

# The Evolution of China's Rural Labor Markets During the Reforms<sup>1</sup>

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This paper contributes to the assessment of China's rural labor markets, while paying attention to whether these markets are developing in a manner conducive to the nation's modernization. According to our household survey, we find that the rapid increase in off-farm employment has continued and accelerated during the late 1990's. Our analysis shows

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that migration has become the most prevalent off-farm activity, has become dominated by young and better educated workers, has expanded most rapidly in areas that are relatively well-off, and has begun to draw workers from portions of the population, such as women, that earlier had been excluded from participation. *J. Comp. Econ.*, June 2002, **30**(2), pp. 329–353. Williams College, Williamstown, Massachusetts 01267; Center for Chinese Agricultural Policy, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China 100101; Department of Agricultural and Resource Economics, University of California, Davis, California 95616; Center for Chinese Agricultural Policy, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China 100101. © 2002 Association for Comparative Economic Studies. Published by Elsevier Science (USA). All rights reserved.

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## 1. INTRODUCTION

Since economic and political reforms began in China in the late 1970's, the nation has experienced rapid economic growth. The expansion of the rural economy has driven a large part of this growth (Putterman, 1992; Perkins, 1994). Rural labor markets have changed dramatically over the past 20 years and their emergence has contributed to the success of the rural economy (Solinger, 1999; West and Zhao, 2000). Many observers of China agree that the success of rural labor in raising incomes and productivity can account for a significant part of the rise in rural welfare (Parish et al., 1995; Rozelle, 1996).

However, the rise of rural labor markets is more important than its role in providing rural residents with a means to raise their incomes (Todaro, 1976; Stark, 1976). For China to modernize successfully, the nation must rely on labor markets to facilitate the shift from a largely rural population to an urban one. Without well-functioning labor markets, it will be difficult for the primary mode of production to be shifted from agriculture to industry. Hence, the question of whether or not rural labor markets have emerged in a way that will allow them to facilitate more effectively the transformation of China is more important than only assessing their contribution to per capita rural income.

Although many researchers have contributed to the debate, scholars do not agree on the role that labor markets have played so far in contributing to China's economic growth. Some researchers believe that significant barriers still exist in China's economy, and that absence of well-functioning rural labor markets has hindered growth. In contrast, others believe that rural labor markets are spearheading China's drive towards modernization. The disagreement may exist, in part, because most previous analyses consider only part of the labor market, focus on only part of the country, or are limited to a subset of questions about labor market performance. Perhaps due to the magnitude of the questions, the bits and pieces that are found in the literature seem inconsistent or contradictory.

Regardless of the source of the disagreement, sharp differences of opinion do exist regarding the amount of progress in China's rural markets. For example,

Meng (1990, 1996) finds substantial evidence of nonmarket labor assignment in the rural industrial sector, although she was writing about the 1980's and early 1990's. Benjamin and Brandt (1997) and Liu et al. (1998) both describe an inverse relationship between farm size and labor use, which is a signal that labor markets do not clear, although this relationship may be confined to on-farm labor. Several scholars have focused on rural and urban institutions that may constrain the movement of labor, despite large wage gaps and positive expected gains from migration. Mallee (2000) and Yang and Zhou (1996) believe a number of barriers, such as land tenure arrangements and mandatory marketing delivery quotas, continue to increase the cost of out-migration and dampen off-farm labor market participation. Johnson (1995) worries that several prominent urban institutions, such as the household registration system and the absence of social and educational services for rural residents in cities, restrict entrance into urban labor markets.

In contrast, other work has illustrated the emergence of functioning rural labor markets and the break down of the institutional barriers that once kept rural labor on the farm. Cook (1999) demonstrates that off-farm labor returns are equal for wage earning and self-employed workers in her rural Shandong sample. Maurer-Fazio (1999) and Zhang et al. (forthcoming) show the rising significance of education as a determinant of off-farm earnings, a result that implies individuals are being rewarded more for their human capital, which is a sign of well-functioning markets. A number of papers document the absence or attenuation of institutional barriers to off-farm labor participation. Lohmar's analysis (1999) of the effect of land tenure and quota policies finds that although more restrictive policies have some impact on household labor response to the off-farm sector, their magnitudes are small. Knight and Song (2001) demonstrate how some urban firms have become less discriminatory in their hiring practices of those without an urban *hukou*. One of the most basic indicators of market health, the level of employment, supports the hypothesis that labor markets have improved over time. Zhang et al. (1995), Rozelle et al. (1999), and the SSB (1990–2000) have documented the explosion of migration and off-farm participation.

The overall goal of this paper is to contribute to the ongoing assessment of China's rural labor markets paying special attention to whether these markets are developing in a way that is conducive to the nation's modernization. Specifically, we have three objectives. First, we will provide an update of the trends in off-farm labor participation. We will estimate the nation's aggregate off-farm participation rates, focusing on the performance of rural labor over the 5 years between 1995 and 2000, a period of relatively slow economic growth. Second, we will decompose the growth in off-farm employment, searching for clues about whether or not markets appear to be developing in ways that will support China's modernization. Finally, we seek to identify some of the main determinants of the off-farm participation trends.

To meet these objectives, the rest of the paper will be organized as follows. In the second section, we introduce the data that are used for the analysis. This is a

set of rural household data collected by the authors in the fall of 2000 that contains 20-year employment histories for more than 2000 individuals from across China. The next section presents a series of figures and tables showing the aggregate and disaggregated trends of employment of rural individuals between 1981 and 2000. The following section presents the results of a multivariate analysis, centering on explaining the determinants of different types of off-farm employment. The final section concludes.

## 2. DATA

The data for this study were collected in a randomly selected, almost nationally representative sample of 60 villages in 6 provinces of rural China (henceforth, the China National Rural Survey or CNRS).<sup>2</sup> To reflect accurately varying income distributions within each province, one county was selected randomly from within each income quintile for the province, as measured by the gross value of industrial output. Two villages were selected randomly within each county. The survey teams used village rosters and our own counts to choose randomly 20 households, both those with their residency permits (*hukou*) in the village and those without. A total of 1199 households were surveyed.

The CNRS project team gathered detailed information on household demographic characteristics, wealth, agricultural production, nonfarm activities, and investment. Several parts of the survey are designed to learn about the household's migration decisions as well as its participation in other labor market activities over time. For roughly half of the households surveyed (610 out of 1199), a 20-year employment history form was completed for each household member and each child of the household head, even when they were no longer considered household members. For each year between 1981 and 2000, the questionnaire tracks each individual's participation in 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 each individual was self-employed or wage earning.<sup>3</sup>

Using the employment history data, we separated off-farm jobs into four types: migrant wage earners (henceforth, migrants), self-employed migrants, local wage

<sup>2</sup> The provinces are Hebei, Liaoning, Shaanxi, Zhejiang, Hubei, and Sichuan. The data collection effort involved students from the Center for Chinese Agricultural Policy, Renmin University, and China Agricultural University. It was led by Loren Brandt of the University of Toronto, Scott Rozelle of the University of California, and Linxiu Zhang of the Center for Chinese Agricultural Policy, Chinese Academy of Sciences. Households were paid 20 yuan and given a gift in compensation for the time that they spent with the survey team.

<sup>3</sup> Enumerators attempted to ask the employment histories from each individual themselves. If a household member or one of the children of the household head was not present, the respondent (which was almost always the household head or spouse of the household head) answered. Extensive pretesting found that the data are fairly accurate. In addition, we conducted a practical test to see whether or not a respondent bias problem exists in the employment history part of our data. We replicated the analysis after excluding observations on individuals whom we did not interview directly and found that the results did not change.

