, when we look at all measures, of both labour feminization and managerial feminization, there is little evidence that agricultural feminization is occurring. While it is difficult to dispute the multiple pieces of evidence, this

35 See for examples, Dwayne Benjamin and Loren Brandt, "Property rights, labor markets, and efficiency in a transition economy: the case of rural China," *Canadian Journal of Economics*, Vol. 35, No. 4 (2002), pp 689–716. Lihua Pang, Alan de Brauw and Scott Rozelle, "Working until you drop: the elderly of rural China," *The China Journal*, No. 52 (2004), pp. 73–94.

argument is not consistent with the common perception among officials and researchers that agricultural feminization is a fact. Are these observers wrong? Is feminization happening in some subsectors of agriculture but not others? The next subsection attempts to reconcile the discussion of agricultural feminization in the literature and the absence of agricultural feminization in our data.

Agricultural feminization among the middle-aged cohort

By computing the hours of farm work done by each individual in 2000, we can describe which demographic groups within households are farming, and the intensity by which they are farming (Table 3). The data indicate that, although men are still more likely to do farm work than women (70 per cent of men do at least some farm work; only 65 per cent of women do: rows 6 and 12), there are differences among cohorts. For example, among the youngest cohort of the household labour force, both males and females are much less likely than others to perform farm tasks, and they work fewer hours when they do work on the farm. Women between 16 and 25 are less likely to work on the farm than men in the same age cohort: only 32.8 per cent of women did any farm work, whereas 39.5 per cent of men did (rows 1 and 7). Likewise, women in the older cohorts (46–55 and over 55) also participate much less in farming (86.0/40.4 per cent) than men in the same cohort (90.3/69.2 per cent).

In contrast, women in the middle-aged cohort participated in farming at higher rates than men (Table 3, column 1, rows 2–3; 8–9). Significantly, the on-farm participation rates are highly correlated to the gaps among the cohorts in

Table 3: Farm Hours Worked and Percentage of People Working on Farm, by Gender and by Age Categories, 2000

<i>Demographic Group</i>	% Working on farm	Mean hours in 2000	Standard deviation
<i>Men aged:</i>			
16–25	39.5	550.8	523.5
26–35	76.5	792.9	677.0
36–45	86.7	860.7	696.1
46–55	90.3	891.9	697.0
over 55	69.2	832.6	665.5
All men	70	803.3	671.9
<i>Women aged:</i>			
16–25	32.8	543.7	533.9
26–35	81.2	849.2	684.9
36–45	91.2	944.1	698.5
46–55	86.0	911.1	688.6
over 55	40.4	574.9	503.2
All women	65	827.1	673.7

Notes:

Means and standard deviations are measured only among individuals working on farm. Sample size is 3,794.

Source:

CNRS.

Table 4: **Farm Hours Worked by Level of Involvement in Farming, by Gender, 2000**

Level of involvement	Men	Women
Farm work only	1,022.4 (682.7)	943.3 (672.0)
Part-time farmer	711.9 (570)	598.6 (555)
Busy season only	378.4 (408.9)	197 (172.2)

Notes:

Standard deviations in parentheses. Sample size is 1,620, and only includes the subsample for which employment history data are available.

Source:

CNRS.

the off-farm labour trends. When cohorts of men participate in the off-farm labour market at higher levels than cohorts of women (as they are doing increasingly), back on the farm women are participating more. The reverse is true for the younger cohorts. In the older cohorts, the participation rate among women falls faster than the participation rate among men.³⁶ As explored in more detail below, this difference is related to elderly women's participation in non-paid housework and grandchild care.

Therefore, while there may be no general move towards agricultural feminization in rural China, social scientists may be observing and taking as feminization a phenomenon that is actually occurring among middle-aged women. The middle-aged women agricultural feminization trend is consistent with cohort effects in the off-farm labour market. Whereas young men and women appear to obtain off-farm jobs in similar numbers, middle-aged men are far more likely than middle-aged women to work off-farm.

Livestock sector and future feminization?

The involvement of women in the livestock sector may mean that feminization, while not happening yet, may still occur in the future. In fact, our data – coupled with the sectoral shifts that have been occurring in the overall agricultural sector – provide evidence that there has been feminization in livestock production and that women's participation in the livestock sector is starting to contribute to overall feminization (although not enough to outweigh other forces currently defeminizing agriculture). Specifically, our data suggest that both the participation in the livestock sector and the hours worked in the sector (conditional on participating) are far higher for women than for men. In fact, the CNRS data show that 59 per cent of those involved in livestock activities in 2000 were women. Furthermore, 64 per cent of the hours input into livestock activities were by women. It appears that livestock sector in rural China is heading towards feminization.

