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Prospects of Non-Farm Employment and Welfare in Rural Areas[1]

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Abstract

Employment elasticity with respect to agriculture value added in South Asia has weakened in recent years. While crop diversification has grown and value added per hectare also grew, employment growth was sluggish. However, the linkages between farm and non-farm employment remain strong. Drawing upon the 50th and 61st rounds of the National Sample Surveys (NSS) for India in 1993 and 2004, we first review the changes in participation rates in farm and non-farm activities by gender, age, education and caste affiliations. This is followed by an econometric analysis of contribution of farm and non-farm employment towards welfare in terms of per capita expenditure. The focus is on household characteristics (size, composition, education, land holding), and community characteristics (access to roads, power and financial services). Using a measure of normalised rainfall, we assess how rainfall shocks influence welfare in farm and non-farm activities. The fact that welfare of self-employed in non-farm activities became more sensitive to rainfall shocks in 2004, relative to 1993, suggests stronger linkages between farm and non-farm activities. Also, the welfare of self-employed in agriculture became more sensitive to rainfall shocks in 2004, presumably due to expansion of agriculture into arid and semi-arid areas. Finally, and not so surprising is the greater sensitiveness of welfare of agricultural labour households to rainfall shocks. So while education and better infrastructure will help enhance welfare in farm and non-farm activities, the policy concern for resilience against rainfall shocks is reinforced.

Key words: Rainfall Shocks, Agriculture, Non-Agriculture, Employment, Income, Consumption, Infrastructure, Education, South Asia, India

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Prospects of Non-Farm Employment and Welfare in Rural Areas

1. Introduction

In rural areas, given the constraints on farm expansion and continuing growth of the rural population, greater attention is being given to non-farm activities[3] in view of their potential for economic development and poverty reduction (Haggblade *et al*, 2007; Unni and Raveendran, 2007; Eswaran *et al*, 2008; Gaiha and Imai, 2007; Lanjouw and Murgai, 2009[4]; Foster and Rosenzweig, 2004; de Janvry *et al*, 2005). It is now well recognized that rural economies are not purely agricultural and that farm households across the developing world earn an increasing share of their income from non-farm activities. Evidence shows that rural non-farm income (RNFY) constitutes roughly 35 percent of rural household income in Africa and about 50 percent in Asia and Latin America. In Bangladesh, as high as 54 percent of rural income comes from the rural non-farm sector (Hossain, 2004). Further, contrary to conventional wisdom, RNFY exceeds farm labour income by a factor 5 to 1 in Latin America and by 20 to 1 in Africa (Reardon, 1997; Reardon *et al*. 1998). However, two exceptions occur. The first is amongst the landless poor and in areas with substantial commercial farming. The second is among the poorest stratum everywhere. In India, for instance, while the ratio of non-farm to agricultural income is 4.5 to 1 for the average household, for the poor it is only 0.75 to 1 (Lanjouw and Shariff, 004).

A number of factors account for the recent interest in the rural non-farm economy. *Firstly*, as stated, employment growth in the farm sector has not been in consonance with the employment growth in general, implying that agriculture alone cannot sustain growing rural communities. *Secondly*, even if productivity and incomes in some non-farm activities are not higher than those in farming, the former as an option makes a difference, as it facilitates income diversification. Diversifying into non-agricultural activities could be a response to insufficient farm income or a means to decrease the vulnerability associated with volatile agricultural incomes due to, for example, exogenous shocks such as rainfall. Given the high likelihood of seasonal unemployment in agricultural economies, total household income is likely to increase if there are more choices for workers or self-employed to work in non-farm

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[3] RNFE covers everything from low-return street-vending to qualified jobs in the formal sector. Thus increasing dependence of the poor on non-farm incomes cannot be viewed always as a sign of a healthy rural economy (Saxena, 2003). Besides, whether incomes are higher or lower depends not just on the nature of the activity but also on the status of the employed person (i.e. whether self-employed or a laborer).

[4] Lanjouw and Murgai (2009) offer an insightful analysis of how non-farm sector raises agricultural wage rates and reduces real poverty.

activities that are less affected by, say, seasonality. *Thirdly,* a planned strategy of rural non-farm development may prevent many rural people from migrating to urban industrial and commercial centers. Although migration to urban areas may be the most appropriate route out of poverty for some groups, rural non-farm economy (RNFE) could also have the potential to slow down rural-to-urban migration and the process of rural poor merely becoming urban poor (Lanjouw and Lanjouw, 2001).

Two major factors that act as an incentive for households to diversify into RNFE can be classified as 'incentives that pull' and 'incentives that push'.[5] The capacity variables that allow households to diversify into non-farm activities include human capital (level of education), physical capital (size of land holdings), financial capital and social and organizational skills. In addition, availability of infrastructure, such as roads and electricity, enables diversification of rural households into non-farm activities. Empirical evidence shows that high initial stocks of human, financial and physical capital enable rich households to obtain skilled employment and purchase the necessary equipment for exploiting high return opportunities in the RNFE. As a result, these households earn returns that are far greater than those earned by poor households. One implication of this is that the distribution of activities over households would follow a bimodal distribution over household incomes in the presence of both demand-pull and distress-push diversification. There would be two clusters of low-return and high-return activities, which are engaged in by the poor and affluent households, respectively.[6]

Our study consists of six sections. First, we review the changes in agricultural productivity, employment and crop diversification for a set of developing countries and sub-regions-including South Asia. This is followed by a review of rural employment and unemployment in India over the period 1977–78 to 2004–05. Drawing upon the results of the 50th and 61st rounds of the NSS data, section 4 discusses the changing composition of the Indian rural labour markets in the post-reform period. Section 5 discusses the specification and estimation of the econometric models. Correlates of monthly per capita consumption

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[5] Pull factors include higher pay offs from or lower risks in rural non-farm activities than those related to farm activities. Some of the push factors could be a drop of seasonal income from farming, a permanent drop in farming income or a decline in the average size of land holdings.

