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Reviewed work(s):
Source: *Economic Development and Cultural Change*, Vol. 50, No. 1 (October 2001), pp. 19-46
Published by: The University of Chicago Press
Stable URL: http://www.jstor.org/stable/10.1086/321915
Accessed: 18/02/2013 05:50

So What If There Is Income Inequality? The Distributive Consequence of Nonfarm Employment in Rural China*

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I. Introduction

The phenomenal rise of China's rural nonfarm sector since around the mid-1980s has been observed by many to have coincided with rising income inequality in the countryside.[1] The intuitive reasoning behind this observation is that, with rural land ownership continuing to reside in the collectives (village authorities) and land distributions carried out in a highly egalitarian manner, household production—especially of farm goods—is an unlikely cause of income inequality.[2] But with the rise of the nonagricultural sector in general and the township and village enterprises (TVEs) in particular, observers point to a widening in the income gap between households that have differential access to these lucrative income opportunities. In particular, in regions where local authorities had successfully developed their nonagricultural enterprises in the 1980s, farm households were able to benefit from these higher-income opportunities as these collective enterprises were still protected by the immobile factor markets across geographic regions.[3]

Indeed, based on a large-scale nationwide survey of the rural households in 1988, A. Khan et al. provide evidence on the disequalizing effect of wage income, despite its still insignificant magnitude, 10%, in overall household income.[4] As wage employment will likely increase in the ensuing decades and therefore assume even greater importance in the overall composition of rural household income, the line of reasoning rehearsed above suggests the likelihood of deteriorating income equality over time: the only questions appear to be how much and how fast.

It is interesting to note, however, that of the studies concerning income distribution in rural China, few have examined the effect of household em-

0013-0079/2002/5001-0002$02.00

ployment in the nonfarm sector on levels of mean income or, more generally, standard of living. The most important question, from our perspective, is whether nonfarm employment and income opportunity contribute to rising farm household income while simultaneously widening the income gap among the farm households. If so, should we applaud or condemn such a development process? What, if any, is the role of education in facilitating access to nonfarm employment and in determining income? Or are these scarce opportunities allocated by means of a less universalistic criterion, such as personal connections or "social capital"?[5] Are these opportunities more or less equal in areas where collectives or TVEs assume a less predominant role? These are, we believe, important questions that need to be addressed in relation to the issue of rural income inequality. On the basis of a unique farm survey covering 400 rural households in four predominantly agricultural Chinese counties, this article sets out to answer these questions.

The article is organized as follows. Section II describes our surveyed counties and provides an economic profile of 400 farm households there. In Section III, we estimate the income function of these households, and in Section IV we measure directly income inequality among them. In light of the possible disequalizing effect of nonfarm income, we examine its determinants in Section V, and in Section VI we draw some conclusions.

II. Village Characteristics and Composition of Income in the Surveyed Counties

The data underlying this study were obtained from a farm survey organized during the winter of 1993 in four counties in the provinces of Hunan and Sichuan, both of which are in China's major grain belt.[6] The four counties selected were Hanshou and Yiyang of Hunan Province and Mianzhu and Fucheng of Sichuan Province.

Hanshou is in the northern part of Hunan Province (fig. 1). Agroclimatic conditions are characterized by central to north Asian monsoon seasons and are thus well suited to grain and cotton growing.[7] Over 60% of the land in Hanshou is allocated to grain production, with rice the main crop. As can be seen from table 1, with up to 85% of its labor force still in agriculture, Hanshou is decidedly the most agricultural community of the four. Other indicators confirm this agrarian predominance. The county has the highest share of grain output in overall gross agricultural value of output (GAVO), the highest share of agricultural output value in the local economy's overall output value, industry included, which is known as the gross industrial value of output (GIVO), and the lowest per capita net income.

Yiyang, the other Hunanese County, is in the central part of the province and is endowed with a mostly flat terrain and alluvial soil (see fig. 1). Agroclimatic conditions in this county are roughly similar to those of Hanshou. As Yiyang has a no-frost period of up to 274 days per year, it is extremely well suited for wet rice cultivation, which indeed makes up 85% of its grain

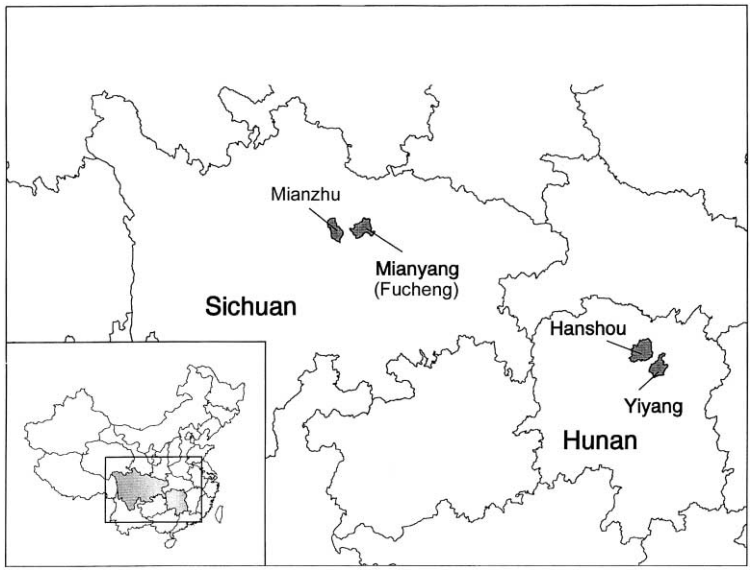

FIG. 1.—Location of the four sample counties

production, and is in fact the main rice-growing region of the province. Although Yiyang has a relatively high population density, the incomes of local inhabitants have not been adversely affected, thanks to the development of a robust industrial sector there in recent years. Its per capita income of 837 yuan in 1992 was not only higher than the national average (759 yuan) but also higher than the provincial average (780 yuan).

Located near the provincial capital of Chengdu in the northwestern plateau of Sichuan Province, both Mianzhu County and Fucheng County of Mianyang prefecture are, like their Hunanese counterparts selected for the survey, rice-growing regions (fig. 1). While grain production has a similar significance in both counties, the living standard is somewhat higher in Mianzhu than in Fucheng, perhaps because of the more developed nonagricultural sector in the former: only about half of its rural labor force was engaged in agriculture, compared with almost two-thirds in Fucheng.

The four counties covered in the study were selected from a larger national sample of counties surveyed annually by the Rural Survey Teams (*nongcun diaocha dui*) under the auspices of the State Statistical Bureau. An important criterion for selection was that both the villages and the counties had to be primarily agricultural, as is reflected by the fact that the surveyed households in all the four counties derived no more than one-third of their incomes from off-farm sources (table 2).[8] In each county, 10 villages were chosen from a sample of several randomly selected townships, and within each village, 10 households were selected for the survey, thus making up 100 farm households for each county and 400 altogether for the entire study.

TABLE 1

CHARACTERISTICS OF FOUR SAMPLE CHINESE COUNTIES, 1993

ITEM	SICHUAN		HUNAN	
	Mianzhu	Fucheng	Hanshou	Yiyang
1. Share of rural labor force in agriculture (%)	51.0	63.8	85.0	65.2
2. GAVO/(GAVO + GIVO) (%)	21.0	34.7	66.5	40.5
3. Per capita net income (yuan)	932.0	893.0	776.0	837.0
4. Share of grain output in GAVO (%)	30.8	29.6	34.7	41.6

SOURCE.—1993 rural household survey.
NOTE.—GAVO = gross agricultural value of output; GIVO = gross industrial value of output.

Before analyzing the income function, it is instructive to examine the structure and composition of farm household income. There are three perspectives from which to look at the issue. First, per capita net income is divided into four levels, and within each level the respective contributions of all enumerated economic activities are computed (the sum of which is equal to one) to show their relative importance (table 2). Four main economic activities are identified. Three—grain production, cash crops, and animal husbandry and fishery—are broadly categorized as agricultural income, and the fourth, nonagricultural income, includes all other economic activity. From the distribution of income shares across the row total, we can easily see that while agricultural income still accounts for the lion's share of household income (roughly 70%), off-farm income has already become a major income source for these rural households. What we have just described, however, is only the general picture; it obscures the relative importance of each of these sectors at different income levels. For instance, a perusal of the "Gny" column in table 2 clearly reveals that income received from grain production (and, to a lesser extent, cash crops) is proportionately more important for households in the lowest income quartile than it is for those in the highest one. The reverse is the case for off-farm income (under the column headed "Nfys"): whereas it accounts for a mere one-quarter for the lowest income group's income, it makes up more than one-third of the highest income group's share of household income.