36 This is also shown in *ibid.*

The effect of women's participation in livestock on feminization becomes evident when looking at the nature of changes in the composition of agricultural output. Statistics published by the China National Statistics Bureau show that livestock accounted for 22 per cent of gross value of agricultural output in 1980,³⁷ rising to 34 per cent by 2005. Recent figures are consistent with the simulation model detailed by Jikun Huang and Chunlai Chen, who suggest the share of livestock output in the total value of agricultural output will reach more than 40 per cent by 2020.³⁸ If men do not begin to raise livestock, this change in the structure of China's agriculture during the past decade and into the near future means that the high rate of participation by women could increase the pressure on agricultural feminization in general. Feminization may occur gradually through structural change, rather than women taking over tasks that men had previously performed.

Even though women seem to be doing more of the work in the household's livestock operations, men still control more of the key phases of the marketing process, a phenomenon that will dampen any conclusion that managerial feminization is also happening. Whereas women contributed 64 per cent of the production work in livestock, men control 59 per cent of the marketing work. This is a sign that as far as the female-dominated livestock sector is concerned, feminization is more labour feminization, and not, according to the earnings-control measure, managerial feminization.

Impacts of the Participation of Women in Agriculture

While admittedly not answering the question of what would have been the effect on women had there been feminization (or if there is in the future), most of what has occurred in China's labour markets in general and in on-farm labour in particular during the past two decades is positive. Hours working off the farm have risen, and wages and other off-farm earnings have been primary contributors to increasing rural household incomes. The more direct link between effort and wages means that women who have entered the workforce are likely to have had access to more of their earnings. To the extent that male-earned wages make their way back into the family budget and assets, higher earnings (by women and men) certainly increase the standards of living of the rural population, especially among the poor.³⁹

Simultaneously, many trends in farming also suggest a positive story. Hours worked on the farm have fallen while crop incomes have risen (since yields have risen, inputs have fallen relative to yields and prices are about the same in real terms).⁴⁰ Although we cannot show a direct link between agricultural earnings

37 China Statistics Bureau. *China Rural Statistical Yearbook 2006* (Beijing: China Statistical Press, 2006).

38 Jikun Huang and Chunlai Chen, *Effects of Trade Liberalization on Agriculture in China: Commodity and Local Agricultural Studies*, United Nations ESCAP CGPRT Centre, Bogor, 1999.

39 Alan de Brauw and Scott Rozelle, "Migration and household investment in rural China," *China Economic Review*, forthcoming. Yang Du, Albert Park and Sangu Wang. "Migration and rural poverty in China," *Journal of Comparative Economics*, Vol. 33, No. 4 (2005), pp. 688–709.

40 Songqing Jin *et al.*, "The creation and spread of technology."

and effort – so it is less certain that women have access to the rising income from farming – to the extent that they do (coupled with falling labour input), welfare for those working on the farm will have risen. The work of Jikun Huang and his co-authors shows that rising technology, improving markets and emerging land rental markets have helped maintain farm income while farm labour inputs declined.⁴¹

The following subsections examine the effect on productivity and income when women run the household. Since any differences in productivity for women-run farms will depend on whether or not women have equal access to inputs and the other resources that are used for farming, we first consider this question. We then examine the impact of female managed farms, using several different definitions, on crop revenue.

Access to land, markets and credit services

If rural women play important roles in the rural economy as a whole, it is also important to understand whether there are any barriers that they may face in fulfilling their responsibilities and providing for themselves and their families that are different from the barriers faced by men. In contrast with much of the literature in other countries, our data show that women-managed households have relatively equal access to many of the key inputs required for farming (Table 5).

First, the family labour available to women-managed farms and other farms are almost the same (3.99 mu per household and 4.07 per mu household: column 1); and the quantity and quality of land and access to irrigation also differ little (columns 2 to 4). Furthermore, our data show almost no difference between women-managed farms and other farms in terms of credit access or borrowing. Female farm managers have almost equal access to credit, and they and their male counterparts both borrow, on average, from two or more individuals or institutions. Both rely almost equally on friends and formal financial institutions (such as banks and credit co-operatives). In other words, households with women who manage their own farms in China appear to have almost identical access to labour, land and credit relative to those run by men. Therefore, if there are differences in yields or cropping income, unequal access to resources is not the reason.

This finding is one of the most striking differences between China and the rest of the world. One potential explanation is that the institutional structure of China is set up to be fairly non-discriminatory. In the case of land, for example, village institutions almost always divide land on a per capita basis and are relatively fair when it comes to dividing plots by quality. In addition, banks, which are mostly state-run, also appear to not discriminate against farms managed by women (though the total volume of loans to farmers is relatively

41 Jikun Huang, Scott Rozelle and Keijiro Otsuka, “The engines of a viable agriculture: advances in biotechnology, market accessibility, and land rentals in rural China,” *The China Journal*, No. 53 (2005).