TABLE 1  
Descriptive Statistics for Selected Variables

Variable	Mean	Standard deviation
Gender (1 = male)	0.49	0.5
Years of education	6.01	3.66
Skill training (1 = yes)	0.185	0.389
Household's total land area, 2000 (mu)	8.91	11.10
Value of durables, 2000 (yuan)	4970	34900
Household labor force	3.75	1.94
Household size	4.13	1.49

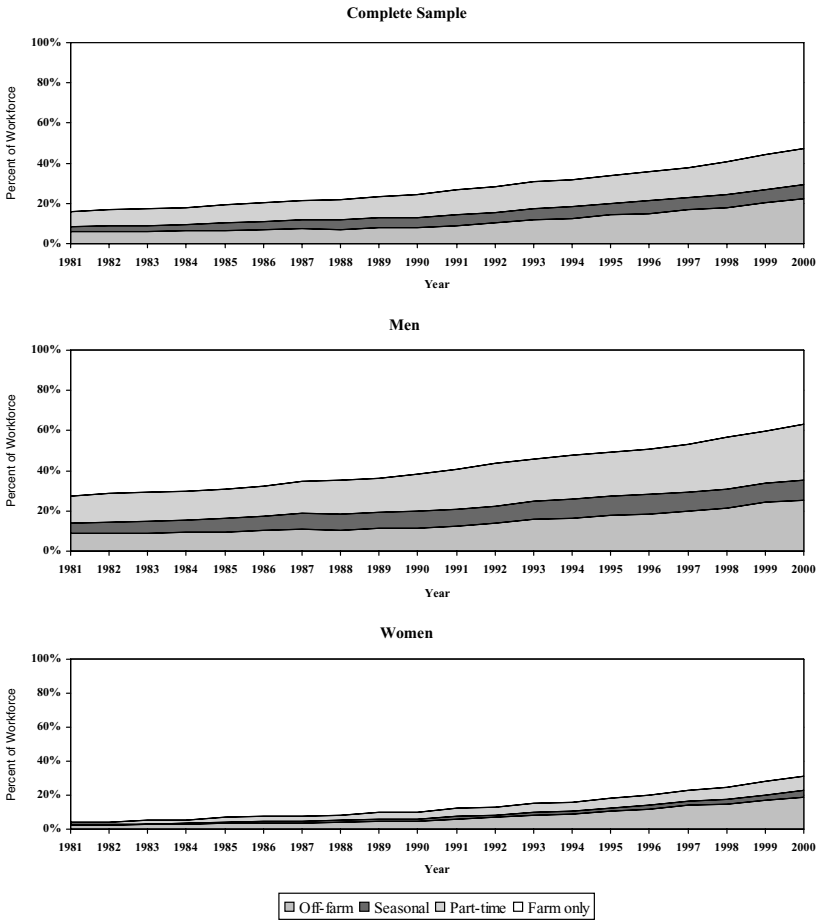
*Note.* Source, Authors' survey.

earners, and local self-employed. Migrants were identified as people who had off-farm jobs but did not live in the household while working. Local wage earners were identified as people who had off-farm employment, were not self-employed, and lived at home while they worked. All people who reported being self-employed off the farm were categorized as such. The definitions held for both members of the household and children of the household head. We also asked about the extent of the participation of each member, in each year, in the household's on-farm activities. A household labor force measure was created by aggregating all individuals in the households above the age of 16 who indicated that they were either working in or searching for employment in agricultural and/or industry in each year. If a person over 16 indicated he had retired, could not work for health-related reasons, or had full-time enrollment in school, he was not included in the labor force total. Descriptive statistics for selected variables are included in Table 1.

### 3. THE EVOLUTION OF RURAL LABOR MARKETS IN CHINA

#### 3.1. Expansion of Rural Labor Markets in the 1990's

Consistent with previous findings of other national studies of rural off-farm employment, data from the CNRS show the off-farm labor force expanded steadily between 1981 and 1995. From around 15% in 1981, our survey estimates that, by 1995, 32% of the rural labor force found some employment off-farm (Fig. 1, top panel). By assuming that neighboring provinces similar to those surveyed have identical rates of off-farm labor participation, we estimate that off-farm rural employment in China rose from less than 40 million in 1981 to more than 150 million farmers in 1995, a growth in off-farm employment of more than 100 million. Although based on a relatively small sample, these numbers demonstrate the consistency of our data with much larger national studies by the State Statistical Bureau (SSB, 1996) and the 1995 national community survey described in Rozelle et al. (1999). The estimate from the CNRS data of 1995 employment rate is almost the same as both SSB's estimate of the nonfarm labor force (31%) and



**FIG. 1.** Percentage of rural labor force engaged in off-farm and on-farm employment. Source: Authors' survey. Each line shows cumulative percentages of all individuals, men or women, in the labor force. The gap between the top horizontal line of each panel (100%) and the uppermost trend line is the percentage of people in full-time farming. Part-time employment refers to individuals who work both off- and on-farm during the entire cropping year. Seasonal workers primarily work off-farm but work on-farm during the busy season.

the 1995 community questionnaire-based estimates of rural off-farm employment (34%).<sup>4</sup>

<sup>4</sup> Our data are also consistent with the estimates of SSB in the late 1980's and Parish's study (Parish et al., 1995) in the early 1990's. For example, our data set estimates that 20% of the rural labor force worked off-farm in 1988. This figure is almost equivalent to the State Statistical Bureau estimate for that year, 21%. Our 1993 labor force participation rate, 29%, is only three percentage points higher than the best guess made by the national study of Parish et al. This difference can be explained, in part, by Parish's slightly broader definition of off-farm labor.

Despite the Asian Financial Crisis, China's own structural reforms, and a general slowing of economic growth in the late 1990's, the CNRS data show that rural off-farm employment growth continued expanding between 1995 and 2000 (Fig. 1, top panel). By 2000, 43% of rural individuals participated in off-farm work, a rise of 11 percentage points in the late 1990's. If representative of the country, more than 200 million rural individuals worked off the farm in 2000, a rise of more than 50 million workers during the late 1990's. Such a large increase in labor flow would be one indicator that China's labor market is functioning well.

