topic of speculation (Bharadwaj 1974*a*; Bhaduri 1973) and have more recently become the focus of empirical investigation (Rudra 1975*a*, *b*; Bardhan and Rudra 1978).

In all villages, labor-credit links are restricted to RFS contracts. They provide poor people with an opportunity to raise credit that would often be totally lacking. In Akola they are of such short duration that they are probably to be interpreted as being of mutual benefit in most cases. Although the contracts are of longer duration in Sholapur, their terms do not appear to be substantially below those available in other submarkets. Only in Aurepalle are terms of credit-linked RFS contracts clearly inferior. But we believe that it is not primarily the tying that puts the laborers at a disadvantage, but the effective collusion of farmers in the absence of alternative sources of labor demand. Without collusion or other forms of monopsony or monopoly power, the terms of tied transactions may thus reflect "competitive" market conditions of supply and demand without an additional extraction of "rents" to the "stronger" partner. In this paper we have found little evidence that tied transactions in a submarket cannot be understood by a supply and demand framework for this type of transaction. Traditional analysis of market imperfections such as monopsony, monopoly, collusion, and restrictions to mobility can then be used to explain unequal or exploitative terms in regions or villages where the imperfections can be documented empirically.

9

Labor Market Behavior in Rural Villages in South India: Effects of Season, Sex, and Socioeconomic Status

James G. Ryan and R. D. Ghodake

Most developing countries of the semiarid tropics (SAT), particularly in Asia, have a relative abundance of labor resources in proportion to capital and land. Statistics on this apparent abundance are usually only available (if at all) in terms of national or regional annual aggregates, as pointed out recently by McDiarmid (1977), Bardhan (1977), and Brandon and Jessee (1977). Even these statistics are often not reliable, particularly for the rural areas. Problems of seasonal unemployment are most acute in rural areas, as revealed in the comprehensive study of Rudra and Biswas (1973). It is imperative to derive more accurate measures and a better understanding of the demand and supply parameters of labor markets, particularly in India, where 70 percent of the labor force is classified as agricultural workers.

This paper represents an attempt to bridge some of the gaps in our knowledge. It is an analysis of the labor market behavior of 240 labor and cultivator households in six semiarid tropical villages in the Maharashtra and Andhra Pradesh states of south India, a region that has largely been neglected in this field of research. The data for this study were drawn from six villages in the SAT of peninsular India, where intensive socioeconomic studies have been conducted continuously since May 1975 as part of the ICRISAT economics program.[1] Details of the labor utilization of each family member and of hired personnel were obtained.[2] These data related to both on-farm and off-farm activities as well as to household use.[2]

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1. For a detailed description of the method [illegible] of information obtained, see Jodha (chapter 5).

2. The on- and off-farm activities were [illegible] Household time allocation of each household member [illegible] preceding each interview.

The major crops grown in the Mahbubnagar villages are paddy, sorghum, groundnuts, pigeon peas, pearl millet, and castor. The Alfisol soils in these villages have a low moisture-holding capacity; this means that all nonirrigated crops are grown in the rainy season. As a result, about two-thirds of total labor use on farmers' fields occurs in the rainy season. The Sholapur villages have medium-deep and deep Vertisol soils, which have a high moisture-holding capacity; thus most nonirrigated cropping occurs in the postrainy season on residual soil moisture. More than half of the total labor use in Sholapur is concentrated in the postrainy season of September to March. The predominant crops here are sorghum, chick-peas, and safflower. Some pearl millet and pigeon peas are sown on the shallow Vertisols in the rainy season. Cotton is the primary crop of the Akola villages, being sown in rows on the medium-deep Vertisols in the rainy season, mixed with sorghum and pigeon peas. More than 90 percent of total crop labor use occurs in the rainy season in the Akola villages.