[6] See also an important contribution by Foster and Rosenzweig (2004). Based on a detailed analysis of NCAER data over the period 1971, 1982 and 1999, they point out that rural diversification tends to be more rapid and extensive in places where agricultural wages have been lower and agricultural productivity growth has been slow.

expenditure (MPCE) of rural households by economic activity are studied, and the results analyzed. Elasticities of consumption expenditure with respect to rainfall, education and infrastructure are also discussed in this section. Finally, section 6 offers concluding remarks from a broad policy perspective.

2. Crop Diversification, Productivity, Employment and Linkages

Gaiha and Imai (2008) focus on changes in averages of the share of non-cereal crops, agricultural employment and productivity over the period 1980s and 1990s. Results show that, in South Asia, the non-cereal crop share (the share of area for non- cereal production in the total arable land) decreased from 49.44 per cent to 44.32 per cent while both agricultural employment per hectare and agricultural value added increased (the former increased from 1.73 to 2.46 while the latter from USD14.10 billion to USD 19.80 billion at 2000 prices).[7] Bangladesh, Bhutan and Nepal show less diversity as compared to other countries in this region. The elasticity estimates of agricultural employment per hectare with respect to agricultural output per hectare of arable land are both positive and significant (the coefficient being 0.306). As expected, higher agricultural productivity leads to more agricultural employment. But what is also important is that the elasticity of agricultural employment to productivity is not very high. Further, as the share of land devoted to non-cereal crops in total arable land (index of crop diversification) increases, the level of employment decreases. This is plausible as diversification towards non-cereal or high value crops is likely to be associated with use of labour-saving agricultural technology. Thus, given that employment opportunities in the farm sector are limited, greater attention is being given to employment opportunities in the non-farm sector.

Gaiha and Imai (2008) also examine the role of agricultural employment in stimulating non-farm employment through backward and forward linkages with the rest of the economy for developing countries. The effect of lagged growth rate of agricultural employment on the growth rate of non-agricultural employment is both positive and significant. The elasticity varies between 10 and 13 per cent depending upon whether nominal or real wages are used as an explanatory variable. This implies that higher growth of agricultural employment has some positive effects on the growth of non-agricultural employment, for example, through backward and forward linkages with the rest of the

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[7] Joshi *et al.* (2004), however, report a slow rise in the Simpson Index of Crop Diversity for South Asia, from 0.59 in triennium ending (TE) 1981-82 to 0.64 TE 1999-2000.

economy.[8] Simulations suggest that higher farm employment growth would further accelerate the growth of non-farm employment. For instance, a 5% higher growth rate of agricultural employment raises non-farm employment growth by 1.39% in India. The corresponding figures for 10% and 15% higher growth rates of agricultural employment are associated with 2.79% and 4.18% non-farm employment growth rates. While a case for acceleration of agricultural growth through modernization of its technology and crop diversification exists, some negative effects of crop diversification on employment are likely. This implies a potentially important role for expansion of employment in the rural non-farm sector.

3. Rural Employment and Non-Farm Sector

For India, the data on rural employment are available for six rounds: 27th round (October 72 to September 73), 32nd round (July 77 to June 78), 38th round (January 83 to December 83), 43rd round (July 87 to June 88), 50th round (July 93 to June 94), 55th round (July 99 to June 00), and 61st round (July 04 to June 05). During this period, at the all-India level, the proportion of non-farm employment in total rural employment rose from 16.6 percent in 1977–78 to 27.6 per cent in 2004–05[9] (Figure 1). As is clear from figure 1, but for a brief period of stagnation between 1987–88 and 1993–94, the proportion of non-farm employment in total employment rose consistently to record a total increase of 11 percentage points between 1977–78 and 2004–05. Figure 1 also reveals a much higher rate of increase in the proportion of male workers (from 16.7% to 33.5%) than female workers (from 10.3% to 16.7%) over this period. However, the increase in both categories was more remarkable during the period 1999–00 to 2004–05 than in the earlier periods.

We now analyze a number of characteristics of rural markets such as the industrial distribution of workforce, employment status of workforce, trends in employment and unemployment rates and the labour force participation rates.

3.1. Industrial Distribution of the Workforce[10]

An analysis of the industrial division of the workforce helps us assess whether the growth of RNFE is more on account of pull or push factors. Table 1 shows that, while agricultural activities continue to be the mainstay for the rural workers, their relative importance declined

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[8] The effect of growth rate of agricultural employment is substantially greater when predicted values of lagged employment are used. This further confirms that endogenous treatment of some of the variables used here can lead to marked differences in corresponding elasticities (Gaiha and Imai, 2006).

[9] Based on the data available from selected villages at the all-India level, Ranjan (2007).