On the whole, what table 2 shows is consistent with the theories of economic development, which postulate that workers will shift toward the economic activities of higher value that commonly become available as the economy develops away from subsistence.[9] As we have seen, the relative importance of crop income does decline systematically as household income goes up. S. Cook's study of the local economy of Zouping in Shandong Province similarly corroborates this same underlying logic.[10] Conversely, off-

TABLE 2

COMPOSITION OF HOUSEHOLD INCOME BY LEVELS OF PER CAPITA INCOME, 1993

LEVEL OF PER CAPITA INCOME	SHARE OF INCOME FROM VARIOUS SOURCES					
	Number of Observations	Pcy	Gny	Ccy	Hfy	Nfys
1	97	543.671	.330	.154	.203	.249
		(79.998)	(.141)	(.132)	(.128)	(.181)
2	96	733.708	.306	.135	.225	.288
		(46.453)	(.126)	(.126)	(.132)	(.194)
3	96	913.095	.275	.141	.237	.281
		(50.936)	(.120)	(.175)	(.147)	(.189)
4	96	1244.360	.236	.108	.226	.366
		(209.271)	(.110)	(.126)	(.141)	(.211)
Average share (%)			28.675	13.45	22.275	29.6

NOTE.—Pcy: per capita income; Gny: share of income from grain production; Ccy: share of income from cash crop production; Hfy: share of income from animal husbandry and fishery; Nfys: share of income from nonfarm sources. Figures in parentheses are standard deviations. Gny + Ccy + Hfy + Nfys = 1.

farm income assumes greater importance as income level rises, reflecting the increasing importance of these economic opportunities to the villagers in the process of China's economic transition and development. Given that the number of off-farm jobs is limited, the key question is who among the farm population has better access to these valuable job opportunities, a subject for subsequent analysis.

Our second decomposition exercise is computed on a county basis so that we can see the relative importance of the four main economic activities in the share of household income when placed in the local (County) context (table 3). Consistent with the reasoning just rehearsed, farm households in the county with the lowest per capita net income, namely, Hanshou, received the highest proportionate share of income from cropping (cash crops included). By contrast, those in Mianzhu, the highest income county, received the lowest share of income from these sources. Moreover, it is interesting to see that, although Mianzhu's share of off-farm income pales in comparison with that of Yiyang, the larger contribution of animal husbandry and fishery in the former reflects the continuing importance of this particular activity in contributing to the overall welfare of the farm households.

Third, in order to provide a sharper contrast contributed by a single economic activity across different income groups, table 4 is computed. First, the per capita net income corresponding to each income quartile is computed based on the mean income of that group. For example, the share of income accounted for by the lowest 25% of households is 0.186, whereas that for the highest 25% is 0.326. The four values are then summed to unity (one). The same exercise is then repeated for the other economic activities; doing so allows us to compare and contrast the relative significance of a particular

TABLE 3

COMPOSITION OF HOUSEHOLD INCOME BY COUNTY, 1993

COUNTY	SHARE OF INCOME FROM VARIOUS SOURCES				
	Pcy	Gny	Ccy	Hfy	Nfys
Mianzhu	932.384	.222	.056	.289	.289
	(264.835)	(.087)	(.031)	(.155)	(.193)
Hanshou	775.667	.293	.237	.181	.288
	(261.857)	(.133)	(.220)	(.125)	(.222)
Fucheng	893.329	.300	.122	.187	.286
	(298.412)	(.131)	(.085)	(.099)	(.189)
Yiyang	837.107	.331	.117	.234	.318
	(287.896)	(.136)	(.069)	(.140)	(.187)

NOTE.—Pcy: per capita income; Gny: share of income from grain production; Ccy: share of income from cash crop production; Hfy: share of income from animal husbandry and fishery; Nfys: share of income from nonfarm sources. Figures in parentheses are standard deviations. Gny + Ccy + Hfy + Nfys = 1.

economic activity for each income group. Here are some of our main observations. First, the top income quartile accounts for 75% more of the share of the income than the bottom quartile. While this difference may appear substantial, it is actually low by international standards—which range between two and four times.[11] Second, we compare and contrast the percentages of income received by each income group in each of the four economic activities. The biggest contrast is found to lie within the nonfarm-work category: the top 25% of the income group receives close to 40% of all the nonfarm income, whereas the bottom 25% receives only 15% (see also fig. 2).

The same can be said for animal husbandry and fishery. What is particularly worth noting, in addition, is that this line of economic activity is important not only for households belonging to the highest income group but also for the middle two quartiles, albeit to a lesser extent. How do we account

TABLE 4

QUARTILE SHARE OF INCOME, 1993

PER CAPITA INCOME QUARTILE	COMPOSITION OF HOUSEHOLD INCOME				
	Income Share	Gny	Ccy	Hfy	Nfys
1	.186	.219	.226	.171	.15
2	.224	.245	.237	.226	.21
3	.263	.260	.264	.273	.243
4	.326	.275	.269	.33	.396
Total	1	1	1	1	1

NOTE.—Gny: share of income from grain production; Ccy: share of income from cash crop production; Hfy: share of income from animal husbandry and fishery; Nfys: share of income from nonfarm sources.

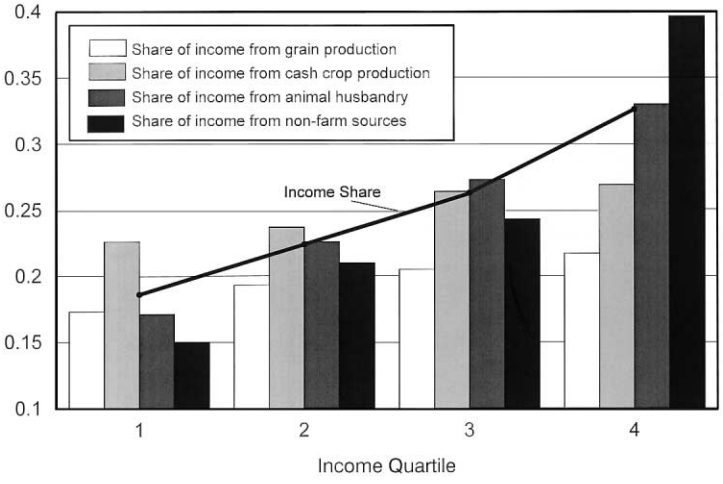

FIG. 2.—Quartile share of income, 1993

for this phenomenon? An educated guess is that the lowest income households may be more constrained by both capital and managerial (or human capital) talents in pursuing these "sideline" businesses. For instance, land must be contracted from the village authorities for a fee (which requires an up-front capital payment), ponds must be dug, feed must be purchased, the entire operation must be managed, and, subsequently, the produce must be marketed. Households with lower income must be constrained in either of the aforementioned respects, if not both.

To summarize, our descriptive analysis of rural income inequality shows that while inequality certainly exists, it is nonetheless modest. Regardless of whether we examine inequality within spatially delimited areas, such as counties, or between them, off-farm employment is an important contributor. There is an exception, however. In Hanshou County, income inequality is also explained—perhaps even better—by variations in farm income, especially grain and cash crop production. We will turn to measuring income inequality more rigorously using the Gini method and regressions in a later section.

III. Determinants of Income Levels

Before ascertaining the causes of household income inequality, we will first test the effects of a number of variables that may have bearings on per capita net income. There are a number of factors, including a household's resource endowment, family demographics and labor supply, differences in educational attainment, the development of agricultural land and labor markets, and the costs of agricultural marketing and off-farm employment. In order to pick up any possible residual regional effects, county dummies are included in the specification. We spell out in the following our hypothesized relationships

between the aforementioned lists of explanatory factors, on the one hand, and per capita income, on the other hand.

a) Per capita arable land (Pcld) is employed as a proxy for a household's nonlabor resource endowment. Holding other factors equal, a family with more cultivated land per person will likely receive a higher income; that is, $f_{\text{Pcld}} > 0$.

b) Defined as the ratio of those aged under 16 and over 60 to those between the two limits, a family's high dependency ratio (Dratio) is hypothesized to have an adverse effect on its income; that is, $f_{\text{Dratio}} < 0$.[12]

c) Educational attainment is employed to serve as a proxy for returns to human capital. In D. T. Yang's article, a distinction is made between the managerial or allocation effect of education and its productivity effect.[13] Following this innovative approach, we use the family member aged 16 or above with the maximum educational attainment as a proxy for the managerial effect on income, whereas we compute the average educational attainment of the remaining household members and use it as a proxy for the productivity effect (respectively, Edmax and Edavg). We expect the relationship between these two variables and income to be positive; that is, $f_{\text{Edmax}} > 0$, $f_{\text{Edavg}} > 0$.