In Aurepalle and Kalman, total male labor used on crops was slightly more than total female labor used; in Dokur, Shirapur, Kanzara, and Kinkheda, however, the total female labor used on crops exceeded total male labor. Increasing amounts of cotton and irrigation seem to imply increasing employment potentials for women in these villages. These high proportions of female labor used on agricultural land far exceed the 20 percent figure cited for Asia by Boserup (1970). Little work on crops is done by children. In all six villages the proportion of female labor hired was much greater than the proportion of male labor hired: 80 to 90 percent of the labor hired in the Mahbubnagar and Akola villages and 60 to 70 percent of the labor hired in the Sholapur villages was female.[3]

Of the total hired labor used in Aurepalle, Dokur, and Shirapur, 63 to 88 percent consisted of females. In the Akola villages and in Kalman, the share of males and females in total hired labor use was almost equal. Males always represented the larger proportion (64 to 90 percent) of the total family labor utilization, especially in the Mahbubnagar villages.

In this paper we will discuss the functioning of the rural daily hired labor markets in the six villages. Particular attention will be given to the extent to which able-bodied people attempt to participate in the daily hired labor market throughout the year, the probability that they will obtain employment, and the wages they will receive, if successful. These questions will be examined separately for males and for females from the four household categories of labor, as well as small, medium, and large farms, using

3. Due to space limitations, all of the tables and analyses on which this paper is based could not be included. The interested reader is referred to the papers by Ghodake, Ryan, and Sarin (1978) and Ryan, Ghodake, and Sarin (1979) for details.

data collected on a two- to four-week recall basis in 1975–76. The data have been smoothed into two-week periods for the subsequent analyses.[4]

PARTICIPATION RATES

The participation rate in the rural daily hired labor market was calculated as the number of person-days of wage work plus work-seeking (involuntary unemployment) in a period, expressed as a proportion of the total number of person-days where participation could have occurred. Work on own farms was excluded. The denominator was calculated using the number of able-bodied people residing in the households at the beginning of the study. We excluded family members who were disabled, regularly at school, less than twelve years old, living permanently outside the village, or employed in regular or professional jobs. Also excluded were permanent servants in the household.

The labor force participation rate was calculated in the same manner as the labor market participation rate, except that person-days of work on own farms were also added to the numerator.[5]

Labor market participation rates for males were significantly lowest in the two Mahbubnagar villages and generally significantly highest in the two Akola villages (table 9.1). Labor market participation rates were all significantly different between pairs of districts for both the adult males and the adult females. For only 7 percent of the time did males in Aurepalle endeavor to find a job in the daily hired labor market. In Kanzara, on the other hand, males participated almost 50 percent of the time. The labor market participation rates for all villages were reduced by the meager participation by members of large-farm households and, to a lesser extent, of medium-farm households. Participation by labor and small-farm households was generally much higher. For males, the highest average labor market participation rate in 1975–76 for the labor and small-farm groups was in Kanzara – 0.87 and 0.70, respectively; the lowest was in Aurepalle – 0.18 and 0.14, respectively.

Females participated in the labor market substantially more (always significant at the 1 percent level) than males in Mahbubnagar villages and in Kinkheda, whereas in other villages males participated significantly more

4. For details see Subrahmanyam and Ryan [illegible]. Most estimates reported here are annual averages. However, the comparisons [illegible] villages, sexes were also made separately for peak and slack labor [illegible] In most cases, results for the seasons were consistent with the annual averages.

5. Farm work includes all operations [illegible] plowing, sowing, weeding, harvesting, and threshing [illegible] building repairs and construction [illegible] and domestic work.

TABLE 9.1. Employment Conditions of Male and Female Adults in Rural Daily Hired Labor Markets in Six SAT Villages of South India, 1975–76

District/ Village/Sex	Market Participation Rate		Probability of Market Employment		Daily Opportunity Cost		Daily Wage Rate	
	Mean	CV (percent)	Mean	CV (percent)	Mean (Rs)	CV (percent)	Mean (Rs)	CV (percent)
Mahbubnagar								
Aurepalle								
Male	0.02***	48	0.71	23	1.77***	25	2.50***	33
Female	0.27	61	0.69	20	1.03	26	1.49	16
Dokur								
Male	0.25***	14	0.76***	30	1.97***	35	2.59***	17
Female	0.61	10	0.82	20	1.58	30	1.93	15
Sholapur								
Shirapur								
Male	0.38***	29	0.70***	12	1.80***	12	2.57***	13
Female	0.25	22	0.49	37	0.68	47	1.39	18
Kalman								
Male	0.29***	19	0.92***	11	2.50***	31	2.77***	19
Female	0.22	17	0.77	18	1.08	28	1.40	14
Akola								
Kanzara								
Male	0.48***	14	0.82***	12	2.05***	15	3.72***	11
Female	0.39	22	0.77	30	1.41	35	1.83	12
Kinkheda								
Male	0.30***	27	0.88***	12	2.52***	19	2.86***	11
Female	0.36	20	0.91	7	1.41	22	1.55	19