[10] This section is based on Ranjan (2007).

substantially by nearly 11 percentage points between 1977-78 and 2004-05. Starting from 83.4 per cent in 1977-78, their share declined to 72.7 per cent of total workers in 2004-05. Data reveal that it is primarily due to the withdrawal of male workers from agricultural activities.
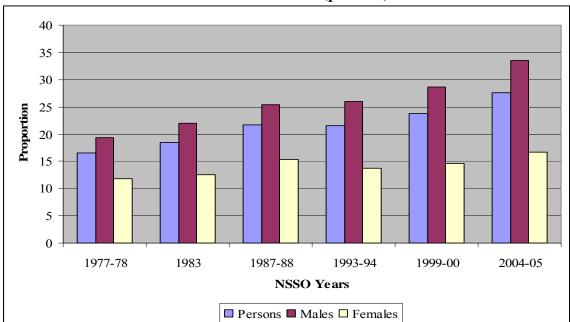
Figure 1: Share of Rural Non-Farm Workers (Male and Female)
1977–78 to 2004–05 (per cent)

Source: Based on data from Ranjan (2007)

In the non-farm sector, the manufacturing sector is the largest source of non-farm employment in rural India. Its share rose from 6.2 per cent in 1977–78 to 8.1 per cent in 2004–05. This kind of diversification does seem to tally with conventional expectations of diversification away from agriculture to more productive manufacturing, supporting the role played by demand-pull factors.[11]

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[11] Foster and Rosenzweig (2004) develop and empirically validate a model in which non-farm capital is mobile and seeks low wage rate areas, so that agricultural development and non-farm activities are substitutes rather than complements. Agricultural development also has a negligible effect on local non-farm business income. In particular, a doubling of yields reduces the probability of locating a factory in a village by 27% but has no effect on non-farm wage or business income taking into account any changes in the business policy environment across states. Two comments are in order: (i) the analysis is confined to manufacturing activities- a large and growing component- among several others; and (ii) it is not self- evident that the demand aspects matter little.

Table 1: Sectoral Distribution of Workers in Rural India
(1977–78 to 2004–05)

Sectors	1977–78	1983	1987–88	1993–94	1999–00	2004–05
Agriculture and Allied	83.4	81.5	78.3	78.4	76.3	72.7
Secondary Sector	8.0	9.0	11.3	10.2	11.4	13.7
Mining and Quarrying	0.4	0.5	0.6	0.6	0.5	0.5
Manufacturing	6.2	6.8	7.2	7.0	7.4	8.1
Electricity, Gas and Water	0.1	0.1	0.2	0.2	0.2	0.2
Construction	1.3	1.6	3.3	2.4	3.3	4.9
Tertiary Sector	8.6	9.4	10.4	11.4	12.4	13.6
Trade, Hotels and Restaurants	3.3	3.4	4.0	4.3	5.1	6.1
Transport & Communication	0.8	1.1	1.3	1.4	2.1	2.5
Other Services	4.5	4.9	5.1	5.7	5.2	5.0

Source: Ranjan (2007).

Till 1999–00, the second largest non-farm employment source was other services sector. While this includes some modern services, many of these activities are in the nature of *residual* opportunities exploited when employment in the commodity producing sectors is not growing fast enough. The relative share of these services in total employment stood at 5.0 per cent in 2004–05 compared with 4.5 per cent in 1977–78. However, it is notable that their employment contribution registered a decline of 0.7 percentage points during the nineties, from 5.7 per cent in 1993–94 to 5.0 in 2004–05. That is when the proportion of employment in manufacturing sector was growing, and that of other services was stagnant or declining, implying a degree of dynamism. The sectors that have experienced a substantial increase in employment levels over the period 1977–78 to 2004–05 are 'construction' (from 1.3% to 4.9%) and 'trade, hotels and restaurants' (from 3.3% to 6.1%). On the other hand, employment shares in rural non-farm activities (RNFA) such as 'mining and quarrying' and 'electricity, gas and water' are not only low but have remained stagnant over the period 1977–78 to 2004–05.

3.2. Trends in Employment Status of Rural Labour

Employment trends in agriculture and non-agriculture sectors over the period 1977–78 to 2004-05 were dissimilar (Ranjan, 2007). For instance, for the 'males', while a decline in self-employment (from 51.5% to 40.9%) and regular employment (from 4.9% to 0.9%) occurred in the farm sector, this decline was largely made up by an increase in the self (from 10.5% to

15.5%) and casually employed (from 3.8% to 9.5%) in the non-farm sector as well as casual workers in the agriculture sector (from 16% to 23%). The number of casual workers increased not only in the non-farm sector, but also in the farm sector implying a growing casualization of the rural 'male' workforce. This evidence of casualization of the rural work force in the farm sector is of serious concern because the declining incidence of self-employment is assumed to drive some people out of self-cultivation to add to the ranks of the landless agricultural laborers.

The trend decline in the self- employment of farm sector was much sharper among the male than the female workers. The proportion of self-employed male workers in the farm sector declined by nearly 11 percentage points as compared with 4 percentage points in the case of female workers. Further, the highest number of workers in the rural areas comprised self-employed workers, followed by casually employed workers. Only a small proportion consisted of regularly employed workers. However, the presence of regular workers was relatively higher in the non-farm sector.

3.3. Trends in Employment and Unemployment Rates in Rural India

Various studies (Ministry of Finance 2004; Planning Commission 2006) in the past few years have expressed a concern about the growth of employment decelerating or declining in the post-reform period. Further, using the NSS estimates, Srivastava (2006) states that there has been a virtual collapse of rural employment. However, Srinivasan (2008) refutes this. He questions their methodology and offers an alternative set of results summarized below[12]. Fitting a simple trend regression to the employment-unemployment data of the NSSO from the 27th round to the 61st round (i.e. over the period 1972–73 to 2004–05), the following trends emerge:

Employment Trends
1. For males regardless of the reference period (one year for US, a week for CWS and person day rate for CDS[13]) used, there is no statistically significant trend in the rural employment rate. This is in sharp contrast to the statistically significant upward trend in the urban male employment rate. The fact that there is a significant upward trend in

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[12] For a more detailed analysis, see, Srinivasan (2010).