d) It is highly likely that skills and experiences of the household head will have a bearing on household income. Lacking such information, however, we resort only to the age of the household head as an indirect proxy (Age). (The square of Age is employed in the estimation in order to capture the life-cycle effect of this variable on earnings, Age^2.) The expected relationship is that per capita income will rise with age of the household head initially but finally decline with it; that is, $f_{\text{Age}} > 0$, $f_{\text{Age}^2} < 0$.

e) Farmers in China have become increasingly reliant on off-farm employment and income opportunities for additional income. Here we want to test this intuitive reasoning by including in our estimation the share of household income from nonfarm sources (Nfys). Intuitively, we expect Nfys to contribute positively to household income; that is, $f_{\text{Nfys}} > 0$.

f) Economic exchange is expected to enhance the mutual welfare of voluntarily participating individuals. We thus want to see if land rental markets and agricultural labor markets will have this desirable effect on household income (respectively, Rent and Hire); that is, $f_{\text{Rent}} > 0$, $f_{\text{Hire}} > 0$.

g) Transportation costs can often be formidable in the context of a developing economy typically characterized by poor road infrastructure. Living in a village far from the nearest market town (Far) would raise not only the costs of marketing one's surplus agricultural produce but also the costs of off-farm employment. We therefore expect $f_{\text{Far}} < 0$.

h) In rural China, not only are labor markets far from perfect, but the fact that many township and village enterprises are owned by the local authorities (dubbed collectives) often implies that access to employment in this sector requires certain social connections. The answer to the question of whether one has resorted to social connections of any sort (Conn) will be used to indicate whether such nonmarket influence has affected job search

outcome. Assuming social connections have no inherent effect on access to nonfarm employment, we therefore postulate $f_{\text{Conn}} = 0$.

i) Finally, county dummies (County) are included to capture any regional fixed effects.

Our estimation of the income function, which is in logarithmic form, can now be written as follows:

$$\begin{aligned}\ln(\text{Pcny}) = {} & \alpha_0 + \alpha_1 \ln(\text{Pcld}) + \alpha_2 \text{Dratio} + \alpha_3 \text{Edavg} \\ & + \alpha_4 \text{Edmax} + \alpha_5 \text{Age} + \alpha_6 \text{Age}^2 + \alpha_7 \text{Nfys} \\ & + \alpha_8 \text{Rent} + \alpha_9 \text{Hire} + \alpha_{10} \text{Far} + \alpha_{11} \text{Conn} \\ & + \alpha_{12} \text{County} + \epsilon,\end{aligned} \tag{1}$$

where

Pcny = per capita net income;
Pcld = per capita arable land;
Dratio = dependency ratio;
Edavg = average level of education received by household members aged 16 or above;
Edmax = maximum level of education received by a household member aged 16 or above;
Age = age of household head;
Nfys = share of income from nonfarm sources;
Rent = a dummy variable equal to 1 if the household has hired in or hired out land, 0 otherwise;
Hire = a dummy variable equal to 1 if the household has hired in labor, 0 otherwise;
Far = distance of the nearest market town;
Conn = a dummy variable equal to 1 if any household member obtained nonfarm work through some kinds of social connections, 0 otherwise; and
County = county dummies.

Table 5 gives a summary of the means and standard deviations of the foregoing list of explanatory variables, and the estimation results are separately presented in table 6. To test the robustness of the estimation, we employ three alternative specifications (eqq. [1]–[3], table 6).[14] In equation (1), all the explanatory variables are included, whereas the regional dummies are dropped in equation (2) to see if there may be any regional effects. Finally, the variable dependency ratio is instrumented (by household size) to correct for the possible endogeneity problem. We do this because the causal relationship between dependency ratio and income is not all that straightforward. While dependency ratio may affect income levels, the reverse may well be the case.

As expected, both per capita farm size and off-farm income are positively and significantly related to a household's income. Depending on the choice

TABLE 5

SUMMARY STATISTICS OF THE EXPLANATORY VARIABLES USED IN INCOME FUNCTION ANALYSIS

Variable	Number of Observations	Mean	SD	Minimum	Maximum
ln(Pcny)	385	6.70	.33	5.63	7.63
ln(Pcld)	385	2.57	.37	−.41	3.56
Dratio	384	.55	.49	0	3.00
Edavg	384	1.27	.40	0	2.40
Edmax	385	2.96	.78	0	6.00
Age	385	40.28	10.86	21	71.00
Age^2	385	1,740.33	916.69	441	5,041.00
Nfys	386	.30	.20	0	.93
Rent	386	.08	.27	0	1.00
Hire	386	.15	.36	0	1.00
Far	386	3.13	2.31	0	20.00
Conn	385	.15	.36	0	1.00

of equation, the size (of farm) elasticity of income is estimated to range from 0.35 to 0.4, which is fairly significant, suggesting that farm income can increase as the size of operations expands.[15] Given China's already high population-to-land ratios and the overall low incidence of land rental market transactions, however, further increase in farm income is bound to lie elsewhere, most notably from the nonagricultural sources.[16] Indeed, the coefficients of the nonfarm variable (Nfys), which range from 0.55 to 0.65, are in fact larger than the farm size coefficients. More specifically, a 10% shift in the composition of household income away from agriculture to nonagriculture will possibly induce a 6% increase in overall household income. In view of the fact that nonfarm income presently accounts for only about one-third of household income, there is, conceivably, room for farm household income to increase based on the future expansion of the nonfarm sector in China's countryside. The highly industrialized regions of eastern China—with some enjoying a share of off-farm income amounting to nearly 80%—offer just such a promise for the people of these predominantly rice-growing regions, for example.[17] In discussing the income effect of nonfarm employment, it is thus important not to lose sight of its importance on mean income levels—an arguably more important welfare indicator for societies at low levels of income. As was pointed out in our introduction, current analyses have focused almost exclusively on the relationship between nonagricultural development and income inequality but neglected the former's effect on income level.

Also consistent with our hypothesis is the finding that higher dependency ratios (Dratio) tend to reduce per capita net income. This analysis appears to have an endogeneity problem, however, as it is not precisely clear whether income is being adversely affected by dependency ratio or vice versa. The *t* value of the Hausman test is −3.21, so we rejected the null hypothesis that the variable dependency ratio is exogenous to income. We therefore corrected

TABLE 6

REGRESSION RESULTS OF THE INCOME FUNCTION

	EQUATION (1)		EQUATION (2)		EQUATION (3)	
	Coefficient	*t* Value	Coefficient	*t* Value	Coefficient	*t* Value
ln(Pcld)	.413	7.514	.351	7.038	.347	5.756
Dratio	−.108	−2.680	−.145	−3.726	−.596	−4.063
Edavg	−.156	−3.233	−.186	−3.781	−.307	−3.898
Edmax	.064	2.810	.062	2.548	.107	2.914
Nfys	.651	5.839	.606	5.403	.546	3.539
County dummies:						
d_1	.032	.747	…	…	−.083	−1.396
d_2	−.198	−4.294	…	…	−.170	−2.740
d_3	−.050	−.841	…	…	−.187	−2.333
Far	.039	1.101	.045	1.413	.100	1.984
Hire	.052	.898	.005	.085	.139	1.635
Rent	.000	−.005	−.003	−.377	−.008	−.707
Age	−.008	−.717	−.007	−.646	−.014	−.931
Age^2	.000	.610	.000	.582	.000	.350
Conn	.009	.210	.040	.886	.033	.549
Intercept	5.719	20.094	5.888	20.478	6.582	15.415
Number of observations	…	330	…	330	…	330
Adjusted R^2	…	.319	…	.253	…	…
F value	…	8.67	…	8.58	…	7.82

for this problem by instrumenting the dependency ratio by household size, a variable that is closely related to dependency ratio but not necessarily related to per capita income. Doing so immediately changed the coefficient from −0.1 to −0.6, a finding that confirmed our suspicion that there was indeed an endogeneity problem.

Results concerning the effect of returns to schooling on income are mixed. While Edmax and Edavg are both significant, their signs are opposite. It is easy to interpret the positive effect of maximum schooling on income, particularly when it is considered a proxy for managerial talents—a quality typically required in (off-farm) self-employment. In this regard, our result is thus consistent with Yang's estimates, according to which "highest farm education is the most important education variable to explain efficiency."[18] What is more difficult to make sense of is the negative, marginal effect of family members' average education on income. Although such a finding could be subject to a range of interpretations, we think the following conjecture may most closely approximate the reality of rural China.