Note: Work on own farms has been excluded from participation rate and employment probability calculations. Asterisks indicate significant differences between figures for male and female labor of the same village.

***Significant at 1 percent level.

than females. Dokur, where irrigated paddy is grown, registered the highest average market participation for females at 0.61. In this village even females from large farms participated 36 percent of the time, and females from labor and small-farm households participated 82 percent of the time, the highest rate of all villages. This indicates that the influence of paddy irrigation on demand for female labor led to substantial participation by females, even those from the large-farm group.

The lowest female participation rate, approximately 0.25, came in the drought-prone, predominantly food grain growing Sholapur villages. The range in these two villages was from approximately 0.47 for females from labor households to 0.08 for those from the large-farm group.

There was a significant amount of seasonal variation in labor market participation of males and females, particularly in Aurepalle (table 9.1). The coefficient of variation (CV) of fortnightly male participation ranged from a high of 48 percent in Aurepalle to a low of 14 percent in Dokur and Kanzara. For females the range was from 61 percent in Aurepalle to 10 percent in Dokur. Again, the effect of extensive paddy irrigation in Dokur was reflected in much more steady market participation throughout the year.

The mean fortnightly market participation rates of males and females from labor households were always greater than those from the small-farm households. The differences were significant at the 1 percent level in paired *t* tests in five out of six villages for males, and in two out of six villages for females. The labor group also had higher market participation rates than medium-farm households for both males and females. These differences were statistically significant at the 1 percent level in five of six villages for males and in all villages for females. Except for Shirapur, males and females from small-farm households participated significantly more than those from medium-farm households.

The simple correlation between the market participation rates of males from labor and from small-farm households was positive and significant in four of the six villages. Aurepalle and Kalman had negative correlations, the latter being not statistically significant. In five of six villages there was no correlation between participation of the male members of the labor households in the market and participation of males from medium-farm households. Correlations between labor market participation of females from the labor and small-farm categories were significantly positive in three villages. Correlations for the other three villages were not significant. Labor participation rates of females from labor households were not as closely correlated with those from medium-farm households. Only two CRs were significantly positive, one was significantly negative, and the remaining three were not significant.

As expected, these results suggest that males and females from labor households participate more in the rural daily hired labor market than do those from cultivator households. Those from the labor group and from the small-farm group tend to enter the labor market at approximately the same time. However, there does not seem to be as much competition between participants from the labor group and from medium-sized farms, especially among males.

These participation rates were calculated excluding [illegible] work on the participants' own farms; they reflect the supply [illegible] to the daily hired labor market as a proportion of total available [illegible]. The rates indicate, on an average over these six villages, [illegible] percent of

TABLE 9.2 Rates of Labor Force Participation and Involuntary Unemployment in Six SAT Villages of South India, 1975–76

District/Village/Sex	*Labor Force Participation Rate*	*Involuntary Unemployment Rate**
Mahbubnagar		
Aurepalle		
Male	0.30	0.07
Female	0.29	0.28
Dokur		
Male	0.43	0.14
Female	0.64	0.17
Sholapur		
Shirapur		
Male	0.46	0.25
Female	0.30	0.43
Kalman		
Male	0.38	0.06
Female	0.26	0.19
Akola		
Kanzara		
Male	0.55	0.16
Female	0.42	0.21
Kinkheda		
Male	0.35	0.10
Female	0.38	0.09

*Farm and labor market work is included in both the numerator and denominator to calculate probability of labor employment (*PE*), from which involuntary unemployment is calculated as (1 – *PE*).