[13] US (PS+SS): Usual Status (Principal and Secondary) per 1000 persons; CWS: Current Weekly Status per 1000 persons in the labour force; and CDS: Current Daily Status per 1000 person-days in the labour force. For a careful exposition, see Srinivasan (2010).

the employment rate of urban males but not rural males is consistent with the fact that reforms by and large had no rural components.

2. The employment trend for rural females is negative and significant (US), while no significant trend exists in the other two measures (CWS and CDS).

Unemployment Trends

3. For the 'rural' males, there is a significant upward trend in the unemployment rates (US), while no significant trends exist in the other two measures[14] (CWS and CDS).

4. For the 'rural' females, the unemployment picture is very different from that of employment. In rural (as also in urban) areas, female unemployment rate exhibits either no significant trend or a significant downward trend. It is likely that the divergent picture between trends in unemployment and employment rates arises from the fact that females move in and out of the workforce more often.

Trends in Employment Status

5. As shown by Srinivasan (2008), among the rural males, there has been a significant upward trend in the casualization of work force. On the other hand, the trends in the employment status for the self-employed and salaried workers have experienced a significant downward trend.

6. For the rural females, there is a downward but non-significant trend in employment as casual labour. Further, trends in the employment status for the self-employed and salaried workers have both experienced a downward trend. This downward trend is also significant for the self-employed category.

4. Changing Composition of the Rural Labour Markets: The Post- Reform Period

Despite India's impressive growth in the past few years, the degree of dependence of rural households on labour income remains very high. This is especially true of regions where the ownership of land is unequal and land fragmentation is pervasive. According to the Report on Consumption Expenditure of Rural Labour Households (1999-2000, 55th NSS Report) survey of the Rural Labour Enquiry Report,[15] there were 44.2 million agricultural labour households constituting 32.2% of total rural households (137.1 million). Given the importance of rural

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[14] This is in sharp contrast to a significant downward trend by all measures in urban areas.
[15] Available at*: labourbureau.nic.in/RLE%2099-2000%20Summary.htm

labour markets, this section focuses on how rural non-farm labour markets have evolved over time, given the changing macro-economic policies since the 1990s.

4.1. Labour Force Participation Rates in RNFE

Analysis of the 50th (July 1993-June 1994) and 61st (July 2004 — June 2005) rounds reveals that the average labour force participation rate (LFPR) in rural non-farm sector (usual: PS+SS) declined marginally — from 44.9 per cent in 1993 to 44.6 percent in 2004 (i.e. a decline from 449 persons per 1000 persons to 446 persons per 1000 persons over the period 1993 to 2004.[16]

Trends by Gender: Disaggregation by gender shows that, while the LFPR for females increased over the period in question, that of males came down. However, despite the fall in the LFPR of males, they continue to dominate the labour market as their participation rate (PR: PS+SS) at 55.5 per cent in 2004 is almost double that of the females at 33.3 per cent.

Table 2: Labour Force Participation Rate
(per 1000 persons) in Rural India by Gender, 1993–94 to 2004–05

Gender	Usual (PS)		Usual (PS+SS)		CWS	
	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05
Male	549	546	561	555	547	545
Female	237	249	330	333	276	287
All	398	401	449	446	415	418

Source: Authors' calculations

Trends by Age Group: Barring the 30-60 age group, where the LFPR went up by 1.5 per cent (from 77.2% to 78.4%) over the period 1993 to 2004, the PR fell for all other age groups. The decline ranged from 2.2 per cent for the 60+ age group to 4 per cent for the 15 to 30 age group. In 2004, the LFPR was highest for the age group 30 to 60 (78.4), followed by workers in the 15 to 30 age group (64.4%). The 60 plus age group witnessed a LFPR of 40.3 per cent. LFPR for children below 15 years was at 0.4 per cent. Similar age-wise distribution is observed in 1993-94.

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[16] In reporting participation per thousand persons, we follow Srinivasan (2010).

Table 3: Labour Force Participation Rate
(per 1000 persons) in Rural India by Age Group, 1993–94 to 2004–05

Age group (years)	Usual (PS)		Usual (PS+SS)		CWS	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
0-<15	55	31	68	40	61	35
>15-<30	590	574	671	644	617	599
>30-<60	693	714	772	784	720	742
Above 60	375	372	412	403	379	376
All	397	401	449	446	415	418

Source: Authors' calculations

Trends by Social Group: Trends in LFPR were found to be unfavourable for the disadvantaged social groups (i.e. Scheduled Castes, SCs, and Scheduled Tribes, STs). While the LFPR fell for both the groups over time, the LFPR increased for the category 'others'. Specifically, the STs experienced a fall from 54.1 percent to 51.8 per cent, and the SCs from 46.2 per cent to 44.8 per cent. Further, despite the fall, the STs continued to have a higher PR in both the periods, as compared with the SCs. Finally, relative to the aggregate sample, the SCs and STs have higher LFPR.