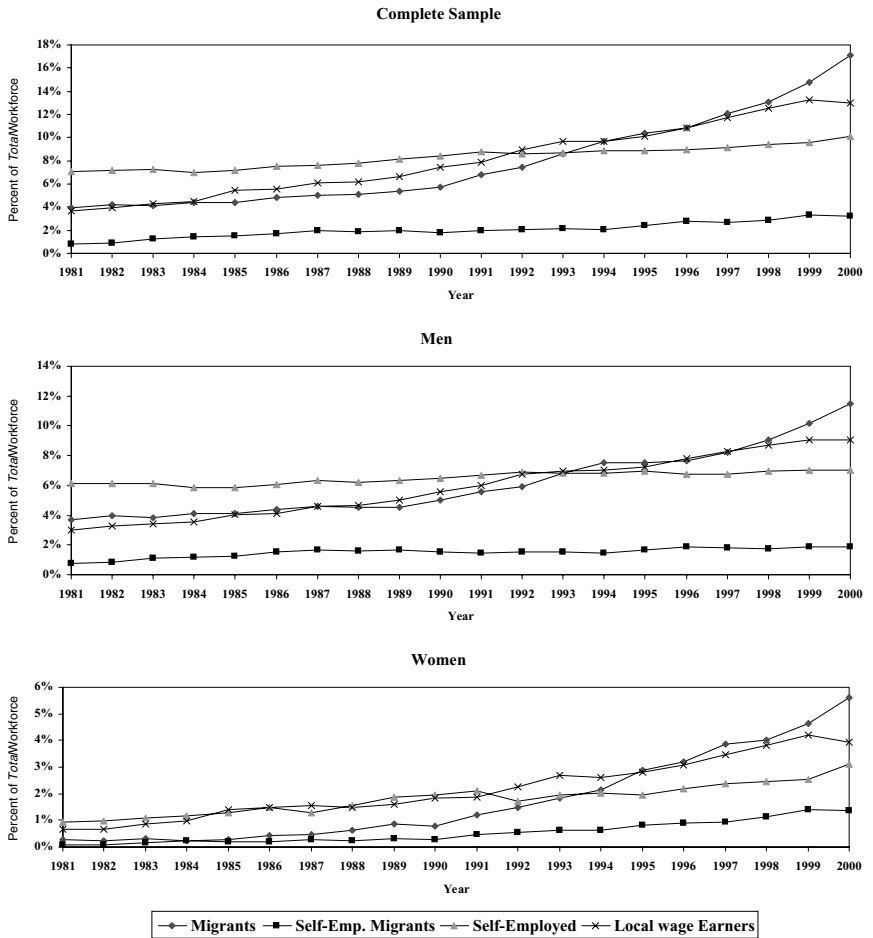
### 3.2. Disaggregating the Evolution of Rural Labor Markets

By disaggregating China's labor trends, the CNRS data demonstrate that labor markets are providing more than just off-farm income to rural residents. Trends by employment type show clearly that the target destination of workers over the past 20 years has shifted from rural to urban (Fig. 2, top panel). In 1981, most rural individuals (nearly 85%) spent their time in farming. Individuals who worked off the farm were almost three times as likely to live at home and work within or close to the village (7% were local self-employed and 4.2% were local wage earners) than to work outside of the village and live away from home (less than 1% were self-employed migrants and less than 4% were migrants). By 2000, almost as many off-farm workers were living away from home (more than 85% in cities or suburban villages of major metropolitan areas) as in the village. Migrants composed both the largest and fastest growing component of the rural labor force.

Migrants have also been venturing further from home over the past 20 years, a trend that has continued in recent years (Table 2). In 1990, over 70% of migrants worked within their own province; just under 30% went out of the province in search of work (row 2). By 2000, almost 40% of migrants left the province for their job (row 1). However, the change was especially striking among workers under 30 years old. In 1990, 31% of young workers were leaving home, whereas 45% were leaving home in 2000 (rows 3 and 4). In contrast, the trend is much less pronounced, or nearly nonexistent, among workers older than 30 (rows 5 and 6). These observations are consistent with the 1995 community-based questionnaire. Rozelle et al. (1999) found that, while only 25% of workers moved out of the province in 1988, by 1995 roughly 40% did.

The labor movement contours created from the off-farm employment histories of different age cohorts amplify these trends and demonstrate one of the most striking characteristics of China's changing employment patterns; i.e., the shift towards off-farm employment is dominated by younger workers (Table 3 and Fig. 3).<sup>5</sup> Workers in all age cohort categories participated at similar rates in 1981, ranging from 18 to

<sup>5</sup> Table 3 and Fig. 3 are created in order to allow us to compare the off-farm labor participation rates of individuals belonging to different age categories during different years. For example, when comparing the participation of 16- to 20-year olds in 2000 (75.8%) with those in 1990 (23.7%) in Table 3, we are actually looking at the participation in 1990 of those individuals who are currently 26 to 30 years old.



**FIG. 2.** Percentage of total labor force engaged in different types of off-farm work. Source: Authors' survey. Each line shows total percentages of all individuals (men or women) engaged in that type of work. The figures include those who are participating seasonally or part-time in agriculture.

19% (Fig. 3). In 1990, participation rates of all age cohorts fell into a narrow range from 20.5 to 33.6% (Fig. 3 and Table 3, column 1). There was no clear progression when moving from the oldest to youngest cohorts. However, by 2000, the rise in the off-farm participation rates of younger workers accelerated relative to older ones and a distinct ranking appeared as one moved from the oldest to the youngest cohort. In 2000, young workers in the 16- to 20-year-old cohort participated at rates more than three times (75.8%) those of 16- to 20-year olds in 1990s (23.7%). Those in the 21- to 25-year-old cohort and those in the 26- to 30-year-old cohort doubled the off-farm participation rates of their 1990 cohorts. In contrast, older



TABLE 2  
Comparison of Location of Migrant Employment in Percentage of Migrants Working  
in Specific Locations by Age in 2000 and 1990

	Off-farm job located within		
	Own county	Province, but outside of county	Another province
All off-farm workers			
2000	29.8	30.4	39.9
1990 <sup>a</sup>	42.2	28.9	28.9
Workers under 30 years old			
2000	26.1	28.9	45.0
1990	36.8	32.2	31.0
Workers over 30 years old			
2000	37.4	32.9	28.7
1990	42.0	30.5	27.3

*Note.* Source, Authors' survey.

<sup>a</sup> For example, the table compares workers who were 25 years old in 1990 with workers who were 25 years old in 2000.

workers, while still increasing their participation rates (by 17 percentage points), worked off the farm at less than half the rate (only 37.6%) than those in the 16- to 20-year-old cohort.

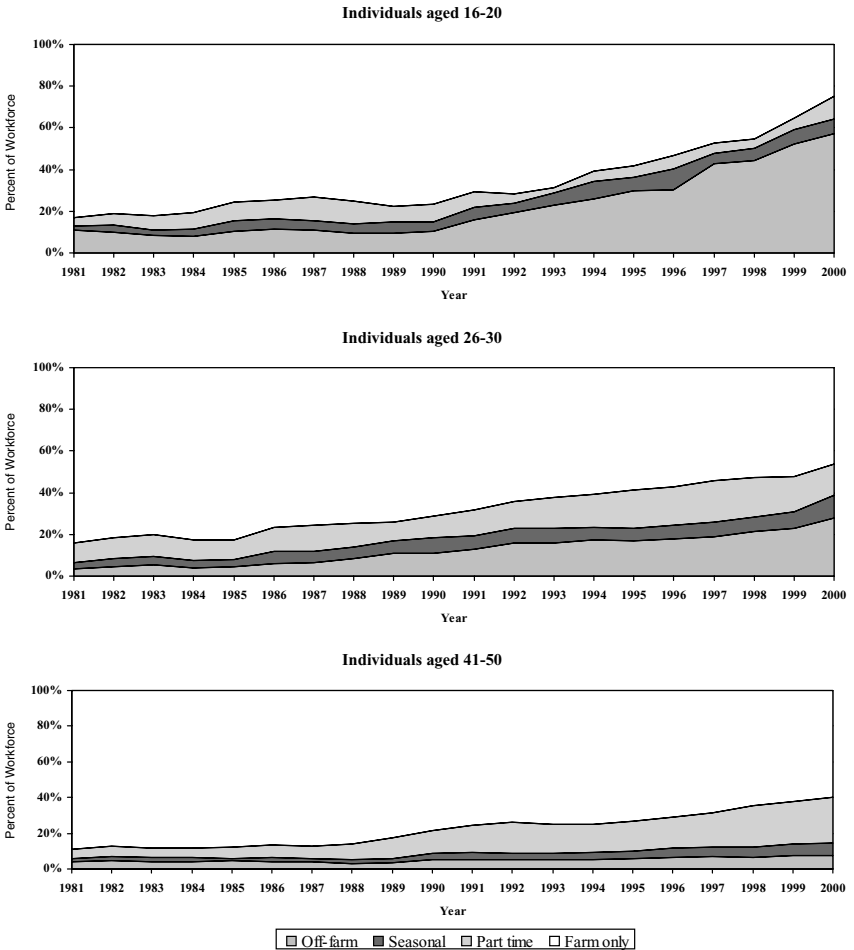
The work behavior of younger workers also illustrates their increasing specialization in the off-farm sector (Fig. 3). For example, in 1990, of those in the younger cohorts who had off-farm jobs, more than half spent time either part time or during

TABLE 3  
Comparison of Labor Participation Rates in Percentage of Individuals  
that Participate in the Off-Farm Labor Force by Age Categories, 2000  
and 1990

Age range groups	Percentage with off-farm work in	
	1990	2000
16–20 <sup>a</sup>	23.7	75.8
21–25	33.6	67.2
26–30	28.8	52.5
31–35	26.9	47.6
36–40	20.5	43.3
41–50	20.8	37.6

*Note.* Source, Authors' survey.