available male and female labor, respectively, participated in work outside their own farms, households, and businesses in 1975–76. When we include own-farm work — as is usually done when measuring labor force participation, as opposed to the labor market participation shown in table 9.1 — there is a substantial increase in the rate for males in the Mahbubnagar and Sholapur villages (table 9.2). Males in these villages devote considerable time to agricultural farm work. This is not so in the Akola villages or for females generally. Very little own-farm labor is contributed by family females from the cultivator households, even though on average they participate a lot in the hired labor market. To illustrate: the average labor market participation rate for males in the six villages was 0.30, whereas the average labor force participation rate was 0.42, indicating that approximately 12 percent of the time of available male labor was devoted to agricultural work on own farms in 1975–76. Although this seems a small fraction of the time, it is larger than that of females, who spent only 3 percent of their available labor time in own-farm agricultural work. Their average labor market participation rate was 0.37; their average labor force participation rate was 0.40.[6]

All these participation rates seem quite low and suggest either that work other than farm and market work is being done in these households or that there is considerable leisure time. The latter explanation is more likely in the large-farm households; these families are generally larger and have much lower participation rates than other households. This group would tend to lower the overall village averages considerably. The large numbers of landless households in the sample with no own-farm work also keep the labor force participation rates low.

PROBABILITIES OF EMPLOYMENT

The probability of employment in the rural daily hired labor market (*PME*) is calculated as the number of days a person was successful in obtaining wage employment as a proportion of the number of days in the period he tried.[7] The probability of involuntary unemployment in the market ($PMU = 1 - PME$) is not equivalent to the usual measures of unemployment, which are based on stock concepts and data from one-time census or sample surveys.[8] *PME* is a flow concept that can be used to weight wage rates properly to indicate opportunity costs of leisure and farm or household work in the context of the new household economics framework. These opportunity costs are discussed later in this paper. For comparison with stock measures of unemployment in India, we also calculate the probability of unemployment (*PU*) with person-days of own-farm work included in both the numerator and the denominator to first calculate probability of labor employment (*PE*); *PU* is then calculated as ($1 - PE$).

In the two drought-prone, predominantly food grain producing villages of the Sholapur region and in the village of Kanzara, males have a significantly better chance of obtaining daily market wage employment than females. In Aurepalle, with its light red soils and with sorghum and castor as

6. Recall that calculation of all these rates is based on the assumption that 365 days are available for work each year. When this number is reduced to allow [illegible] days of leisure per week, the labor market participation rates are 0.39 for males and 0.42 for females, whereas the labor force participation rates rise to 0.53 and 0.51, respectively. Own-farm work then occupies 15 and 4 percent of the available labor time of all males and females, respectively.

7. In calculating the probability of employment we have [illegible] between employment on other farms, employment in nearby urban [illegible] employment for private or government employers.

8. See, for example, Krishna (1973) and [illegible] include farm- and self-employed people in the [illegible]

the major crops, there is no significant difference. On the other hand, in Dokur and Kinkheda, females have a significantly higher probability of employment than males (table 9.1).

In Shirapur, females can only find market employment on half the occasions when they wish to. Males are successful 70 percent of the time. In Shirapur not only are average probabilities of female employment low but their fluctuation throughout the season is particularly high; the CV for females is 37 percent, whereas for males it is much less (12 percent). In Kalman, a village in the same region, average employment probabilities for both males and females were substantially better (0.92 and 0.77, respectively) than in nearby Shirapur. Seasonal variations were also smaller. This illustrates the difficulties of generalizing results from individual villages and applying them to the region as a whole. The fact that Shirapur is more drought-prone and has a higher proportion of postrainy season cropping/rainy season fallow than Kalman probably accounts for its meager employment potential. Postrainy season crops require much less hand weeding and interculturing than rainy season crops, and these operations are usually done by hired labor.

The most buoyant daily labor markets appear to be in the two cotton-growing Akola villages. In Kanzara, both males and females succeed about eight times out of ten in finding a job, whereas in Kinkheda they succeed nine times out of ten. Seasonal fluctuations are not substantial, except for Kanzara females ($CV = 30$ percent).