Notwithstanding that off-farm employment opportunities had grown at rapid rates in the early 1990s, the demand for these jobs nevertheless still outstripped their supply. This implies, first of all, that it is only villagers with above-average educational attainment who may enjoy better access to these scarce work opportunities. Our own computation based on the same data set on which this present analysis is predicated indeed shows that up to 42% of those who obtained nonfarm work have an educational attainment of junior

high school.[19] Having a better education is, however, only a necessary condition for obtaining nonfarm employment; it is by no means a sufficient condition. Depending on the extent of the scarcity of nonfarm work, these jobs may have to be "rationed" among the better-educated rural workers eager to obtain them. Should they indeed fail to do so, they would be stuck with farming—an occupation in which education does not necessarily translate into a comparative advantage. It may very well be the case that the best farmers in peasant agriculture may be the least educated; literacy offers little help when it comes to the time-honored traditions of diligence and industriousness. While such a conjecture may plausibly explain the negative relationship between average educational attainment of a household and per capita income, it must remain speculative in the absence of further evidence.[20]

There are some interesting regional effects to be noted from our estimations. Compared with Yiyang County (case 4), Fucheng County (case 3) has a negative coefficient, although its mean per capita income is actually higher than that in Yiyang, suggesting that households in this latter county are somewhat disadvantaged in terms of local resource endowment. Were it not for the positive compensating effects of other variables (education, for example), farmers in Fucheng would have a lower income than their counterparts in Yiyang.

With regard to the possible effect of factor markets, the land rental market is found to have no significant effect on income. This is rather understandable in light of the low incidence of rental market transactions in three out of the four counties. Hanshou County, where such transactions are atypically high (18%),[21] is the exception. The average for the remaining three counties is less than 5%—too low a magnitude to have any noticeable impact on farm household income. The same can be said of the agricultural labor market. With the small size of the landholdings cultivated by households and the continuing predominance of agriculture in these communities, it is inconceivable just how large the market for hired farm laborers could possibly become. Moreover, with up to two-thirds of the hired hands reportedly belonging to the friends-or-relatives category, labor transactions might actually better approximate mutual aid rather than outright cash-based market exchange.[22] At any rate, the small and nascent farm labor market, as opposed to the off-farm labor market, is unlikely to produce a substantial impact on the income received by farm households. Finally, but not least, neither the distance of one's village to the nearest market town nor the "endowment" of social capital has significant effects on income. We will elaborate on the latter aspect in a subsequent section.

IV. Rural Income Inequality Examined

We will analyze rural income inequality by two means. First, we will decompose household inequality using the Gini decomposition method, both among

the farm households and between the four counties.[23] Second, we want to examine income inequality at the village level using regression analysis.

Decomposing Gini Coefficient of Household Inequality[24]

Let y_i be the total income of household i, where $i = 1, \ldots, n$, and let y_{is} be the income obtained by household i from sector s, where $s = 1, \ldots, S$. Obviously, $y_i = \sum y_{is}$. Let the distribution of the total household income be represented by $Y = (y1, \ldots, yn)$ and the distribution of income component s be represented by $Ys = (y1s, \ldots, yns)$. We can calculate the Gini, a coefficient with a value that ranges from zero to one (G), using the following formula:

$$G = 2\,\mathrm{Cov}[Y, F(Y)]/E(Y), \tag{2}$$

where $F(Y)$ is the cumulative distribution of total household income in the sample, that is, the rank of y in the sample divided by the total number of observations, and $E(Y)$ is the mean income of the sample households. The Gini coefficient can be decomposed in the following way:[25]

$$G = \sum R_s G_s S_s, \tag{3}$$

where R_s = Gini correlation of income from source s with total income, defined as $\mathrm{Cov}[Y_s, F(Y)]/\mathrm{Cov}[Y_s, F(Y_s)]$; G_s = Gini coefficient of each individual income source s; and S_s = share of income source s in total income.

The relationship between R_s, G_s, and S_s on the one hand and G on the other hand may be reasoned as follows. As a measure of income inequality among households contributed by a particular economic activity or income source, Gini will be larger the larger the G_s (col. 2, table 7). By the same token, defined as the relative share of a particular economic activity or income source in overall household income, the larger the S_s, the higher the Gini coefficient (col. 1, table 7). Finally, R_s, which is a correlation measure between the rank of a particular income source and total income in inequality terms, also exhibits a positive relationship with G (col. 3, table 7). The last and most important step is to calculate the percentage share of inequality contributed by a particular income source (P_s) by $P_s = (R_s G_s S_s/G) * 100\%$. As before, we divide total income into four sources, namely, (i) grain production, (ii) cash crops, (iii) animal husbandry and fishery, and (iv) nonfarm work. Now we can interpret the analytical results in table 7.

First, the Gini for the whole sample is a mere 0.182. This compares favorably with that of many developing countries, such as Brazil (0.57), Bolivia (0.42), South Africa (0.62), Malaysia and Philippines (0.50), and is also smaller than that of such advanced economies as the United States (0.38) and Canada (0.28).[26] Turning to the specific findings, computations in the "G_s" column of table 7 suggest that the Ginis are the largest for nonfarm work

TABLE 7

DECOMPOSITION OF GINI COEFFICIENTS

Income Source	Share in Total Income (S_s) (1)	Gini Coefficient of the Particular Income Source (G_s) (2)	Gini Correlation with Total Income Rankings (R_s) (3)	Contribution to Gini Coefficient of Total Income ($S_sG_sR_s$) (4)	Percentage Share in Overall Gini (P_s) (5)
Grain production	.287	.261	.426	.032	18.7
Cash crops	.135	.48	.183	.012	7.0
Animal husbandry and fishery	.222	.387	.539	.046	26.9
Off-farm income	.296	.456	.594	.081	47.4
Total	1	.182	1	.171	100

and, surprisingly, also for cash crops. Given that the share of cash crops is small, however (0.183, cf. "R_s" column), the overall contribution of this income source or economic activity in overall Gini is a mere 7% (P_s, obtained by $S_sG_sR_s/G$ [col. 5]). In sharp contrast, given the much larger share of off-farm income in total income (0.594; see column headed "R_s"), its contribution to the overall Gini is much larger: 47.4%. Next to income from nonfarm employment, income from animal husbandry and fishery is the largest contributor to the overall Gini (26.9%). This finding is consistent with the earlier descriptive findings. Not surprisingly given its proportionate significance in households' production, grain production ranked third at 18.7% (see also fig. 3).

Does inequality take on a different dimension within a spatially delimited area, such as a county? To answer this question, we decompose the Gini coefficient on a county-level basis, with the results summarized in table 8. A striking finding is that the highest Gini is not always found in the county with the highest per capita net income or the county with relatively abundant off-farm employment opportunities, namely, Mianzhu County in Sichuan Province. With a coefficient of 0.16, its Gini is the lowest of the four counties, despite nonfarm income being the single largest contributor to the Gini (see also fig. 4).

Second, a comparison of the Ginis between the four counties reveals that off-farm work is not necessarily always the largest disequalizing force behind any observed inequality; differences in an activity's contribution to overall income inequality are substantial between regions. Take nonfarm earnings, for instance. While they disproportionately account for 60% of the overall Gini in Mianzhu, they represent only 35% in Hanshou. In Hanshou, the county in our study with the lowest per capita income, it is cropping income—grain and cash crops combined—that altogether accounted for over 50% of the

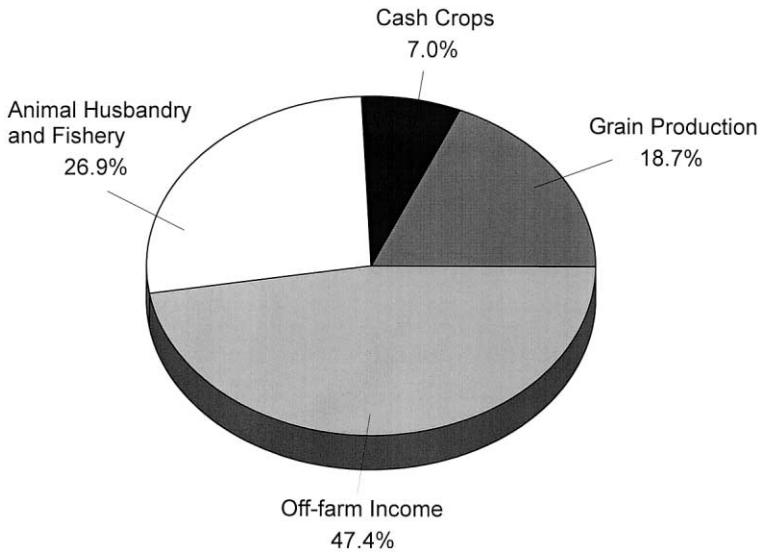

FIG. 3.—Percentage share in overall Gini coefficient

observed inequality. The aforementioned contrast between the two regions in terms of the contribution of nonfarm earnings to income inequality suggests that the source of inequality is likely to change in accordance with economic development. For instance, off-farm income is unlikely to be a major disequalizing force in a society in which agricultural activities predominated—a stage of development at which income levels are correspondingly low.[27] Conversely, as a society develops away from subsistence-oriented production toward off-farm work, not only will the latter become a major source of income inequality; more important, it will simultaneously raise the overall income levels of that society. Why, therefore, ignore the benefit that economic development can confer on household income? Why focus only on its costs?[28]