<sup>a</sup> For example, the table compares workers who were between ages 16 and 20 in 1990 with workers who were ages 16 to 20 in 2000.

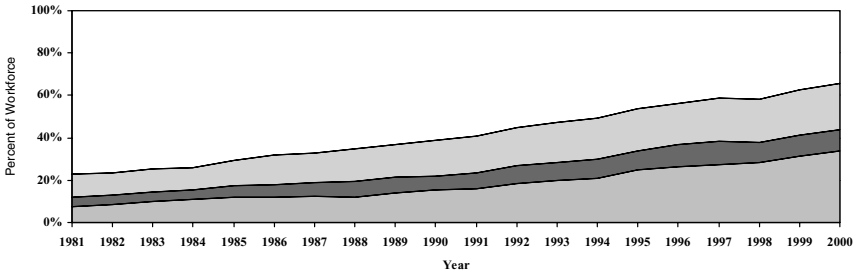


**FIG. 3.** Percentage of rural labor force engaged in off-farm and on-farm employment, by range of ages. Source: Authors' survey. See Fig. 1 for description of figures.

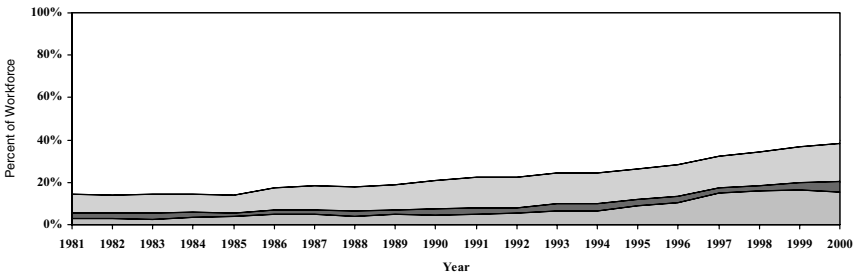
the busy season working on the farm (Fig. 3, top and middle panels). By 2000, less than a quarter of the youngest cohort who worked off-farm spent any time in agriculture. In contrast, in 2000, of those in the 41- to 50-year-old cohort who worked off the farm, over 80% of them were still working in agriculture, either on a part-time or seasonal basis (Fig. 3, bottom panel). Our data illustrate a growing tendency for young workers to live away from home and be increasingly less engaged in on-farm work.

The trends that are emerging across China's provinces are also striking and illustrate vividly the changing nature of labor markets and the nation's emerging

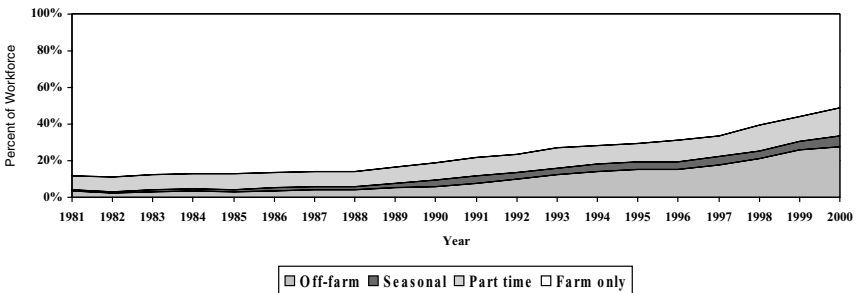
## Zhejiang



## Sichuan



## Hubei



**FIG. 4.** Percentage of rural labor force engaged in off-farm and on-farm employment, by province. Source: Authors' survey. See Fig. 1 for description of figures.

development path (Fig. 4). For example, off-farm participation rates in the richest province in our sample, Zhejiang (Fig. 4, top panel), are both historically higher and have grown faster than those in other provinces (Fig. 4, middle and bottom panels). By 1990, total off-farm labor participation in Zhejiang neared 40%, a level well above the national average. By 2000, the off-farm participation rates of rural residents across all of Zhejiang, including its poorest southern and western counties, had grown to nearly 65%, well above that of poorer provinces. In poorer provinces, such as Sichuan and Hubei, off-farm participation started at a much

lower rate in 1981 and grew slowly until 1990. After 1990, as migration has emerged as the most dominant type of labor activity, labor participation rates in these provinces have accelerated. If the trends of Zhejiang and other provinces portend the future growth paths of China, we should expect to see continued strong and accelerating labor market growth in the coming years.

### 3.3. Effects of Developing Rural Labor Markets

While emerging rural labor markets may have numerous effects on the fabric of rural and urban economies, we limit our descriptive analysis in this section to two of the possible effects. First, we examine how the development of labor markets has affected the level of participation of women in off-farm activities. Second, drawing on our earlier survey and using the same categorization of labor activities, we see how labor markets may be facilitating geographical specialization.

Emerging labor markets have already begun to positively affect the off-farm participation rates of women (Figs. 1 and 2). Although women have participated at rates far below those of men throughout the entire 20-year sample period, participation rates have risen rapidly since the early 1990's (Fig. 1, middle and bottom panels). In the 1980's, and consistent with the findings from the national community survey-based study reported in Rozelle et al. (1999), the participation rates of men (more than 25% in 1981) far exceeded those of women (less than 5%). Moreover, despite low initial levels of involvement in the off-farm sector, participation rates for women grew more slowly than those of men during the 1980's.

However, in the 1990's, the participation rate of women in the off-farm sector rose faster than that of men. The rising participation rates of women have been driven by the entry of women into all job categories, although the most striking absolute gains have come from migration (Fig. 2, middle and bottom panels). Throughout the entire decade of the 1980's, less than 1% of women left their homes to work for a wage. However, since 1990, the rate of growth has been higher than any category of job types for either men or women. By 2000, nearly 6% of the female labor force was working as wage-earning migrants. One interpretation of this rise in the participation of women is that, as labor markets have become more competitive, the scope for managers to exercise their discriminatory preferences has declined, therefore opening up new employment opportunities for those who had previously not been able to participate. Alternatively, the rise in women's work could have occurred as the types of industries that have a preference for the skills of women rose.