Table 5: Comparing the Difference in Access to Resources/Service among Different Type of Households

Types of farms	Household size	Cultivated land per labour (mu)	% of good quality land	% of irrigated land	Number of individuals or institutions borrow money from 1995–2000	Friend or relative ^a	Bank or other credit co-op ^a
Women-managed farms	3.99	2.73	72.83	66.40	2.26	82.76	13.79
Other-farms	4.07	3.23	71.41	65.20	2.42	80.21	13.83
Total	4.06	3.18	71.55	65.31	2.40	80.61	13.82

Notes:

^aThe figures in columns 6 and 7 are measured in % of those who borrowed money during the year.

Source:

CNRS.

low). Finally, input markets work well in China, and so inputs such as fertilizer are extremely accessible to anyone who wants to buy them. In other words, because of the institutions and depth of markets in China, there are few barriers that the average person – regardless of gender – faces in obtaining access to productive inputs.

Impacts on productivity

When assessing the impact of the reforms on women, one must address questions about whether or not their changing participation in agriculture can be associated with lower farm earnings. Internationally, women-headed households and women-cultivated plots have produced lower yields and revenues.⁴² Women can be less efficient producers for a variety of reasons.⁴³ If true in China, then some of the gains women have received in the off-farm sector may have been offset by lower earnings in the farm sector.

Farms managed by women might be expected to be less efficient than farms managed by men in China, given that women are much more involved in child rearing and housework than men. In order to assess whether women-headed households are more, less or equally efficient in cropping, we use a fixed-effects regression approach. Specifically, the logarithm of total cropping revenue for

42 World Bank, *Engendering Development*, World Bank Policy Research Report (Washington, DC: World Bank, 2001).

43 Katrine A Saito, H. Mekonnen and D. Spurling, *Raising the Productivity of Women Farmers in Sub-Saharan Africa*, World Bank Discussion Paper 230, Africa Technical Department Series (Washington, DC: World Bank, 1994); Agnes R. Quisumbing, *Improving Women's Agricultural Productivity as Farmers and Workers*, Education and Social Policy Department Discussion Paper 37 (Washington, DC: World Bank, 1994).

plot i farmed by household h in village v , y_{ihv} , is regressed on a measure of female management, Z_{hv} , a vector of household wealth and demographic characteristics X_{hv} , and plot level characteristics P_{ihv} .⁴⁴ The basic model is as shown in equation (2):

$$y_{ihv} = \alpha_v + Z_{hv}\gamma + X_{hv}\beta + P_{ihv}\eta + \varepsilon_{ihv}$$

To control for differences in growing conditions, prices and other unobservable factors across villages, we include a village-level fixed effect, α_v .

Our null hypothesis is that the coefficient on the female managed farm variable, $\gamma=0$, or that plot revenue is no different on farms run by women from on farms run by men. Since we lack a perfect measure of female farm management, we test four possible measures that are available in the CNRS. We initially use the indicator variable for a female-headed household. Second, we use the nominal farm management measure, based on the employment history form, which was only asked in half the sample households. To augment that measure, we also use one based on the reported off-peak hours worked on the farm by the husband and wife in 2000; if the husband either did not work on the farm or only worked on the farm in the busy season, while the wife worked on the farm either part-time or full-time (rather than peak season only), we code the household as a female-managed farm. Finally, we use the share of hours worked on farms by females.

Using more than 4,500 plot-level observations for the analysis, we find results that are at odds with the results from other parts of the world.⁴⁵ Regardless of the measure of female farm management, we find no evidence that it is negatively associated with plot-level crop revenues, holding household and plot characteristics constant (Table 6, rows 1 to 4). Therefore, we cannot reject the null hypothesis in any case that women are equally efficient as men at managing plot revenue. In fact, the point estimates for all four measures are positive, which would suggest that women may, if anything, be better farm managers than men in rural China. In other words, despite the fact that women have taken on significant non-formal employment responsibilities and provided a large fraction of farm labour, plot-level earnings for farms women manage appear to be at least equivalent to earnings on plots that men manage. The most direct interpretation of this result is, of course, that women are at least as good at farming as men. However, the results in Table 6 suggest that we cannot reject alternative interpretations. It could be that since women-headed households are frequently (though not always) those in which the husband permanently works outside the village, such households face fewer capital constraints and therefore are able to produce more (although we attempt to hold wealth constant). It also

44 Plot level characteristics include its size (in *Engendering Development*), irrigation status, farmer-reported quality, topography, the distance of the plot from the household and whether or not a shock occurred on the plot in 2000.