Analysis of Intervillage Income Inequality

After ascertaining how income inequalities among the surveyed farm households and among the survey regions were determined, we wanted to know what makes the distribution of income more or less equal in one village compared with the others. The same hypotheses and explanatory variables used in Section II are employed here to regress on the dependent variable, namely, the village-level Gini coefficient (cf. Sec. III).[29] A major difference between the two exercises is this: following B. Chiswick, our estimation includes the effect of the variance of a number of factors, such as land endowment, share of off-farm income, education, and so forth, on income inequality (see eq. [4]).[30] In addition, in order to compute the returns to schooling among different economic activities, we estimate a production function using

TABLE 8

DECOMPOSITION OF GINI COEFFICIENTS BY COUNTY

	S_s	G_s	R_s	$S_sG_sR_s$	% in Overall Gini (P_s)
Mianzhu:					
Grain production	.221941	.201737	.300890	.013472	9.635926
Cash crops	.055207	.283104	.155922	.002437	1.743034
Animal husbandry and fishery	.287322	.333789	.409528	.039276	28.092220
Off-farm income	.292397	.443827	.652100	.084625	60.528820
Total	1	.160392	1	.139810	100
Hanshou:					
Grain production	.291427	.285739	.456843	.038042	20.803610
Cash crops	.239736	.528797	.422076	.053507	29.260780
Animal husbandry and fishery	.183267	.394970	.367950	.026634	14.564930
Off-farm income	.285570	.505467	.448091	.064680	35.370680
Total	1	.184076	1	.182864	100
Fucheng:					
Grain production	.300302	.284006	.539742	.046033	26.430280
Cash crops	.121585	.387336	.306477	.014433	8.286947
Animal husbandry and fishery	.187308	.340008	.554961	.035343	20.292610
Off-farm income	.286361	.459762	.595170	.078359	44.990160
Total	1	.178689	1	.174168	100
Yiyang:					
Grain production	.331215	.227438	.493145	.037149	19.885760
Cash crops	.117388	.311090	.306797	.011204	5.997292
Animal husbandry and fishery	.233805	.396919	.589516	.054708	29.285080
Off-farm income	.317592	.415124	.635250	.083751	44.831870
Total	1	.190034	1	.186812	100

land, labor, fixed capital, and the average years of schooling as inputs.[31] We are able to do this for both grain and cash crops. Owing to the lack of such information pertaining to off-farm work, however, the same exercise cannot be performed. As an alternative, we use only the variance of the share of income from nonfarm sources as a proxy for its effect on income inequality.

Given that income inequality is often analyzed in the form of the Kuznets hypothesis, we also would like to test whether such a relationship may exist in the present context. Since the Kuznets curve is essentially an expression capturing the changing relationship between income levels and income inequality over time, the cross-sectional nature of our study obligates us to control for the conceivable differences between villages with respect to factor endowments, educational level, and other explanatory variables in the regres-

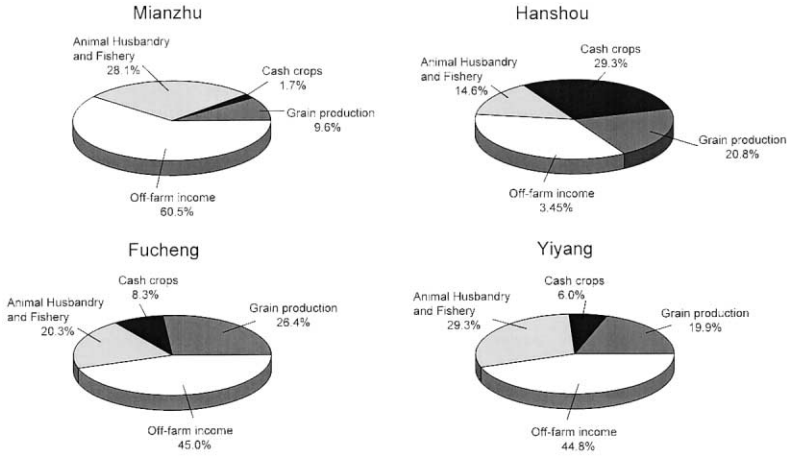

FIG. 4.—Decomposition of Gini coefficients by county

sion.[32] We can now write the estimation as follows:

$$\begin{aligned} \text{vGini} = {} & \beta_0 + \beta_1 \text{Var Edmax} + \beta_2 \text{Var Edavg} + \beta_3 \text{Var Pcld} \\ & + \beta_4 \text{Var Nfys} + \beta_5 \text{Rtsgn} + \beta_6 \text{Rtscc} \\ & + \beta_7 \text{Var Dratio} + \beta_8 \text{Var Far} + \beta_9 \text{Var Hire} \\ & + \beta_{10} \text{Var Rent} + \beta_{11} \text{County} + \beta_{12} \text{Var Conn} \\ & + \beta_{13} \text{Pcvy} + \beta_{14} \text{Pcvy}^2 + \mu, \end{aligned} \tag{4}$$

where

vGini = village level Gini coefficient;
Var Edmax = variance of the maximum level of education in the village;
Var Edavg = variance of the average level of education in the village;
Var Pcld = variance of per capita arable land;
Var Nfys = variance of share of income from nonfarm source in the village;
Rtsgn = rate of return of schooling from crop production;
Rtscc = rate of return of schooling from cash crops;
Var Dratio = variance of the dependency ratio in the village;
Var Far = variance of distance from the nearest market in the village;
Var Hire = variance of the agricultural labor market;
Var Rent = variance of land rental market;
County = county dummies;
Var Conn = variance of social connections; and
Pcvy = per capita village income.

The estimation results are presented in table 9. In equation (1), where

TABLE 9

REGRESSION RESULTS OF INCOME INEQUALITY

	EQUATION (1)		EQUATION (2)		EQUATION (3)	
	Coefficient	*t* Value	Coefficient	*t* Value	Coefficient	*t* Value
Var Edmax	−.012	−.473	−.005	−.204	−.011	−.426
Var Edavg	−.206	−2.062	−.236	−2.799	−.201	−1.783
Var Pcld	.001	1.985	.001	1.577	.001	1.669
Var Nfys	.988	2.029	.997	2.105	1.004	1.970
Rtsgn	.062	2.512	.058	2.397	.063	2.376
Rtscc	.011	.413	.016	.678	.010	.377
Var Dratio	.072	1.267	.088	1.765	.070	1.044
Var Far	−.002	−.838	−.001	−.459	−.002	−.856
Var Hire	.075	.942	.086	1.226	.071	.851
Var Rent	−.036	−.377	−.068	−.788	−.038	−.375
d_1	−.023	−.842	…	…	−.022	−.718
d_2	−.028	−1.318	…	…	−.028	−1.084
d_3	−.008	−.297	…	…	−.007	−.257
Var Conn	.102	1.243	.077	1.135	.106	1.230
Pcvy	…	…	…	…	.000219	.261
Pcvy^2	…	…	…	…	−.0000001	−.281
Intercept	.143	5.128	.132	6.168	.057	.157
Number of observations	…	39.000	…	39.000	…	39.000
Adjusted R^2	…	.326	…	.348	…	.269
F value	…	2.310	…	2.840	…	1.870

all but the village income variables are included, income inequality across villages can be explained by variations in resource endowment, the differential access to or opportunities for off-farm employment, and the rate of returns accrued to grain production.[33] Returns to education, however, have the curiously opposite effect of reducing inequality. In view of the opposite sign between the rate of return to grain production and the returns to education more generally, it would be of interest to ascertain which one is the stronger of the two. In particular, given the earlier estimate that education has a negative coefficient for overall income (cf. table 6), it is incumbent on us to estimate the rates of return to education in crop production to see if they are positive or negative and are significantly different from zero.[34]

According to our estimates, returns to education in crop production are negative in more than half of the 40 villages, and the estimates are not significantly different from zero.[35] Moreover, not only is the coefficient of average education much larger than that of the return to education in crop production (−.2 compared with .06, second row of table 9), but education—be it average or maximum—also has a much wider range than the returns to education in this particular sector.[36] Taken together, these analytical results suggest that differences in the average levels of schooling are more likely to have a greater, beneficial impact on reducing income inequality than the opposite effect pertaining to the returns to schooling in crop production.