Specialization of another type, the emergence of specialized modes of production in different villages across China's geographical landscape, may have also been facilitated by the emergence of labor markets. Drawing on the 1995 national community based survey of 215 randomly selected villages from 8 provinces, a set of provinces that include the same 6 provinces in the 2000 CNRS household survey,

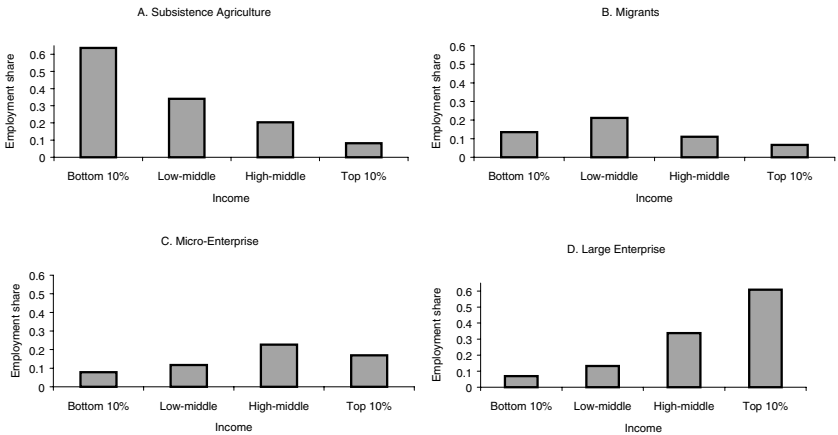


FIG. 5. Employment shares among off-farm sectors by income levels in rural China, 1995.

we find a distinct pattern in the distribution of economic activity (Fig. 5).<sup>6</sup> In Fig. 5, the villages in the sample are ranked by average income per capita and we study the share of the village workforce that is employed in subsistence agriculture (those farmers who only have agricultural income), migration, micro-enterprises (or self-employment), and large scale manufacturing. Each panel in Fig. 5 represents a different type of employment. In the poorest 10% of the villages in the sample, people are employed primarily in subsistence agriculture and are relatively more likely to be employed in subsistence agriculture than richer households (Fig. 5A). In contrast, the percentage of the workforce engaged in migration is higher in villages in the lower-middle income category than in other income categories (villages in the 50th to 90th percentile of the average income per capita distribution in Fig. 5B). Likewise, upper middle-income villages (those in the 10th to 50th percentile) are relatively specialized in micro-enterprise operation, while they have much lower participation in migration (Fig. 5c). Finally, large-scale manufacturing is the dominant employer in the economies of the richest 10% of the sample villages (Fig. 5D).

A closer examination of our data shows that village specializations across space are interlinked and demonstrate how labor markets have helped transform China's economy. Lohmar et al. (1998) show that there is a linkage between the development of migrant labor markets and the rise of employment in the richest villages that depend on manufacturing. Much of the labor in rural industry (which is almost exclusively located in the suburbs of major metropolitan regions) has come from other rural areas. Figure 5D illustrates that part of the rise of large scale

<sup>6</sup> These figures, which are from 1995, are from Mohapatra (2001). Mohapatra illustrates that employment patterns have been used in a number of studies to represent different types of economic activity.

manufacturing in the richest parts of China may have been allowed by the emergence of migrant labor markets that have facilitated the concentration of large quantities of labor (Fig. 5B).

### 3.4. Summary of Descriptive Findings

In this section, we have provided evidence showing how labor markets are performing in a way consistent with an economy that is in transition from agriculture to nonagriculture and a population that is shifting from rural to urban. Our descriptive analysis illustrates that labor markets have allowed migration to become the dominant form of off-farm activity, have been increasingly dominated by young workers, have expanded fastest in economies or areas that are relatively well-off, and have increasingly drafted workers from groups in the population, such as women, that had been excluded from participation. Rural workers also showed signs of specialization, particularly when examined by age group and by the location of their village. Young workers work much less on the farm than do older workers in 2000. Most remarkably, the on-farm participation of young workers in 2000 is much less when compared to those in their same cohorts in 1990 and 1981. China may be producing a new generation of rural residents who have much less knowledge about farming than their predecessors and who will spend their whole lives off the farm.

## 4. METHODOLOGY

### 4.1. Modeling the Determinants of Off-Farm Employment

To explain the determinants of different types of off-farm employment among individuals in the sample villages and to examine the trends in our data after considering multivariate effects, we use a fixed effects conditional logit estimator similar to that developed by McFadden (1974). We assert that, in each year,  $t$ , an individual,  $i$ , from village,  $v$ , chooses to participate in the activity,  $j$ , that maximizes his expected utility from his labor allocation decision, given a vector of individual, household, and community characteristics  $\mathbf{X}_{ivt}$ . If we define an indicator variable,  $y_i$ , that equals 1 when individual  $i$  participates in activity  $j$  and is 0 otherwise, we can estimate the effects of the variables contained in  $\mathbf{X}$  on the individual's labor market participation decision by estimating

$$y_{ivt} = f(\mathbf{X}_{ivt}\beta + \mu_v) + \varepsilon_{ivt}, \quad \text{for all activities } j, \quad (1)$$

where  $\beta$  represents a vector of parameters that corresponds to the effects of the individual and household characteristics on participating in each economic activity, and  $\mu_v$  is a village level intercept.<sup>7</sup> We estimate Eq. (1) for three different economic

<sup>7</sup> In using the logit estimator, we assume that the error term is independent and identically distributed across observations according to the Weibull distribution.

activities to investigate the determinants of participation in migration, local wage earning, and self-employment.

We include variables in  $\mathbf{X}_{i,t}$  measured at the individual and household level to explain off-farm labor market participation. Based in part on our observations in the previous section and in part on the labor supply literature, we hypothesize that each person's gender and age in year  $t$  affect his or her participation rates. We further hypothesize that human capital measures, including years of education and whether or not the person has received any training in a trade (either in a formal apprenticeship program or in a formal training program), will affect positively participation rates if labor markets are working relatively efficiently. At the household level, we include two variables that control for wealth (the value of durable goods owned and the amount of land held), the size of the household labor force in year  $t$ , and the average level of off-farm experience in year  $t$  of the other members of an individual's household.<sup>8</sup> Finally, we include a time trend or year dummies in all regressions. All variables in all equations are time varying by year except for the measures of wealth, land size, and the value of the household's durable goods. In the first set of regressions that include observations for all of our sample years, these variables are set at their 2000 level and act as shifters. In the second set of regressions, we use only 6 years of our data and construct measures of the two wealth variables that vary over time from 1995 to 2000.

In most of our estimations, we use data on 2297 individuals from 610 different households that were employed in either the on-farm or off-farm sector or both at some time during the period 1981–2000. Because some individuals enter the labor force during this period and others stop working, we do not have a full panel of 45,940 observations; rather, we have 34,257 observations in total. We dropped villages in the rare case in which there was zero participation in a particular type of employment. For example, in the case of one village, none of the individuals in the sample household migrated during the sample period. These households could not be included in the migration equation because there was no variation within the village for the left-hand side of Eq. (1), so that the village fixed effect was perfectly correlated with the dependent variable for that village. As a result, 33,214 observations from 59 villages were used to explain migration participation and 33,198 observations from 59 villages were used to explain participation in self-employment.

## 4.2. Results of the Multivariate Analysis

In this section, we present the results of three multivariate exercises to decompose further the labor market trends during the reform period and to examine the

<sup>8</sup> To create the household labor participation experience variable, we sum the total number of years in which each member of a person's household worked in the off-farm sector back to 1981. Then we sum all of the years that the other individuals in the household worked during this period. In order to avoid endogeneity concerns, we lag the variable in our regression analysis. In order to address concerns that the endogeneity of such a variable could affect our results, we dropped the variable in work not shown and found that the other parameter estimates did not change.

determinants of off-farm labor participation. We estimate Eq. (1) separately for migration, local wage employment, and self-employment using the entire 20-year sample (including both those who work and those who do not work, but are looking for a job) to create a set of baseline results. We estimate the model with a continuous time trend variable in one set of regressions and a series of year dummy variables in another set. Next, we create a period dummy variable by setting  $D_{1990s} = 1$ , if the year is greater than or equal to 1990, and 0 otherwise. We interact  $D_{1990s}$  with the other independent variables. In this way, we can make inferences about the development of off-farm labor markets by observing the differences in trends between the 1980's and 1990's. We estimate Eq. (1) separately on the sample of years for the 1980's and the 1990's. Finally, we repeat the analysis for the subset of individuals from Zhejiang Province, under the assumption that labor markets may be most advanced in this province and that the findings may predict outcomes in the rest of China in the coming years.