Table 4: Labour Force Participation Rate
(per 1000 persons) in Rural India by Social Group, 1993–94 to 2004–05

Social group	Usual (PS)		Usual (PS+SS)		CWS	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Scheduled Tribe	479	477	541	518	490	479
Scheduled Caste	407	398	462	448	422	418
Others	383	390	432	435	402	410
No information	-	302	-	356	-	326
All	397	401	449	446	415	416

Source: Authors' calculations

Trends by Education Level: Both the educated and the illiterates experienced similar fate in terms of their LFPR over the period 1993 to 2004. The LFPR fell for almost all levels of educated workers, the only exception being the group that had studied until the middle level. Further, a very clear direct link exists between the LFPR and the education level. The LFPR is highest for the group that studied the most (above matriculation, 68.9%), followed by the matriculates (60.6%), middle (56.8%) and primary (45.4%). The LFPR is lowest for the illiterates at 39.2 per cent.

Table 5: Labour Force Participation Rate
(per 1000 persons) in Rural India by Education Level, 1993–94 to 2004–05

Education Level	Usual (PS)		Usual (PS+SS)		CWS	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Illiterate	361	346	414	392	378	362
Primary	429	413	476	454	449	431
Middle	501	520	552	568	522	538
Secondary/Matriculation	571	556	624	606	595	582
Above Matriculation	684	650	720	689	704	671
No information	267	224	316	265	271	240
All	398	401	449	446	415	416

Source: Authors' calculations

4.2. Usual Work Status in RNFE

Majority of the labour force in the non-farm economy (56.8% in 1993 and 57.2% in 2004) is self- employed. This is followed by those who work as casual labour (35.2 % in 1993 and 32.2 % in 2004). Salaried workers constitute a very small proportion of the rural labour force (6.4 % in 1993 and 6.9 % in 2004). Further, while the LFPR does not vary much between males and females among the self-employed and casual labour, this is in sharp contrast to the regularly employed. Salaried males are almost three times more than salaried females (8.8% for men and 3.6 % for women in 2004). Also, while the unemployment rate did not change much for the males (1.4 % in 1993 to 1.6% in 2004), it increased sharply for the females (0.8% in 1993 to 1.8 per cent in 2004).

Table 6: Usual Work Status (PS+SS)
per 1000 Persons in Rural India by Gender, 1993–94 to 2004–05

Gender	Self employed		Regular wage/salaried		Casual labour		Unemployed		All	
	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05
Male	568	572	84	88	334	324	14	16	561	555
Female	582	625	27	36	383	320	8	18	330	333
All	573	592	64	69	352	322	12	17	449	446

Source: Authors' calculations

Trends by Social Group: While majority of the SCs are casual workers, followed by the self-employed, the trend is the opposite of that for the STs. Most of the STs are self-employed, followed by casual laborers. Wage employment for both groups is not only low but also lower than the average for all laborers in rural India. However, within the category of regular wage earners, it is found that a larger proportion of SCs has regular salaried employment. However, the unemployment rate is higher for the SCs as compared to the STs.

Table 7: Usual Work Status (PS+SS)
per 1000 Persons in Rural India by Social Group, 1993–94 to 2004–05

Social group	Self employed		Regular wage/salaried		Casual labour		Unemployed		All	
	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05
Scheduled Tribe	525	549	40	43	430	400	6	8	541	518
Scheduled Caste	368	410	53	65	571	510	9	16	462	448
Others	645	657	71	76	269	249	14	19	432	435
All	573	591	64	69	352	322	12	17	449	446

Source: Authors' calculations

Trends by Education Level: Further, a clear direct link exists between the level of education and the proportion of laborers having a regular salary. While only 2.9 percent of the illiterates have a regular job, the proportion is as high as 15 per cent for the matriculates and 29.3 per cent for workers with higher levels of education. However, it must be kept in mind that these numbers have come down since 1993. Further, as expected an inverse relation exists between level of education and the workers working as casual labour. Only 6.2 percent of the matriculates worked as casual laborers in 2004, while the corresponding ratio for the illiterates was 39.8 per cent. Interestingly, people with higher levels of education were also found to have higher unemployment rates. While unemployment was as high as 9.8 percent for the most educated, it was as low as 0.05 per cent for the illiterates.

To conclude, results indicate that in aggregate terms participation rate has not increased.[17] In fact, it registered a negligible reduction over the period 1993–94 to 2004–05.[18]

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[17] Thus, in comparison to East and South East Asian countries-in particular, China- the shift of rural workers from farm to non-farm employment has been negligible in India. This is one of the several reasons why rural poverty has not fallen as rapidly in India as in other Asian countries.

[18] For a meticulous and detailed corroboration of a negligible effect of growth acceleration on employment, see Srinivasan (2010).

However, the composition of employment changed over the period. Specifically, there were increases in the participation rate of 'self-employed', while the participation rate of 'casual labour' declined.

Table 8: Usual Work Status (PS+SS)
per 1000 Persons in Rural India by Education Level, 1993–94 to 2004–05

Education Level	Self employed		Regular wage/salaried		Casual Labour		Unemployed		All	
	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05
Illiterate	549	569	31	29	419	398	2	5	414	392
Primary	644	616	58	60	291	312	7	12	476	454
Middle	662	638	95	83	220	259	22	20	552	568
Secondary/ Matriculation	607	658	208	150	128	147	58	44	624	606
Above Matriculation	508	561	338	293	57	62	98	84	720	689
All	573	592	64	69	352	322	12	17	449	446