Males in Mahbubnagar are successful in finding off-farm employment in three out of four attempts. Dokur females are successful eight times out of ten but in Aurepalle females succeed only seven times out of ten. The seasonal variation in job probabilities also seems higher for males compared with females in these two villages, where irrigated paddy is important. The periods of the year when the probabilities of employment are lowest vary from village to village, even within the same region.

Paired t tests showed that for males there was a mixed picture with respect to the relationship between probabilities of market employment for the labor group and for the small- and medium-farm groups. In three villages there was no significant difference between the mean probabilities of employment of the labor and small-farm groups. In two villages the probability for small-farm males was significantly greater than for males from the labor group. In one village the reverse was true. In three villages the probability of employment for males from the medium-sized category was significantly less than that for males from the labor group, and in the other three there was no significant difference. In four villages the small-farm males had a significantly better chance of finding a job than medium-farm males. In the other two villages there was no significant difference.

Females from small farms in three of the villages had significantly better

employment probabilities than those from labor households. In one village the reverse was true, but in the other two there was no significant difference. Females from the medium-farm group in three villages also had significantly better chances of finding a job than those from the labor households. There were no significant differences in the other three villages. Females from the small- and medium farm groups did not differ statistically in their employment probabilities in four out of the six villages. In Dokur the latter group had a better chance, whereas in Shirapur the former did.

What this pattern suggests is that in general, males from labor households have a better chance of successfully finding daily wage employment compared with their counterparts in the cultivator households than do their spouses. Hence it is true not only that females generally are no better off and are often worse off than males in terms of daily labor market employment opportunities but that, in addition, females from the poorest households (the labor group) are often the most disadvantaged.

It seems that fluctuations in probabilities of market employment in 1975–76 for females from the labor and small- and medium-farm groups in each village were more positively related than those for males. This is suggested by the fact that all correlations were positive and significant for females, whereas for males only half were. A possible conclusion is that females from the different socioeconomic groups in these villages tended to be competing for similar jobs more frequently than males.

The overall probability of involuntary market unemployment (PMU) for males in these six villages in 1975–76 averaged 0.19; for females the average was approximately 0.23.[9] Because of the relatively small amount of time devoted to own-farm work in most of these villages, the probability of unemployment (PU) does not fall a great deal when we include farm work in the numerator and the denominator (table 9.2). The exceptions are for males in the two Mahbubnagar villages and for females in Shirapur, where own-farm work was more significant. On average across the six villages, the PU for males was 0.14 and for females 0.21. These estimates of the extent of unemployment are far in excess of the rates derived in the 1961 census in India, 0.005 and 0.001 for males and females, respectively. They are also much higher than those obtained in the twenty-first round of the National Sample Survey in 1966–67, of 0.018 for rural males and 0.045 for rural females, as reported in Sen (1975). However, there are many deficiencies in the aggregate statistics on unemployment in India, as I have described in detail by Sen. Our average PUs compare with Mehra's figure for disguised

9. The average PMUs for males were [illegible] and [illegible] percent, respectively, for females the corresponding [illegible]. [illegible] that during peak periods the probabilities of [illegible] and females become almost equal, whereas during [illegible] female labor employment more adversely

unemployment in the total agricultural labor force in India of 0.17, as reported in Sen (1975), but they are about double those derived by Krishna (1973), using National Sample Survey data on rural workers who are idle but are willing to work more. Krishna points out that his figures are minimum estimates. They are also much higher than the 0.13 derived by P. K. Bardhan (1979*b*) for West Bengal, using the rural subsample of the 1972–73 National Sample Survey of that state.

A number of models of rural–urban migration, such as those by Harris and Todaro (1970) and McDiarmid (1977), assume the probability of employment in rural areas to be one. Lal (1974) reports a value of one as the ratio of the market rate to the "social wage rate" in a number of states in India. These values are often used as implicit weights in the social benefit-cost analysis of projects. The results from these six villages suggest that opportunity costs of rural labor based on probabilities of employment of one may be considerably overestimated. This may explain the paradox of models that predict increasing rural–urban migration in India in spite of an apparently increasing amount of urban unemployment. Ignoring rural unemployment may be the problem in such models.