In almost all respects, the multivariate regression analyses perform well. The  $R$ -square measures of goodness of fit of the ordinary least squares (OLS) versions of the equations all exceed 0.90. Most of the coefficients of the basic variables in the models have the expected signs and are highly significant. For example, we find that the size of the household's labor force increases participation in the wage earning sectors (Table 4, row 6). Most importantly, the basic results are robust to variations in specification, the selection of subsamples, and functional form. In particular, the coefficient estimates of the main independent variable are almost the same when the model includes either the time-trend variable or the separate year dummies.<sup>9</sup>

The baseline results demonstrate clearly that the findings in the descriptive results hold up to multivariate analysis (Table 4).<sup>10</sup> For example, male participation in migration is more than 280% higher than female participation during the entire sample period (entries 1 and 2, row 2). Likewise, male participation exceeds female participation by 107% in the local wage earning markets and by 229% in self-employed activities (entries 3 to 6, row 2).<sup>11</sup> The propensity of those in younger age cohorts to participate in off-farm labor markets also appears for migrants (entries 1 and 2, row 1) and wage earners (entries 3 and 4), although less so for self-employment activities (entries 5 and 6). In the case of a migrant (wage earner)

<sup>9</sup> Comparisons of these two versions of the model can be made by noting that the coefficients of the variables in Table 4, columns 1, 3, and 5, which are the estimates generated when including a time trend, are almost identical to those of columns 2, 4, and 6, which are the estimates generated when including year dummies.

<sup>10</sup> Odds ratios can be interpreted as the additional probability of an event if there is an additional unit of the explanatory variable, *ceteris paribus*. For example, examining Table 4, column 1, row 1, the figure 0.93 can be interpreted to mean that for every additional year in age of an individual, there is a 7% less probability ( $1 - 0.93$ ) of having a migration job.

<sup>11</sup> The results also are consistent with the higher rate of discrimination that migrant workers, including women, face in the urban labor markets, a point that is consistent with the findings of Zhao (1999). Zhao finds that women in rural Sichuan have a 6.5% lower probability of finding work as a migrant.



TABLE 4

Conditional Fixed Effects Logit Estimator Explaining the Participation of Individuals in Migration, Local Wage Employment, and Self-Employment in Rural China, 1981–2000

Explanatory variables	Dependent variable					
	Migration		Local wage employment		Self-employment	
	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.93 (31.26)**	0.93 (31.31)**	0.94 (29.36)**	0.94 (29.43)**	0.99 (4.50)**	0.99 (4.47)**
Gender (1 = male)	3.80 (27.67)**	3.81 (27.68)**	2.07 (16.34)**	2.07 (16.35)**	3.29 (24.70)**	3.29 (24.71)**
Years of education	1.16 (19.39)**	1.16 (19.34)**	1.16 (19.79)**	1.16 (19.77)**	1.00 (0.09)	1.00 (0.10)
Skill training	1.73 (11.53)**	1.74 (11.60)**	1.81 (12.69)**	1.82 (12.78)**	2.87 (22.26)**	2.86 (22.20)**
Average HH experience	1.17 (18.18)**	1.17 (17.99)**	1.26 (27.18)**	1.26 (27.03)**	1.34 (34.47)**	1.34 (34.53)**
Size of HH labor force	1.26 (19.67)**	1.27 (19.72)**	1.28 (20.91)**	1.28 (20.99)**	0.94 (4.73)**	0.94 (4.72)**
Total land area, 2000	0.99 (3.69)**	0.99 (3.74)**	0.99 (3.27)**	0.99 (3.36)**	1.00 (0.63)	1.00 (0.61)
Value of durables, 2000	1.00 (2.69)**	1.00 (2.69)**	1.00 (4.40)**	1.00 (4.41)**	1.00 (0.65)	1.00 (0.63)
Time trend <sup>a</sup>	1.07 (13.56)**		1.03 (6.31)**		1.00 (0.87)	
Year dummies		Included		Included		Included

Note. Coefficients reported are odds ratios; *z* statistics are in parentheses.

\*\* Significance at the 5% level; 34,257 observations were used in the regressions.

<sup>a</sup> To account for changing economic conditions over time, columns 1, 3, and 5 use a time trend, and columns 2, 4, and 6 use year-by-year dummy variables.

during the entire sample period, for every additional year of age of an individual, the probability that he or she will be in the off-farm labor market falls by 7% (6%). Hence, it is 97% more likely (1.07 to the 10th power) that a person of a certain age will be in the migration work force when compared to an identical individual who is 10 years older.

Our results also show the importance of human capital, including education, training, and experience, in determining an individual's participation in any off-farm activity (Table 4, rows 3 to 5). For each additional year of education, the probabilities of becoming a migrant and local wage earner both rise by 16%. The participation in formal training and apprenticeship programs also has a large and significant effect in increasing the participation in all forms of labor market activity. Individuals also benefit from the experience of other household members. When other members of a household in China have experience in off-farm labor

markets, an individual's probability of working off the farm rises.<sup>12</sup> To the extent that we would expect well-functioning labor markets to give more employment opportunities to those with higher levels of human capital during the reform period, labor markets appear to have been playing some role. Table 7 in the Appendix shows that our estimated impacts of education on participation in the migrant work force remain virtually unchanged when we control for the ability of the individual by including measures of the father's education level and the grades that each individual earned during the last year in school.<sup>13</sup>

Our analysis of the changes in China's migration participation rates between the 1980's and 1990's demonstrate the evolution of China's labor markets (Table 5). Our findings show that the labor force has been becoming younger over time and that formal education has been rewarded increasingly (rows 1 and 3; 9 and 11). Whereas in the 1980's off-farm labor was already becoming younger (6% less probable for each additional year of age); this tendency accelerated in the 1990's to 7% more probable. The results of the separate regressions illustrate an even larger effect of age in the 1990's versus the effect of age in the 1980's (rising to 8% in the 1990's, column 3, row 1).<sup>14</sup> Estimates of the increase in the probability of finding a migrant job for each additional year of education between the 1980's and 1990's range from 8% (Table 5, column 1) to 11% (columns 2 and 3). Most of the same changes also appear in the local wage earning and self-employment sectors of China's labor markets between the 1980's and 1990's (Appendix Table 8).

Other findings also demonstrate important changes in migrant labor markets. For example, to the extent that the rise of women's employment is a sign of improving labor markets, our results show that the difference between the probability of men's migration participation and that of women's fell dramatically from more than 500% in the 1980's to less than 250% in the 1990's (Table 5, row 2). The results could also be driven by a rise in industries that employed the labor of women.

<sup>12</sup> In the variable, as constructed, there actually may be some evidence of nonmarket assignment in the employment decision if a positive and significant coefficient is associated with the family experience variable. If an individual gets a job from family member connections, it would not necessarily support the idea that labor markets have improved. However, if this variable is measuring the knowledge and reduced costs of search that individuals pick up from other family members that have off-farm jobs, it could be measuring the return to valuable human capital at the household level. With our data, we cannot distinguish between these two explanations.