Source: Authors' calculations

5. Determinants of Monthly Per Capita Consumption Expenditure (MPCE) of Rural Households by Economic Activity

Factors such as ownership of land, household size and education of the individual are important in the determination of household welfare, since they affect per capita earnings and consumption expenditure. The importance of human capital in accounting for observed differences in wages and productivity has a very long history in economics (Becker 1964; Jorgenson, Gollup, and Fraumeni 1987; Barro 1991). Community characteristics, such as access to roads, power and infrastructure in general, also play a very important role in the welfare of agricultural households. The most obvious example of how public investment in infrastructure might affect agricultural productivity is through public transportation. An improved highway system can reduce the farmers' cost of acquiring production inputs and of transporting outputs to market (Antle 1983; Gopinath and Roe 1997; Yee *et al*. 2002; Songco, 2002; Deichmann *et al*., 2002; Roler and Waverman, 2001; Galal and Nauriyal, 1995). Songco (2002), for example, reports that a 1 per cent increase in the stock of infrastructure is associated with a 1 per cent increase in GDP across all countries. Further, since much of India's agriculture continues to be rain-fed, changes in weather conditions too have important implications for households' total agricultural production and well-being. Fluctuations in weather patterns and commodity prices translate into income shocks faced by rural households (Morduch, 1995). These risks and uncertainties are especially important

as they result in consumption fluctuations (Dercon, 1996, Paxon, 1992). While rainfall variability is not the only exogenous factor affecting farm output, it contributes significantly to income variability and consequently welfare (Rosenzweig and Binswanger, 1993).

Gaiha and Imai (2004) and Gaiha *et al*. (2009) examine the effect of droughts on household welfare. They state that loss of agricultural output and food shortage are not the only consequences of droughts. There are often large second round effects some of which persist over time. By the time these effects play out, the overall economic loss is substantially greater than the first round loss of income. Hardships manifest in malnutrition, poverty, disinvestment in human capital (e.g. withdrawal of children from school), liquidation of assets (e.g. sale of livestock) with impairment of future economic prospects, and, in extreme cases, mortality.[19] Given the importance of rainfall variability on economic well-being, in the analysis that follows, rainfall fluctuations along with education and infrastructure have been incorporated as explanatory variables to analyze their impact on consumption expenditure of rural households in India.

The Model

Here the relationship between log of monthly per capita consumption expenditure, on the one hand, and individual, household and village level characteristics, on the other, is explored for 'all rural households', 'self employed in non-agriculture', 'agricultural laborers', 'other laborers' and 'self employed in agriculture', based on regression analysis of the 61st round of the NSS.[20]

The model is specified as below:

$$Q_i = \alpha_0 + \alpha_1 H_i + \alpha_3 I_i + \alpha_4 S_i + \theta_i$$

where

- *Q_i* is the log of monthly per capita consumption expenditure (MPCE).

- *H_i* is a vector of individual characteristics such as gender and educational status of each person, and household characteristics such as size of the household and caste to which each person belongs. A households endowments include land holding.

- *I_i* is a vector of community level infrastructure characteristics (both physical and financial) such as access to finance and roads.

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[19] Responses to such risks can occur at two stages. One takes place prior to the occurrence of the event (i.e. risk reduction) and the second after the event (i.e. risk mitigation). See, for example, Mpuga and Okwi, 2002; Dercon, 1996; Morduch, 1995; Townsend, 1995; and Paxson, 1992.

[20] The results based on the 55th round of the NSS are not reported except some key elasticities for comparison with those obtained from the 61st round of the NSS.

- *Si* is a variable designed to capture shock experienced by households due to fluctuations in rainfall. The rainfall shock is measured as normalized rainfall-deviation of actual annual rainfall (2004-05 for 61st round) from its mean over the period 1970 to 2005, divided by its standard deviation.[21] For the regression, a dummy for normalized rainfall for the year 2004–05 has been used. It takes the value 1if normalized rainfall exceeds 0 and 0 otherwise.

- θi is the random error term assumed to be independently and identically (i.i.d.) distributed with constant variance.

Data Sources

Data sources for the household level characteristics are primarily based on the 61st (July 2004 to June 2005) round of survey conducted by the National Sample Survey Organisation (NSSO) on employment and unemployment in India.[22] For rural India, 8128 villages formed the Central sample for this round. Of these, 7999 villages were eventually surveyed. The total number of households is 398,031. Data pertaining to 'Infrastructure' variable is taken from *The Rural Infrastructure Report, 2007*, published by the National Council of Applied Economic Research (NCAER). Data on rainfall were collected from the India Meteorological Department. Local area rainfall data — obtained from 38 weather stations across the country — are merged with the household survey data for the respective years.

Results

The results are summarized in Table 9. Let us first consider the association between household characteristics and welfare across farm and non-farm activities.

- The higher the number of adult males, the greater is the welfare-especially among 'labour households'. So also is the case with number of adult females but with relatively large contributions to welfare in 'other labour' and 'self-employed in agriculture' households.

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[21] As suggested by the reviewer, we tried to use the normalized rainfall and its square (the latter is posited to capture the adverse effects of excess deficit or surplus rainfall, through crop yields and related activities, on the welfare indicator) for our regression analysis. However, as the results were implausible (e.g. negative expenditure-rainfall elasticities in most cases), we decided to rely on our specification *despite* its limitations (e.g. it does not distinguish between moderate or more than moderate rainfall in the excess over normal rainfall). Also, state level averages of actual rainfall sometimes conceal large variation in rainfall within a state. So a more definitive assessment of expenditure-rainfall elasticities is not feasible with the data at our disposal. For details of state-wise distribution of normalized rainfall (1993–94 and 2004–05), refer to appendix 2.

[22] A stratified multi-stage design was adopted for the 61st round survey. Agriculture and farm activities, and non-agriculture and non-farm activities are synonymously used.