A key question arising from this observation is why education has the

desirable effect of raising overall income level but reducing income inequality. One guess is that education better places one in off-farm employment but has little effect on wage income. More specifically, if proportionately more households of a higher educational attainment who originally belonged to lower income quartiles are able to obtain off-farm jobs, their income would be enhanced while overall income inequality simultaneously would be reduced. Indeed, as we shall show in Section V, education is important in facilitating access to off-farm employment but not in determining total income.

In equation (2), the village dummies are dropped and the results remain the same. In equation (3), where per capita village income is included, we see no sign of an empirical Kuznets curve, and the analytical results are basically similar to those of equation (1).[37]

V. Determinants of Nonfarm Employment

Earlier estimations have confirmed the opposite contributions of nonfarm income to raising the mean income of the farm households, on the one hand, and to rising income inequality, on the other hand (the latter includes the distributive consequences between the villages). Insofar as the demand for nonfarm work outstrips supply, the question of who has access to these valuable employment and income opportunities has important welfare consequences. According to A. Lewis, large agrarian economies are, owing to their abundant farm labor supply relative to available employment opportunities, frequently subject to enormous employment pressures in the agricultural sector—a condition that renders the returns to labor low.[38] To see if China suffers from problems of a similar kind, we compute a production function for agricultural production by estimating the returns of education in the farm sector. Curiously, the marginal product of farm labor is estimated to be negative, which does not seem rational. While overall returns to all rural workers may be low, it is unlikely that the rural people pay no regard to the returns of their marginal effort. We attribute such a problem to the result of a reporting error, stemming primarily from farm subjects' overstating the number of hours they worked on the farm, when the amount of time that they actually spent was much less. Indeed, so-called surplus farmworkers in China may be no more than a mere statistical artifact; China now has reportedly as many as 100 million rural migrants working in the urban areas who, nonetheless, are still being classified as employed in farming and animal husbandry.[39] Seen in this light, what China has, in other words, is therefore surplus rural workers, not surplus farmworkers.

Against this background, it is perhaps not unreasonable to postulate the following "stylized" conditions for motivating our analysis. First, there is keen competition among the rural inhabitants for off-farm employment opportunities. Second, instead of maximizing the marginal returns or the wage rate (be it daily or hourly), those in search of such opportunities are likely more concerned with maximizing total income that can be generated from such

employment opportunities. With these assumptions in mind, we will therefore employ total income from nonfarm employment as the dependent variable in our estimated income (instead of wage) equation. Accordingly, the coefficient that results from this modification will be the marginal effect of education on total off-farm income and not the rate of return to schooling, as would otherwise be the case under the human capital model.

Our next step is to estimate a labor supply function. There are some inherent difficulties associated with doing so in the case of females, however. A primary reason is that, compared with their male counterparts, proportionately more women are likely constrained from participating in off-farm work, in view of the fact that family obligations remain the primary responsibility of females. Formally stated, these women are likely to face higher reservation wages. Should that be the case, our estimation of the wage equation will likely face the problem of selection bias, namely, that more women without a participation constraint will be included in the estimation, in which case the estimated coefficients will not be consistent. To deal with this problem, we resort to J. Heckman's procedure, which involves the identification of some variables that will apparently affect the participation decision but not necessarily determining income.[40] One promising candidate for this variable is the number of children a married female has. While this may alter her reservation wage (or income), this should have no effect whatsoever on her productivity and hence on wages (income). After having done this, we need to correct for the possible bias due to selective participation. Formally, this can be done using the participation equation,

$$Z_i^* = \gamma M_i + \mu_i, \quad Z_i = 1 \text{ if } Z_i^* > 1 \text{ and } 0 \text{ otherwise;}$$

$$\text{Prob}(Z_i = 1) = \Phi(\gamma' M_i) \text{ and } \text{Prob}(Z_i = 0) = 1 - \Phi(\gamma' Mi), \tag{5}$$

and the income equation,

$$Wi = \beta' xi + \epsilon i \tag{6}$$

observed only if $Z_i = 1$, $(u_i \epsilon_i) \sim$ bivariate normal $(0, 0, 1, \sigma_\epsilon, \rho)$

$$E(Wi|Zi = 1) = \beta' x + \rho\sigma_\epsilon \lambda(\gamma' M). \tag{7}$$

We estimate this model by full maximum likelihood estimation.[41]

It is important to point out that in estimating our participation equation we include an additional variable, namely, the influence of social capital, to measure the possible effect of social networks, or *guanxi*, in affecting one's access to employment off the farm. The inclusion of this variable in the estimation is arguably important for the following reason. While rural China has become more market-oriented as a result of the reform, local officials may still be in charge of important allocation decisions on scarce resources, of which positions in government departments and collective enterprises are prominent examples.[42] As such, this is a hypothesis worth examining, conditional on data availability.

The other important reason for examining the possible role played by social networks is that they provide valuable information on specific job vacancies and therefore facilitate the process of matching. It is fortunate that we have just such a question in our questionnaire asking those respondents with off-farm work how they actually obtained their jobs. They were presented with four discrete choices, ranging from heavily dependent on social connections to relying entirely on the labor market.[43] To simplify our analysis, we treat this as a dummy variable,[44] and we regard respondents choosing any one of the former three choices as representing some kind of social capital endowment or connections—to which a value of one would be assigned, and zero otherwise.[45] In this way we can estimate the possible effect of social connections on the odds of obtaining nonfarm employment. In addition, our explanatory variables include the marital status and age of household members (to serve as proxies for demographic effects), whether one has a child under 10 years of age (the participation constraint), land rental and farm labor markets, human capital, and regional effects. Finally, in order to distinguish the effect of a young child separately for men and women, two separate equations are estimated. Males and females of age 16 and above in the sample are used in the estimations.

Our estimation reveals that women's participation in nonfarm work is primarily affected by two considerations (table 10). First, as indicated by the negative coefficient, women are significantly constrained in seeking off-farm employment opportunities if they have to take care of a young child. Such a finding perhaps corroborates the thesis that women with younger children and presumably with no other family member (such as a mother-in-law) to help out would likely remain stuck with farm and household work even where the rural nonfarm sector thrives.[46] Second, and on the brighter side, the better-educated female rural workers are more likely to be seeking off-farm employment opportunities. That is, provided that they have attained a minimum educational attainment—junior secondary school in this case—women are able to improve their earnings (and, as a corollary, their overall household income) by allocating more of their time to working off the farm (table 10, "Education" row). More generally stated, education affects income levels via the effect of time that individuals allocate between alternative employment and income opportunities. That said, as women get to the age of marriage and, subsequently, childbearing, they will likely be constrained by domesticities, particularly looking after children at home (row 2).

What is perhaps more encouraging, though, is the finding that there are no significant income differentials among the various categories of nonfarm jobs. Conditional on participation or access, once one lands in an off-farm job, the economic returns are broadly similar, suggesting modest if any premium accrued to particular types of off-farm employment.