WAGE RATES

Average female daily wage rates in these six villages in 1975–76 were approximately 56 percent of those for males and also were significantly different at the 1 percent level.[10] Male wages averaged Rs 2.83 per day; daily female wages averaged Rs 1.60 (table 9.1). Male wages were generally highest in the two Akola villages. Kanzara had the highest (Rs 3.72) and the lowest was in Aurepalle (Rs 2.50).[11] Of the females, those from Dokur had the highest average wage rate, Rs 1.93 per day. This seems to be explained by the importance of the paddy crop in Dokur, which requires a large amount of female labor for transplanting and weeding. The lowest female wages were in the drought-prone Sholapur villages; they averaged only Rs 1.40 per day. The much-reduced demand for weeding labor because of the postrainy season cropping pattern in the Sholapur villages no doubt helps explain the lower female wages there.

Employed women tended to work approximately 5 to 12 percent fewer hours per day on the job than employed men (table 9.3, columns 4 and 5). Hence on an hourly basis women's wages were approximately 60 percent of men's in these villages.[12] However, women worked 10 to 30 percent more

10. This percentage is much lower than the 80 percent for thirteen states in India in 1960–61 derived by Rosenzweig (1978).

11. These wages are expressed in nominal terms only. Deflating by a food grain price index in the two states would, no doubt, bring the wages closer together.

12. Hourly wages for children are approximately 55 percent of the wages of adult males.

TABLE 9.3 Average Hours Worked per Day by Adult Males and Females and by Children in Six SAT Villages of South India, 197[illegible] ([illegible] percent)

District/Village	*When All Activities Are [illegible] Own Farm Household and/or for Others*			*When [illegible] for Others [illegible] Wages*		
	Adult Males	*Adult Females*	*Children*	*Adult M[illegible]*	*Adult Females*	*Children*
Mahbubnagar						
Aurepalle	6.90	[illegible]	6.49	[illegible]	[illegible]	[illegible]
	(0.91)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dokur	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sholapur						
Shirapur	8.62	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	(1.75)	[illegible]	(1.16)	[illegible]	[illegible]	[illegible]
Kalman	6.65	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	(0.6[illegible])	(1.03)	[illegible]	[illegible]	[illegible]	[illegible]
Akola						
Kanzara	6.81	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	(0.58)	(1.50)	[illegible]	[illegible]	[illegible]	(0.76)
Kinkheda	7.76	9.54	[illegible]	[illegible]	[illegible]	7.53
	(1.00)	(0.68)	(0.89)	[illegible]	[illegible]	(0.48)

Note: Unlike other data on labor use in this paper, the data in this table pertain to labor used in the following: crop production, animal husbandry, building and construction repairs and maintenance, trade, marketing, transport, domestic work, food and fuel gathering processing, and handicrafts. Time spent traveling is also included. [illegible] based on averages of one-day recalls made more than 20 times from mid 1975 to the end of 1976 by all respondents. Standard deviations appear in parentheses.

hours per day than men on those days when activities were performed by both for their own farms/households and/or for someone else for wages (table 9.3, columns 1 and 2). This is no doubt a reflection of the dominant role of women in domestic work, food and fuel gathering processing, and handicrafts, which are done in addition to their participation in agricultural activities.

Table 9.3 shows that generally, the daily hours of work when done for wages did not fluctuate a great deal seasonally. As one would expect, there was a larger seasonal variation in daily hours of work when it was performed on one's own farm or in one's own household. The higher CV for hours of children's work was primarily a result of their lower mean hours of work (50 to 80 percent of adult females). When women and children worked for wages, they tended to work approximately the same number of hours.

There did not appear to be consistent differences in hours of work of household members across the four categories (labor, small, medium, and large farms) within each village. However, [illegible] from large farms,

particularly women, often worked fewer hours per day than those from the other households.