- Welfare and household size are inversely related, more so among the 'labour households'.

- Education contributes across all types of households. The pattern of welfare effects is, however, somewhat surprising. Relative to illiterates, the progression from Primary to Higher secondary and above is generally associated with larger contributions to welfare across different types of households. While the 'self-employed in non-agriculture' benefit most from higher secondary and above levels of education, 'other labourers' and 'self-employed in agriculture' also benefit substantially.

- Whether the human capital embodied in work-experience and learning- by- doing matter is confirmed through age-group as a proxy. Both among the 'self-employed' in non-farm and farm activities are observed to benefit more from older workers.

- As expected, other things being equal, the SC and ST households have lower welfare, regardless of the type of households, relative to others.

- The association of welfare with amount of land holding reveals a somewhat surprising pattern — benefits to 'other labour', 'self-employed in non-farm' activities and 'agriculture labour' households vary in this order.

We now examine the association between infrastructure, rainfall and welfare across farm and non-farm activities.

- Infrastructure matters a great deal with both roads and financial services contributing to welfare across all household groups. While financial services enhance welfare of all types of households, roads benefit 'self-employed in non-agriculture and agriculture'. It is also interesting to note that financial services benefit all types of households but the effects are small.

- Household welfare varies with normalised rainfall across all types of households, with the highest positive effect on the welfare of 'self-employed in non-agriculture', followed by 'agricultural labour' households. The strong association of positive rainfall shocks with the welfare of 'self-employed in non-agriculture' is indicative of strong linkages with agriculture.

- In the column for 'all rural households', the dummies for different types of households suggest that 'others' had the highest welfare indicator (presumably because of the preponderance of salaried households), followed by 'self-employed in non-agriculture', and then 'self-employed in agriculture'. The lowest rung belongs to 'agricultural labour households'.

Table 9: Correlates of Log of Monthly per capita Consumption Expenditure
2004–05

Samples	All Rural	Self-employed in non- agriculture	Agricultural Laborers	Other Laborers	Self-employed in agriculture
Explanatory variables	Coeff.(|t|)	Coeff.(|t|)	Coeff.(|t|)	Coeff.(|t|)	Coeff.(|t|)
Number of adult males in households	0.049 (38.61)***	0.064 (23.07)***	0.092 (28.22)***	0.08 (20.83)***	0.037 (21.15)***
Number of adult females in households	0.051 (35.95)***	0.045 (14.41)***	0.048 (13.54)***	0.06 (15.43)***	0.059 (29.55)***
Dummy: literate but below primary	0.061 (18.35)***	0.066 (9.51)***	0.094 (11.23)***	0.09 (10.29)***	0.059 (12.28)***
Dummy: primary to middle	0.097 (28.56)***	0.114 (15.80)***	0.104 (10.09)***	0.12 (12.27)***	0.096 (19.75)***
Dummy: middle to secondary	0.151 (33.54)***	0.210 (21.72)***	0.122 (7.01)***	0.17 (9.87)***	0.142 (21.44)***
Dummy: higher secondary and above	0.225 (47.47)***	0.285 (27.37)***	0.091 (3.57)***	0.20 (9.32)***	0.186 (23.66)***
Dummy: age between 30 and 60	0.028 (9.15)***	0.019 (3.61)***	0.028 (4.95)***	0.03 (4.98)***	0.029 (7.98)***
Dummy: age above 60	0.049 (10.26)***	0.043 (3.88)***	0.014 (1.15)	0.01 (0.90)	0.075 (11.57)***
Dummy: ST castes	-0.144 (47.51)***	-0.118 (15.76)***	-0.036 (3.37)***	-0.08 (7.56)***	-0.148 (36.00)***
Dummy: SC castes	-0.110 (29.23)***	-0.141 (18.74)***	-0.081 (15.02)***	-0.05 (8.17)***	-0.101 (15.18)***
Household size	-0.064 (91.93)***	-0.052 (36.25)***	-0.092 (61.43)***	-0.09 (48.95)***	-0.058 (58.57)***
Land owned	0.026 (46.53)***	0.051 (22.60)***	0.045 (9.66)***	0.11 (19.91)***	0.020 (33.90)***
Dummy: normalized rainfall for the year 2004-05	0.047 (4.97)***	0.256 (10.60)***	0.142 (25.53)***	0.04 (6.40)***	0.040 (2.31)**
Dummy: SE in Non-agriculture household	0.155 (33.82)***	-	-	-	-
Dummy: Agriculture laborers household	-0.094 (16.61)***	-	-	-	-
Dummy: SE in agriculture household	0.118 (26.71)***	-	-	-	-
Dummy: Others	0.289 (58.84)***	-	-	-	-
Financial accessibility index	0.0005 (60.40)***	0.001 (36.80)***	0.0003 (13.55)***	0.0002 (7.11)***	0.0005 (40.66)***
Road availability index	0.002 (111.9)***	0.002 (50.69)***	-	-	0.002 (70.58)***
Constant	5.59 (1034)***	5.59 (642)***	5.59 (589)***	5.71 (500.96)***	5.70 (936)***
Number of observations	*78579*	*18474*	*14361*	*12003*	*33156*
F-statistics	*2896.92****	*701.04****	*381.45****	*286.27****	*978.77****

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level. Absolute value of t-statistics in parenthesis. Definitions of variables used are given in Appendix 1.