<sup>13</sup> The survey included the following question for all individuals who had already finished their education and were no longer in school: "What were the grades of each individual at the end of the last full year of schooling?" The response choices were good, average, and poor. We control for ability using a dummy that is one when grades were good at the end of school and zero otherwise. The dummy was also given a value of zero when an individual had never attended school.

<sup>14</sup> Care should be taken in interpreting the interaction terms; because of the functional form of McFadden's conditional, fixed-effects, logit estimator, the coefficients of the interaction variables are multiplicative, not additive. Hence, the 1990's effect is found by multiplying the base effect of the 1980's (in this case 0.94) by the additional effect in the 1990's (in this case 0.99). In other words, the 1990's is found by multiplying 0.94 by 0.99 which is equal to 0.93. This means that, in the 1980's, for every additional year of age, an individual would have a 6% less chance of working as a migrant (or  $1 - 0.94$ ). In the 1990's, there was 7% less chance of working ( $1 - 0.93$ ). In other words, the effect of getting older on reducing the probability of finding a migrant job becomes larger in the 1990's.

TABLE 5  
 Conditional Fixed Effects Logit Estimators Explaining the Change in Participation of Individuals  
 in Migration in Rural China between the 1980's and 1990's

Explanatory variables	Dependent variable		
	(1) Migration <sup>b</sup>	(2) Migration between 1980–1990 <sup>b</sup>	(3) Migration between 1990–2000 <sup>b</sup>
Age	0.94 (14.53)**	0.94 (13.43)**	0.92 (30.26)**
Gender (1 = male)	6.10 (16.55)**	12.87 (20.58)**	3.23 (21.76)**
Years of education	1.10 (7.07)**	1.06 (5.55)**	1.17 (17.35)**
Skill training (1 = yes)	2.37 (9.43)**	1.87 (21.85)**	1.58 (8.13)**
Average household experience	1.55 (17.51)**	1.64 (27.84)**	1.16 (15.77)**
Size of household labor force	1.16 (6.83)**	1.17 (7.93)**	1.28 (18.07)**
Total land area, 2000	0.98 (3.58)**	0.99 (1.33)	0.99 (3.82)**
Value of durables, 2000	1.00 (1.44)	1.00 (0.95)	1.00 (3.16)**
Age <sup>a</sup> * 90's dummy	0.99 (3.20)**		
Gender * 90's dummy	0.57 (4.74)**		
Education * 90's dummy	1.08 (4.96)**		
Training * 90's dummy	0.64 (4.22)**		
Experience * 90's dummy	0.74 (11.66)**		
Labor force * 90's dummy	1.13 (5.21)**		
Land area * 90's dummy	1.01 (1.83)		
Durables * 90's dummy	1.00 (1.85)		
Time trend	1.09 (11.80)**		
Year dummies		Included	Included

*Note.* Coefficients reported are odds ratios; z statistics in parentheses.

\*\* Significance at the 5% level; 34,257 observations were used in column 1; 12,623 observations were used in column 2; and 21,631 were used in column 3.

<sup>a</sup> The 90's dummy variable is one for all years between 1990 and 2000, and zero otherwise.

<sup>b</sup> The odds ratios for the interacted variables (rows 9 to 16) should be interpreted as multiplicative. Column 2 only includes data from 1981–1990 and column 3 only includes data from 1990–2000 (1990 was included in both regressions as the base year).

TABLE 6

Conditional Fixed Effects Logit Estimator Explaining the Participation of Individuals in Migration, Local Wage Employment, and Self-Employment in the Rural Sector of Zhejiang Province, 1981 to 2000

Explanatory variables	Dependent variable		
	(1) Migration	(2) Local wage employment	(3) Self-employment
Age	0.93 (28.52)**	0.94 (24.54)**	1.00 (0.58)
Gender (1 = male)	4.78 (26.75)**	2.31 (15.78)**	2.53 (15.54)**
Years of education	1.16 (15.92)**	1.15 (16.08)**	1.06 (6.14)**
Skill training (1 = yes)	1.85 (10.92)**	2.14 (13.94)**	3.38 (21.10)**
Average household experience	1.22 (19.79)**	1.31 (26.76)**	1.36 (31.58)**
Size of household labor force	1.30 (19.06)**	1.30 (19.18)**	0.95 (3.23)**
Total land area, 2000	0.99 (2.91)**	0.97 (5.99)**	0.99 (1.71)
Value of durables, 2000	1.00 (5.59)**	1.00 (4.17)**	1.00 (7.62)**
Age * Zhejiang <sup>a</sup>	1.01 (2.48)**	0.99 (2.58)**	0.97 (7.22)**
Gender * Zhejiang	0.43 (7.76)**	0.70 (3.52)**	2.21 (7.64)**
Education * Zhejiang	1.05 (2.60)**	1.03 (1.42)	0.84 (10.59)**
Training * Zhejiang	0.85 (1.48)	0.50 (6.54)**	0.61 (4.84)**
Experience * Zhejiang	0.87 (8.87)**	0.89 (7.01)**	0.97 (2.13)**
Labor force * Zhejiang	0.91 (3.67)**	1.00 (0.16)	1.02 (0.96)
Land area * Zhejiang	1.00 (0.58)	1.04 (5.98)**	1.02 (2.79)**
Durables * Zhejiang	1.00 (5.91)**	1.00 (3.40)	1.00 (8.10)**
Year	1.07 (13.75)**	1.03 (5.92)**	1.00 (0.80)

Note. Coefficients reported are odds ratios; asymptotic  $z$  statistics in parentheses.

\*\* Significance at the 5% level; 34,257 observations were used in the regressions. For interpretation of the coefficients, see text and footnotes of Table 5.

<sup>a</sup> The Zhejiang variable is one for individuals in Zhejiang province and zero otherwise.

The same pattern of the evolution of China's labor market also appears across space (Table 6). When interacting the baseline determinants of participation with a dummy variable for Zhejiang province, we find that rural residents in this province are participating in local wage earning labor markets (although not migration markets) at younger ages and are being better rewarded for their formal education with employment opportunities. Women are far more likely to have employment in Zhejiang, perhaps an indication that the propensity to discriminate against women in the work place is lower. Although in the rest of the sample a male has a 378% higher chance of being employed; in Zhejiang province, there is only a 106% higher chance for a male to be employed. Additionally, the variable that is included to hold constant the effect that an individual gets a job by being introduced by one of his or her family members, rather than on the basis of his or her own human capital, is smaller in magnitude for Zhejiang than in the rest of China. In other words, having a member of one's household in the migrant or off-farm work force is less important in Zhejiang than in other parts of China. In summary, to the extent that labor markets in Zhejiang foreshadow future trends for the rest of China, the evolution of labor markets is proceeding in a positive and productive direction.

When we include time-varying measures of each household's land area and wealth (measured as the value of durable assets) for the years 1995–2000, we find that there is no impact on participation (Appendix Table 9). In other words, when holding all other things constant, migrant, local wage, and self-employed labor markets are not providing additional opportunities for the rich or land-endowed to participate in off-farm activities. With poorly functioning markets, these factors could be important determinants of an individual's decision to be in or out of a market.

## 5. CONCLUSIONS

In this paper, we assess the evolution of China's rural labor markets, decompose it into its component parts, and identify the determinants of participation in the off-farm sector during the 1980's and 1990's. Our paper provides evidence of the rapid increase in labor market activity over the whole period. Most notably, we find that a rapid rise in employment has continued even until the late 1990's, which is a time when some feared that macroeconomic conditions might keep rural residents on the farm or drive them back to the farm.