In support of the contention of Rodgers (1975) that the degree of seasonal wage variability is less than that of seasonal employment variability, we found more evidence for females than we did for males. Rodgers contends that wages are more "sticky" than employment, due to provision of meals by employers and interseasonal "guarantees." We found that in five of the six villages, the CVs of wages were less than the CVs of the employment probabilities for females. For males this was true in only three of the six villages. Contrary to Raj (1959), we found a general tendency for lower average employment probabilities to be associated with higher CVs of wages for males. Like Sethuraman (1972) and McDiarmid (1977), we found that whenever there was a statistically significant correlation between fortnightly daily wages and probabilities of employment for the labor and small-farm households, it was usually positive. However, this was true in only one of the twelve cases for males and in four of the twelve cases for females. On the other hand, there was at least one case of small-farm males in Aurepalle in which the correlation coefficient value was significant and negative, which is in line with the Rodgers (1975) hypothesis. Hence the evidence concerning this relationship is still quite weak.[13]

It seems that for males there is no tendency for the members of the labor group, who generally participate more in the rural daily hired labor market, to receive higher wages as a result of their being more continuously available throughout the year. In fact, there is evidence from these villages to the contrary. Small-farm males in these villages apparently can hire daily workers from labor households at the same time that they hire themselves out and be better off for it. The same is not true for females. This no doubt helps explain the relatively high levels of labor hiring observed on the small farms by Ghodake, Ryan, and Sarin (1978). It may also help explain the predominance of hired females in the female labor force.

There were significant positive correlations between male participation rates and probabilities of employment in four of the six villages. For females this was true in only two villages, and in two others the correlation was significantly negative. This suggests that, for males, the more the participation the better the chance of obtaining a job. This is not so true for females, implying that there may be stronger "discouraged worker" effects operating for males than for females in these villages. There are fewer hired agricultural tasks that women perform exclusively-- they are mainly restricted to nursery bed raising, transplanting, planting, weeding, and thinning. This task segmentation appears to so limit effective demand for female labor that increased female labor market supply (participation), combined with such a restricted demand, leads to excessive unemployment.

13. Kalpana Bardhan (1977) presents an excellent review of the available Indian literature on the relationships between labor supply, labor demand, and wage determination

SUBJECTIVE OPPORTUNITY COST AND LABOR MARKET DUALISM

Opportunity cost is defined here as the expected wage foregone by a prospective labor market participant when that person works instead on the farm or in the household, or chooses leisure. Opportunity cost is measured here as OC_t, where

$$OC_t = W_t(PMU)_t$$

and W_t is the market wage rate in period t. It is therefore the subjective value of time considered by individual agents in the economy. This should be contrasted with the concept of social opportunity cost used in social benefit-cost analysis, which adjusts for distortion of domestic prices relative to international markets.

Often, data can be obtained on seasonal rural market wage rates, but there is no way of knowing how close these rates are to the seasonal opportunity costs of labor. Such costs are at the heart of questions related to labor supply analysis and the value of household production and time. McDiarmid (1977) refers to the necessity of obtaining local or regional measures of seasonal opportunity costs (as opposed to the countrywide single measures he derives) in areas where religious and language constraints prevent labor mobility. These circumstances generally prevail in the parts of the Indian SAT studied here.

The opportunity cost of labor for males averaged Rs 2.26 per day in 1975–76, which was 90 percent higher than that for females (Rs 1.20). In spite of the fact that there was a mixed picture concerning the probability of employment in these villages, males consistently had significantly higher opportunity wages than females (table 9.1). The CVs of opportunity costs were in general higher than those of daily wages or of probabilities of employment. There would therefore seem to be considerable scope for designing technologies that specifically aim at capitalizing on periods when labor opportunity costs are low. To do so would both enhance the profitability of the technology and create employment in slack, unremunerative periods with consequent redistributive benefits.[14]

To test the labor market dualism hypothesis of Sen (1966) that the

14. Hired labor may benefit relatively more than family labor from the creation of employment if the generally positive correlations between fortnightly wages and labor use and percentage of hired labor found by Ghodake, Ryan, and Sarin (1978) are any indication. Also, large farmers have lower CVs of fortnightly labor use than small farmers and hire more labor (Ghodake, Ryan, and Sarin 1978, pp. 17–24). This suggests that the smoothing of labor peaks may benefit hired labor proportionately more.

imputed price of labor to small farmers is lower than the actual price of labor to large farmers—paired *t* tests were performed on the fortnightly wage rates of the labor category (by sex) compared with the fortnightly market opportunity costs of labor from the small, medium, and large farms. The hypothesis contends that because large farmers are excess demanders of labor, their labor cost is the full agricultural wage. Small farmers are excess suppliers of labor and their relevant labor "price" is their opportunity wage.