Of greater interest perhaps is the finding that social capital or networks do not help one in gaining access to nonfarm employment, a result that differs from that of Cook.[47] Networks may be relevant in Zouping County, as Cook

TABLE 10

REGRESSION RESULTS OF LABOR PARTICIPATION AND WAGE EQUATION FOR MALE AND FEMALE WORKERS

	COEFFICIENT (*z*-Statistics)			
	Male		Female	
	Participation	Wage	Participation	Wage
Single	−.9626	…	.3972	…
	(−3.85)		(1.436)	
Child10	−.0527	…	−.4334	…
	(−.312)		(−2.633)	
Hire	.0709	…	.1706	…
	(.468)		(1.042)	
Rent	−.4707	…	.0075	…
	(−1.874)		(.030)	
d_1	.1104	…	.1314	…
	(.609)		(.683)	
d_2	.3589	…	−.1422	…
	(2.005)		(−.725)	
d_3	−.1180	…	−.1950	…
	(−.658)		(−.999)	
Education	.1876	−25.33	.5361	−7.734
	(2.231)	(−.411)	(5.412)	(−.047)
Age	.1775	−30.94	.0169	−31.51
	(7.113)	(−1.074)	(.644)	(−1.322)
Age^2	−.0027	.2798	−.00026	.2809
	(−8.38)	(.694)	(−.872)	(1.028)
Conn	.0732	86.96	.2530	151.59
	(.0465)	(.723)	(1.444)	(.778)
Constant	−2.1409	1838.58	−2.406	1524.809
	(−3.858)	(3.284)	(3.965)	(2.019)
Number of observations	620	…	570	…
Model χ^2	290.95	…	89.66	…
Lambda	−174.25	…	−32.75	…

NOTE.—Single = 1 if the person is not married, 0 if the person is married; Child10 =1 if the family has at least one child under the age of 10, 0 otherwise; Rent: dummy variable = 1 if the household has hired in or hired out land, 0 otherwise; Hire: dummy variable = 1 if the household has hired in labor, 0 otherwise; Conn: dummy variable = 1 if any household member obtained nonfarm work through some kinds of social connections, 0 otherwise; Education: Educational level; Age: age; Age^2: the square of Age; d_i, i = 1, 2, 3: county dummies.

finds, primarily because most of the township and village enterprises there are collectively owned and local officials play a critical role in allocating employment in this lucrative sector. Conversely, the provinces of Sichuan and Hunan do not have a strong tradition of collectively managed nonagricultural enterprises. Most of these are private concerns, which began to proliferate only in the early 1990s. Jobs in these sectors, as a result, are primarily allocated by means of the market mechanism, which powerfully explains why social capital plays little if any role in the allocation of the nonfarm jobs.

For the male workers, our estimation results suggest that marital status is significant; it is the married, older men who have an edge over their younger,

single counterparts with respect to access to off-farm employment. It is, however, not entirely clear why this is so, although the younger farmworkers may well have migrated for employment opportunities in the urban areas, given the higher returns in the latter.[48] Second, and consistent with a previous finding, education is important in determining participation in or access to off-farm work but not in determining total income. Third, and most interesting, is the finding that the development of an active land rental market has a negative effect on male farmworkers with respect to seeking off-farm employment. That is, for those who have a stronger preference for farming, having more land to farm can be a substitute for the alternative of working off the farm. In other words, as long as one is able to obtain higher earnings as a result of extending his size of farm operations, there is no reason why one must abandon farming altogether for off-farm work. If this reasoning is correct, then there are important policy implications regarding the development of the land rental market in rural China, which is apparently still in a nascent stage. As with the female rural labor force, social capital or networks have no effect on either the participation decision or total income determination.

VI. Conclusions

The relationship between economic growth and its distributive consequences has long been a topic attracting the attention of many economists in the development literature. China's reform and transition to a market-oriented economy has attracted many to study the distributive consequences of the reform of its many rural institutions and policies. Our analysis, based on a unique farm survey conducted in four predominantly agricultural communities, has the following important findings worth recapitulating in this concluding section. Where nonfarm employment opportunities have flourished, they do contribute significantly to raising overall farm household income and simultaneously to income inequality. While we do not have any information on what inequality was like prior to the rise of this robust sector, the resulting inequality, as indicated by the Gini coefficient, is decidedly low by any measure. In particular, it should be noted that there is no straightforward relationship between income levels and inequality, as borne out by the finding that the county with the highest per capita net income also turns out to have the smallest Gini. Within this context, it is perhaps even more important to focus our analytical attention on the beneficial effect of nonfarm income on raising the overall standard of living in China's rural communities. Our findings evidently suggest that only in counties with relatively high levels of income does nonfarm income become the single largest contributor to the Gini. At low levels of income, as in the case of Hanshou County, it is agricultural production in a broad sense that contributes the most to the Gini.

The other important question is, How do we account for the observed low level of income inequality in our findings? We think it can be attributed primarily to two factors. First, while education certainly improves one's access

to nonfarm employment and thereby helps raise one's household income, it has a relatively small effect on wages, owing in turn to the lack of wage dispersions among nonfarm occupations. As W. Parish, X. Zhe, and F. Li and others have noted, the general lack of a wage premium can readily be explained by the low skill requirements of most nonfarm jobs at this stage of development in rural China.[49] To the considerable extent that nonfarm jobs do not require a great many skills, any insider's information concerning job vacancy and the potential use of personal connections would appear superfluous. This explains both the fact that social capital plays no significant role in facilitating access to nonfarm employment and the active nature of the labor market as it has been observed to exist in our surveyed communities.

But social capital is not significant for another, perhaps more important, reason. In areas dominated by private firms, as in our surveyed counties, there are solid grounds for believing that hiring decisions are predicated primarily on merits or productivity rather than personal considerations, in which instance it creates a level playing field on which farm households can compete on an equal footing. Insofar as educational attainment does not differ tremendously among the rural population, access to nonfarm employment is likely to be relatively equal among the farm households. Contrary to what might be expected, it is the private rather than the collective enterprises that are providing a more equal opportunity for farm households to enhance their income via participation in nonfarm employment. In this connection, one should thus not condemn policies that encourage the development of a private-sector economy. As long as it helps raise the overall income and the standard of living for the majority of the rural people, a moderate rise in inequality is not a hefty price to incur in the process of economic development.

Notes

* We would like to thank D. Gale Johnson for extensively commenting on an earlier draft and an anonymous reviewer and Denise Hare for helpful comments and suggestions. We alone are responsible for the remaining blemishes.

1. See, among others, Denise Hare, "Rural Nonagricultural Activities and Their Impact on the Distribution of Income: Evidence from Farm Households in Southern China," *China Economic Review* 4 (1994): 59–82; Azizur Khan and Carl Riskin, "Income and Inequality in China: Composition, Distribution and Growth of Household Income," *China Quarterly* 154 (1998): 221–53; John Knight and Li Shi, "Cumulative Causation and Inequality among Villages in China," *Oxford Development Studies* 5 (1997): 149–92; John Knight and Lina Song, "The Spatial Contribution to Income Inequality in Rural China," *Cambridge Journal of Economics* 17 (1993): 195–213; and Scott Rozelle, "Rural Industrialization and Increasing Inequality: Emerging Patterns in China's Reforming Economy," *Journal of Comparative Economics* 19 (1994): 362–91.

2. Household production accounts for up to three-quarters of disposable household income. Azizur Rahman Khan, Keith Griffin, Carl Riskin, and Zhao Renwei ("Household Income and Its Distribution in China," *China Quarterly* 132 [1992]: 1029–61) note that family production activities have an equalizing effect on rural income distribution.

3. Knight and Song; Rozelle.

4. Khan et al.

5. The importance of political relationships and therefore social connections in allocating scarce resources, including off-farm employment opportunities in the rural areas, is not entirely clear in the reform period. On the one hand, Victor Nee ("Organizational Dynamics of Market Transition: Hybrid Forms, Property Rights, and Mixed Economy in China," *Administrative Science Quarterly* 37 [1992]: 1–27) advances the thesis that the power of rural cadres is gradually being eroded by the reform; therefore, rural households should reduce their dependence on them for employment and other opportunities. On the other hand, Jean Oi ("Fiscal Reform and the Economic Foundation of Local State Corporatism in China," *World Politics* 45 [1992]: 99–126) argues that rural cadres tend to have developed control over the nonfarm enterprises they have helped found and manage since the reform, the result of which is that they continue to shape the employment and income opportunities of the rural households. Social connections are therefore employed as an explanatory variable in our analysis to shed some empirical light on this debate.

6. Hunan is located in the central southern part of China, whereas Sichuan is in the southwestern part.

7. In fact, it is the only surveyed county where cotton is grown.

8. An exception is Yiyang County, whose share of off-farm income is just slightly over one-third.

9. D. Gale Johnson, "Agricultural Adjustment in China: Problems and Prospects," Discussion Paper no. 99:01 (University of Chicago, Office of Agricultural Economics Research, Chicago, April 1999).

10. Sarah Cook, "Work, Wealth and Power in Agriculture: Do Political Connections Affect Returns to Household Labor?" in *Zouping in Transition: The Process of Reform in Rural North China*, ed. Andrew G. Walder (Cambridge, Mass.: Harvard University Press, 1998).

11. Debraj Ray, *Development Economics* (Princeton, N.J.: Princeton University Press, 1998).

12. This variable also measures the contribution of labor input to levels of income received by the surveyed households.

13. Dennis T. Yang, "Education in Production: Measuring Labor Quality and Management," *American Journal of Agricultural Economics* 79 (1997): 764–72.