45 See World Bank, *Engendering Development*.

Table 6: Regression Analysis of the Relationship between Female-Managed Farms and Plot Revenues

	Dependent variable: ln (plot revenue)			
	(1)	(2)	(3)	(4)
<i>Female farm management measures</i>				
Female is head (1=yes)	0.071 (0.058)			
Nominal female manager, based on employment history		0.019 (0.041)		
Nominal female manager, based on hours worked			0.053 (0.039)	
Share of hours worked, females				0.069 (0.050)
<i>Household characteristics</i>				
Logarithm, land size	0.009 (0.022)	0.072 (0.026)**	0.011 (0.022)	0.011 (0.022)
Logarithm, household size	0.043 (0.042)	-0.034 (0.053)	0.038 (0.041)	0.032 (0.042)
Logarithm, household wealth	0.005 (0.010)	0.015 (0.012)	0.005 (0.009)	0.004 (0.009)
Education of household head (years)	0.002 (0.004)	0.002 (0.005)	0.002 (0.004)	0.002 (0.004)
Age of household head	0.0001 (0.001)	0.001 (0.002)	0.0004 (0.001)	0.001 (0.001)
Plot Characteristics				
Irrigated? (1=yes)	0.293 (0.031)**	0.328 (0.038)**	0.294 (0.031)**	0.292 (0.031)**
Distance to household (km)	0.004 (0.011)	0.002 (0.011)	0.003 (0.011)	0.004 (0.011)
Log, plot area	0.990 (0.016)**	0.989 (0.021)**	0.990 (0.016)**	0.990 (0.016)**
High quality? (1=yes)	0.161 (0.026)**	0.163 (0.034)**	0.162 (0.026)**	0.162 (0.026)**
Plot is hilly (1=yes)	-0.092 (0.031)**	-0.061 (0.039)	-0.093 (0.031)**	-0.094 (0.031)**
Plot is terraced (1=yes)	-0.091 (0.060)	0.070 (0.069)	-0.087 (0.060)	-0.088 (0.060)
Plot had shock in 2000 (1=yes)	-0.146 (0.028)**	-0.178 (0.037)**	-0.145 (0.028)**	-0.143 (0.028)**
Single season plot	-0.321 (0.028)**	-0.362 (0.036)**	-0.321 (0.028)**	-0.319 (0.028)**
Number of observations	4,547	2,437	4,547	4,540

Notes:

** indicates statistical significance at the 5% level. Robust standard errors in parentheses. All equations include village level fixed effects.

Source:

CNRS.

could be that those farms that are women-run are not random. For example, it could be that the only households that have farms that are women-run are those with particularly capable women.

Impacts on income

One of the theoretical assumptions with female-headed households is that they are less likely to earn as much income as their counterparts because of limited access to higher wage off-farm sectors. However, according to our data, families in which the wife takes over farming responsibilities do not seem to have a lower income than other households. In fact, for some reason (perhaps because when the wife manages the farm, the husband can take a job off the farm) the income per capita of a woman-managed farm household is higher. The average income of a woman-managed farm household in our sample is more than 3,000 yuan/capita; the average income of other households is around 2,000 yuan/capita. Although we cannot observe relative welfare differences between women in households with women-managed farms from women in households with farms managed by men, the income difference is a good indicator that women are better off in households in which they run their own farms.

Conclusions

This article has made three main contributions. First, we established a conceptual framework that we believe can help more carefully define the concept and dimensions of agricultural feminization, how to measure it, and how to think about its consequences. Second, we believe we have mostly debunked the myth that China's agriculture is becoming feminized. Our analysis – which uses different data sets, different measures and looking at different aspects of the problems – fundamentally finds that in China there has been a feminization of neither labour nor management in its agriculture. Women take on a large part of on-farm work (as well as an increasingly large role in off-farm work), but they appear to be putting in no more than half the agricultural labour, their share of labour is not increasing and their role in management, while growing a bit, is still relatively minor. Even if women were taking over farms, our analysis finds that the consequences in China would be mostly positive, from a labour supply, productivity and income point of view.

Finally, there may be some lessons for the rest of the world on what policies and institutions help make women productive when they work on and manage in a nation's agricultural sector. Policies that ensure equal access to land, regulations that dictate open access to credit, and economic development strategies that encourage competitive and efficient markets have all contributed to an environment in which women farmers can and appear to succeed. China has also begun to promote female agricultural extension agents. Although fewer than 30 per cent of extension agents in China are women overall, nearly 40 per cent of young ones are. When women have access to inputs and information and new technologies, there is no reason that they cannot produce at levels equally efficient to men.