In three of the six villages, the differences between wage rates of males from labor households and small-farm male opportunity labor costs were significantly positive. In two, the differences were not significant, and in one the difference was significantly negative. In all six villages the wage rates of females from the labor group significantly exceeded the market opportunity costs of family female labor from the small-farm households. Ghodake, Ryan, and Sarin (1978) observed that the proportion of family female labor used on farms in these villages is inversely related to farm size. This was not observed to be true for family males.

In the three villages where wages of males from labor households were significantly greater than small-farm market opportunity labor costs, family male labor use per hectare was significantly greater on small farms than on large farms, as predicted by the dualism hypothesis. This was also true in all six villages for females. On the basis of this evidence the labor market dualism hypothesis receives stronger support for females than for males. A major reason is the higher involuntary unemployment probability for females (particularly those in the drought-prone regions), which creates larger divergence between their wage rates and opportunity costs. This divergence in turn leads to the more substantial differences we observed between family female labor use per hectare on small farms and on large farms.

A paradox remains, however, with regard to large farms where there was some labor market participation. In three out of six villages, the fortnightly wage rates of male labor from the labor category were significantly higher than the market opportunity labor costs of males from large farms. Five out of six villages showed positive significant differences between fortnightly labor wage rates and opportunity labor costs of females from large farms. Hence for those large farms whose members enter the labor market, the "dual labor market" hypothesis holds equally well.[15] Many large farmers are also faced with wage rates for hired labor that are higher than the market opportunity costs of their own family labor. It thus seems clear that the hypothesis is an oversimplification of the operations of the labor market in these villages.

Judging by the generally low and/or nonsignificant correlations of wage

15. It is recognized that OC_i may not be a good measure of the value of time for farmers who do not participate in the labor market. For them, OC_i is less than their "reservation wage." This selectivity bias is more important for large-farm families, where market participation is generally less than that by small-farm families.

rates of males and females, there would appear to be considerable segmentation in the male and female labor markets in five of the six villages studied here. The notable exception is Dokur, where paddy is grown under irrigation. A detailed analysis of the relative contribution of males and females to the various field activities in these villages showed there were only two "joint" operations—harvesting and threshing. Women concentrated almost exclusively on five tasks—nursery bed raising, transplanting, planting, weeding, and thinning. Men focused on nine major operations, four of them involving bullock power.

Males and females tended to participate in the daily labor market at similar times, particularly in Aurepalle and in the Sholapur villages. They also had similar chances of obtaining a job throughout the year. In theory then, one would expect wage rates of males and females also to move together if females were able to shift in and out of tasks similar to those done by males as their respective wage rates began to diverge. However, the extent to which this trend is absent in five of these six villages is an indication of the degree of apparent segregation of their male and female labor markets.

CONCLUSION

If these six villages are representative of the SAT regions of south India, it appears that women have a role equal to men in the agricultural labor force. Furthermore, it is clear that women, especially landless women, have less chance than men of finding daily wage employment, particularly in the slack agricultural seasons. If this situation is to be improved and not aggravated, new agricultural technologies for these regions must be designed to enhance demand for the tasks generally reserved for females. A large untapped reserve of female labor appears to be able and willing to engage in more market-oriented activities in slack seasons, and it may even exceed the sizable male reserves. There would thus seem to be excellent scope for designing technologies that would capitalize on this reserve.

However, there is a need for closer study of how these villagers allocate the time that presently is not devoted to own-farm or paid market work. This amounts to more than 50 percent of their total time. It is imperative to understand the reason for this surprisingly high figure in order to assess whether the large *apparent* labor reserve just mentioned is indeed a potential market supply. The work of Bardhan (chapter 12) and Rosenzweig (chapter 11) suggests that labor supply elasticities for adults in north India are less than unity. We propose to test this hypothesis on a seasonal basis, using our panel data on more than 1,500 individuals in south India, collected over several years. The new household economics models developed by Heckman (1974), MaCurdy (1979), and others would seem the appropriate ones to quantify the determinants of the individual labor supply.