In our disaggregation of labor market trends, we show that labor markets are acting consistently with an economy that is in transition from being dominated by agriculture to being dominated by other forms of production and consistently with a population that is becoming more urban. Our descriptive analysis illustrates that labor markets have allowed migration to become the dominant form of off-farm activity, have become increasingly dominated by young workers, have expanded most rapidly in economies or areas that are relatively well-off, and have drawn on portions of the population that had been excluded previously from participation, such as women. Rural workers also show signs of specialization especially when we examine their working behavior by age group and location of their village.

Young workers are much less likely to work on the farm than older workers in 2000. Perhaps more telling, young workers in 2000 participate in farming far less frequently than workers in 1990 and 1981 in the same age cohorts.

In our multivariate analysis, we find robust support for all of the descriptive findings and show that many of the trends consistent with the emergence of labor markets that can transform China's economy are becoming stronger. Over time and across space, younger and more educated workers are working off the farm. Barriers to entry are falling for women. If China continues to change as it has over the past 20 years and as it has in its better off regions, we expect rural residents to continue their shifts from rural to urban markets and from agriculture to industry. Indeed, all of these are consistent with optimistic future development in China, at least in the case of its labor markets.

## APPENDIX

TABLE 7

Conditional Fixed Effects Logit Estimator Explaining the Change in Participation of Individuals in Migration, Local Wage Employment, and Self-Employment in Rural China between the 1980's and 1990's

Explanatory variables	Dependent variable		
	(1) Migration	(2) Local wage employment	(3) Self-employment
Age	0.93 (31.57)**	0.93 (29.75)**	0.99 (4.72)**
Gender (1 = male)	3.92 (28.01)**	2.12 (16.79)**	3.30 (24.71)**
Years of education	1.16 (17.93)**	1.15 (18.23)**	1.00 (0.12)
Skill training (1 = yes)	1.69 (10.97)**	1.76 (12.04)**	2.85 (22.08)**
Average household experience	1.17 (18.21)**	1.26 (27.27)**	1.34 (34.41)**
Size of household labor force	1.26 (19.15)**	1.26 (27.27)**	0.94 (4.79)**
Total land area, 2000	0.99 (3.50)**	0.99 (3.01)**	1.00 (0.52)
Value of durables, 2000	1.00 (2.52)**	1.00 (4.30)**	1.00 (0.67)
Fathers' years of education	1.00 (4.93)**	1.00 (5.29)**	1.00 (2.15)**
Grades good at end of school? (1 = yes)	1.25 (4.58)**	1.28 (5.19)**	1.05 (1.05)
Time trend	1.07 (13.79)**	1.03 (6.56)**	1.00 (0.96)

Note. Coefficients reported are odds ratios; asymptotic  $z$  statistics in parentheses.

\*\* Significance at the 5% level; 34,257 observations were used in the regressions.

TABLE 8

Conditional Fixed Effects Logit Estimator Explaining the Participation of Individuals in Local Wage Employment and Self-Employment in Rural China, 1981–2000, 1981–1990, and 1990–2000

Explanatory variables	Dependent variable					
	Local wage earners			Self-employment		
	(1)	(2)	(3)	(4)	(5)	(6)
	1980–1990	1990–2000		1980–1990	1990–2000	
Age	0.93 (31.26)**	0.97 (7.40)**	0.92 (29.31)**	0.94 (29.43)**	0.99 (2.62)**	0.99 (4.33)**
Gender (1 = male)	3.80 (27.67)**	3.41 (13.05)**	1.86 (12.17)**	2.07 (16.35)**	4.70 (14.38)**	3.10 (21.06)**
Years of education	1.16 (19.39)**	1.11 (7.54)**	1.18 (17.82)**	1.16 (19.77)**	0.97 (2.06)**	1.00 (0.31)
Skill training	1.73 (11.53)**	2.20 (8.34)**	1.73 (10.03)**	1.82 (12.78)**	4.81 (16.26)**	2.35 (15.64)**
Average HH experience	1.17 (18.18)**	1.87 (21.19)**	1.24 (22.96)**	1.26 (27.03)**	2.17 (24.66)**	1.30 (29.81)**
Size of HH labor force	1.26 (19.67)**	1.37 (12.20)**	1.30 (18.91)**	1.28 (20.99)**	0.97 (1.27)	0.94 (4.47)**
Total land area, 2000	0.99 (3.69)**	1.00 (0.20)	0.98 (4.68)**	0.99 (3.36)**	0.97 (1.10)	1.00 (0.52)
Value of durables, 2000	1.00 (2.69)**	1.00 (1.30)	1.00 (4.97)**	1.00 (4.41)**	1.00 (1.11)	1.00 (0.29)
Time trend	1.07 (13.56)**					
Year dummies		Included	Included		Included	Included

*Note.* Coefficients reported are odds ratios; asymptotic  $z$  statistics in parentheses.

\*\* Significance at the 5% level. Columns 1, 3, and 5 use a time trend; and columns 2, 4, and 6 use year-by-year dummy variables to account for changing economic conditions over time; 34, 257 observations were used in the regressions.

TABLE 9

Comparison of Conditional Fixed Effects Logit Estimators Explaining the Change in Participation of Individuals in Migration, Local Wage Employment, and Self-Employment in Rural China That Use Time-Varying and Static Variables for Land and Durables, 1996–2000

Explanatory variables	Dependent variable					
	Migration		Local wage earners		Self-employment	
	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.91 (24.80)**	0.91 (24.86)**	0.92 (24.26)**	0.92 (24.18)**	0.99 (2.00)**	0.99 (2.81)**
Gender (1 = male)	2.74 (14.64)**	2.77 (14.80)**	1.62 (7.39)**	1.62 (7.27)**	2.78 (14.87)**	2.79 (14.79)**
Years of education	1.17 (13.18)**	1.17 (13.12)**	1.18 (13.42)**	1.18 (13.73)**	1.01 (0.67)	1.00 (0.34)

TABLE 9—Continued

Explanatory variables	Dependent variable					
	Migration		Local wage earners		Self-employment	
	(1)	(2)	(3)	(4)	(5)	(6)
Skill training	1.47 (5.19)**	1.45 (4.98)**	1.69 (7.31)**	1.69 (7.27)**	1.94 (9.14)**	2.02 (9.59)**
Average HH experience	1.11 (9.92)**	1.13 (10.45)**	1.19 (15.43)**	1.18 (14.92)**	1.24 (20.25)**	1.22 (19.40)**
Size of HH labor force	1.29 (13.08)**	1.25 (12.32)**	1.28 (12.96)**	1.27 (13.05)**	0.93 (4.00)**	0.94 (3.32)**
Total land area, 2000	1.00 (3.74)**		1.00 (2.65)**		1.00 (0.43)	
Total land area		1.00 (0.98)		0.99 (2.91)**		1.00 (1.18)
Value of durables, 2000	1.00 (3.94)**		1.00 (5.42)**		1.00 (0.63)	
Value of durables		1.00 (4.36)**		1.00 (5.42)**		1.00 (0.05)
Time trend	1.13 (5.52)**	1.12 (5.32)**	1.08 (3.62)**	1.08 (3.53)**	1.00 (0.13)	1.01 (0.32)

Note. Coefficients reported are odds ratios; asymptotic  $z$  statistics in parentheses.

\*\* Significance at the 5% level; 10,664 observations were used in the regressions.

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