14. The analysis of cross-sectional data typically suffers from the problem of heteroscedasticity. To see if this is the case, we performed the Cook-Weisberg test and confirmed it. To correct for this problem, we employ H. White's variance-covariance matrix (Halbert White, "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity," *Econometrica* 48 [1980]: 817–38) to estimate the *t*-statistics.

15. Such an interpretation does not necessarily entail increasing returns to scale in farm production, however. Even where the production technology in question assumes the properties of constant returns to scale, insofar as the rural labor market is not large enough to absorb the "surplus" rural workers, a larger farm size allows a family to utilize its members more fully.

16. Given that it is possible for education to affect earnings indirectly via its effect on one's likelihood of obtaining better-paid nonfarm employment, we have also estimated the equation by dropping, first, the share of nonfarm income in a household income and, second, the two education variables. The results of doing so turn out to be the same, implying that there is some unknown mechanism through which education affects income. We are, however, unable to identify such a mechanism because of insufficient explanatory variables (but see Sec. IV).

17. James K. S. Kung and Shouying Liu, "Farmers' Preference regarding Own-

ership and Land Tenure in Post-Mao China: Unexpected Evidence from Eight Counties," *China Journal* 38 (1997): 33–63, esp. 37.

18. Yang, p. 771.

19. James K. S. Kung and Yiu-fai Lee, "Non-farm Employment in Rural China: Myth and Reality," Working Paper no. 5 (Hong Kong University of Science and Technology, Division of Social Science, Hong Kong, 1998).

20. We are, however, able to reject the possibility that some members of households with higher levels of average education are students and so are currently not generating income for their families as we found no correlation between household dependency ratio and average educational attainment.

21. This was due mainly to the rather infrequent land readjustment in that county. See James K. S. Kung, "Equal Entitlement versus Tenure Security under a Regime of Collective Property Right: Peasants' Preference for Institutions in Post-reform Chinese Agriculture," *Journal of Comparative Economics* 21 (1985): 82–111.

22. Ibid.

23. One of the most widely used measures of inequality, the Gini coefficient is an aggregate numerical measure that ranges from zero (perfect equality) to one (perfect inequality). Graphically, it is measured by dividing the area between the 45° line (the perfect equality line) and the Lorenz curve by the total area lying to the right of the equality line. See Joseph Gastwirth, "The Estimation of the Lorenz Curve and Gini Index," *Review of Economics and Statistics* 54 (1972): 306–16.

24. This section follows Murray Leibbrandt, Christopher Woolard, and Ingrid Woolard, *The Contribution of Income Components to Income Inequality in South Africa: A Decomposable Gini Analysis* (Washington, D.C.: World Bank, 1996).

25. Oded Stark, J. Edward Taylor, and Shlomo Yitzhaki, "Remittances and Inequality," *Economic Journal* 96 (1986): 722–40.

26. Klaus Deininger and Lyn Squire, "A New Data Set Measuring Income Inequality," *World Bank Economic Review* 10 (1996): 565–91. Clearly, it is not entirely appropriate to compare the Gini for an area as small as a county directly with that of a nation. We are, however, doing this just to put our analysis in some perspective.

27. From this perspective, Y. S. Cheng's ("A Decomposition Analysis of Income Inequality of Chinese Rural Households," *China Economic Review* 7 [1996]: 155–67) finding of crop production being the main source of income inequality in villages where income derived from this particular source accounts for up to 70% of household income is thus not surprising. Our own estimation finds that grain production alone still accounts for up to one-fifth of the observed inequality in a context where households have already diversified into a number of noncropping economic activities as well as off-farm pursuits.

28. Unfortunately, data limitations (of a cross-sectional nature) prevent us from employing a social welfare function approach to evaluate the trade-offs resulting from rising off-farm income between income level and income inequality.

29. Let $a = bx + cy$. $\mathrm{Var}\,(a) = b2\,\mathrm{Var}\,(x) + c2\,\mathrm{Var}\,(y) + 2bc\,\mathrm{Cov}\,(x,y)$. Given that we have 11 explanatory variables, there will be 55 covariance terms altogether. We simplify the analysis by excluding all the covariance terms in the estimation.

30. Barry Chiswick, *Income Inequality: Regional Analyses within a Human Capital Framework* (New York: Columbia University Press, 1974).

31. Some assumptions about productivity are obviously required in this type of estimation. In our exercise, the reported labor input of all the parties is aggregated. The few hired hands that are used by the surveyed households are assumed to be as productive as the male family members, and female household members are assumed to be only 80% as productive.

32. That is, we are concerned with whether there is any income inequality among the 40 villages at a particular point in time, not the distributive consequences of a single village over time.

33. The significance of this last factor is not surprising, in light of the earlier finding that grain production has contributed to spatial income inequality at both the village and county levels.

34. We are indebted to D. Gale Johnson for directing our attention to this particular issue.

35. When we divide the mean rate of returns to education in the cropping sector (.002) by the standard deviation (.38), the result, 0.005, is not significantly different from zero. This result is slightly higher in the case of cash crop production (0.078) but is nonetheless still not significantly different from zero.

36. The ranges are .053–3.2 for average education and .1–8.23 for maximum education, which are much wider than those pertaining to crop production (−.73 to 1.4) and cash crop production (−1.25 to .7).

37. In order to confirm the Kuznets hypothesis, the sign of the income coefficient must be positive and the coefficient of its square negative. We obtained the expected sign, but the coefficients are not statistically significant.

38. Arthur Lewis, "Economic Development with Unlimited Supplies of Labor," *Manchester School* 22 (1954): 139–91.

39. The overestimation of China's labor force as agricultural is best summed up in the following passage: "If there are 100 million rural migrants in urban areas and they spend half the year in the city, this implies that employment in agriculture is now on the order of 233.5 million rather than 283.5 million based on the official estimate" (Johnson [n. 9 above], p. 13).

40. James Heckman, "The Common Structure of Statistical Models of Truncation, Sample Selection, and Limited Dependent Variables and a Simple Estimator for Such Models," *Annals of Economics and Social Measurement* 5 (1976): 475–92.

41. See the reference manual of Stata 6.0 (Stata Press, *Stata Reference Manual Release* [College Station, Tex.: Stata Press, 1999]) for a detailed derivation of the formula for the maximum likelihood estimation procedure.

42. Oi (n. 5 above).

43. These options include the following. First, the respondent relies primarily on the social networks of either a cadre family member, an affine relative, or a close friend in obtaining the reported nonfarm work. Second, the respondent may alternatively rely on the connections of a noncadre family member, affine relative, or close friend for a job in the same enterprise in which the latter is reportedly employed. Third, and to a lesser extent, the respondent relies on her friends' referrals and introduction for a nonfarm job. Finally, the respondent obtains the job without any of the aforementioned "assistance."

44. It needs to be clarified that the value of the dummy variable (0, 1) is assumed to be the same for every member of the household. For example, as long as one family member reported having found nonfarm work using social connections, we treat all other members in the same family as having the same connected means, regardless of whether they have a nonfarm job or not. As such, this is not a perfect measure of social capital but rather a proxy for measuring the potential effects of social capital insofar as the farm respondents are honest about the information they provide.

45. Alternatively, we have also tested the possibility that referrals by one's friends may represent more of a market option rather than one characterized by social connections. In this model, we grouped the first two alternatives into a dummy variable and assigned it the value of zero. The third and fourth options were each assigned the value of one. The analytical results obtained are basically the same, so we do not present them here.

46. Elisabeth J. Croll, "The New Peasant Economy in China," in *Transforming China's Economy in the Eighties*, vol. 1, ed. Stephan Feuchtwang, Athar Hussain, and Thierry Pairault (London: Zed, 1988); Tamara Jacka, "The Public/Private Dichotomy and the Gender Division of Labor," in *Economic Reform and Social Change in China*,

ed. Andrew Watson (London: Routledge, 1992); and William Parish, Xiaoye Zhe, and Fang Li, "Nonfarm Work and Marketization of the Chinese Countryside," *China Quarterly* 143 (1995): 697–730.

47. Based on a panel data set of the same locale employed by Cook (n. 10 above), however, J. Morduch and T. Sicular fail to find that social connections have any obvious effect on income inequality over time (Jonathan Morduch and Terry Sicular, "Rethinking Inequality Decomposition, with Evidence from Rural China," discussion paper [Harvard University, Department of Economics, Cambridge, Mass., 1998]).

48. Yaohui Zhao, "Labor Migration and Earnings Differential: The Case of Rural China," *Economic Development and Cultural Change* 47 (1999): 767–82.

49. Parish, Zhe, and Li.