A somewhat surprising result is the substantially higher elasticity of expenditure for the 'self-employed in non-farm' activities to *rainfall* over the period 1993–2004 (table 10). Whether this is because of stronger farm and non-farm linkages requires further investigation. The expenditure elasticities with respect to *education* also reveal a pattern which is partly surprising.

- Expenditure-education elasticities are significant for each type of household and for *all* in both 1993 and 2004.

- However, in most cases, the magnitudes are small.

- In most cases, the elasticities rise from below primary to primary-middle. Higher levels of education, with a few exceptions, are, however, associated with lower expenditure elasticities. Presumably, this finding reflects limited employment opportunities for those with higher educational attainments.

- Over the period 1993–2004, and in most cases, the expenditure elasticities decreased across different education levels and types of households. A somewhat surprising finding is that expenditure elasticities were higher for 'agricultural labour' and 'other labour' households. Also, for the highest level of education (i.e. higher secondary and above), the elasticities were higher for 'all households', 'self-employed in non-agriculture', 'other labourers' and 'self employed in agriculture' in 2004 than in 1993.

In sum, higher school level education contributes to welfare.

That rural *infrastructure* matters in enhancing welfare is also confirmed by our analysis. Specifically,

- Financial access is associated with significantly higher welfare across *all* and different types of households. Also, the elasticities were higher for 'all households', 'self employed in non-agriculture', and for 'self employed in agriculture', and lower for both 'agriculture' and 'other labour' households. Finally, with a few exceptions, these elasticities were higher in 2004.

- Road availability also contributes significantly to welfare of 'all households', 'self employed in non-agriculture', and 'self employed in agriculture' in 2004.[23]

- Power accessibility seems to matter most, going by the expenditure elasticities for 1993.[24]

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[23] The estimates for 1993 are not reported as these were not robust.

[24] As power accessibility was highly collinear with other infrastructure variables in 2004, it was omitted. Consequently, the coefficients of road and finance are likely to be biased upward.

In sum, there is a strong case for strengthening rural infrastructure.

Table 10: Elasticities of MPCE* with respect to Selected Variables 1993–94 and 2004–05

Variables	All Households		Self Employed in Non Agriculture		Agricultural Labor		Other Laborers		Self Employed in Agriculture	
	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05
Dummy: normalized rainfall for the year 2004-05	0.0112	0.0236	0.0224	0.1289	NS	0.0717	0.0260	0.0204	0.0077	0.0205
Dummy: literate but below primary	0.0114	0.0084	0.0144	0.0097	0.0082	0.0117	0.0113	0.0128	0.0117	0.0082
Dummy: primary to middle	0.0127	0.0112	0.0170	0.0146	0.0068	0.0086	0.0129	0.0142	0.0134	0.0122
Dummy: middle to secondary	0.0093	0.0081	0.0123	0.0130	0.0025	0.0030	0.0055	0.0068	0.0093	0.0087
Dummy: higher secondary and above	0.0083	0.0109	0.0097	0.0160	0.0010	0.0011	0.0032	0.0049	0.0077	0.0094
Financial accessibility index	0.0179	0.0998	0.0561	0.1267	0.0818	0.0645	0.0876	0.0353	0.0141	0.0997
Road availability index	-	0.0455	-	0.0534	-	-	-		-	0.0405
Power accessibility index	0.4554	-	0.5705	-		-	-	-	0.3573	-

Source: Authors' calculations. NS=not significant. Definitions of variables used are given in Appendix 1
* Elasticities have been computed from the estimates of 1993-94 regression and 2004-05 regression. Due to space constraint, the results of 1993-94 regressions are omitted. The details, however, are available on request.

6. Concluding Remarks

Employment elasticity with respect to agricultural value added in South Asia has weakened in recent decades. While crop diversification has grown and value added per hectare also grew, employment growth was sluggish. Thus, given the constraints on farm expansion and continuing growth of the rural population, greater attention must be given to non-farm activities- especially in view of their potential for economic development and poverty reduction.

Our analysis confirms that, controlling for differences in household characteristics (e.g. education, land ownership, sex, caste, age, gender) and infrastructure support, rainfall impacts households differently, depending on their main source of income. Expansion of non-farm activities has some potential for consumption enhancement in times of crises. However, the opportunities for increasing consumption by diversifying into rural non-farm activities may be limited for poor households due to their lack of assets (human and physical) required for starting a new activity, limited access to credit and lack of entrepreneurial ability. Between agricultural and other labour households, the former tend to perform better when

rainfall is above normal. A somewhat surprising result is the substantially higher elasticity of expenditure of both 'self-employed' in non-farm and farm activities to rainfall in 2004 relative to 1993. Whether these significantly higher elasticities reflect stronger farm and non-farm linkages and expansion of agriculture in arid and semi-arid conditions requires further investigation.

In conclusion, there is strong evidence favoring the growing importance of non-farm activities. However, resilience of not just farm but also non-farm activities to rainfall shocks is a major policy imperative.

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Appendix 1: Definitions of Variables Used in the Analysis

Variable	Definitions
Number of adult males in households	Number of male aged 15 years and above
Number of adult females in households	Number of female aged 15 years and above
Dummy: age below 30 (reference category)	=1 if age of individual<=30 years; 0 otherwise
Dummy: age between 30 and 60	=1 if age of individual>30 and <=60 years; 0 otherwise
Dummy: age above 60	=1 if age of individual>60 years; 0 otherwise
Dummy: illiterate (reference)	=1 if illiterate; 0 otherwise
Dummy: literate but below primary	=1 if educated but below primary; 0 otherwise
Dummy: primary to middle	=1 if passed primary to middle; 0 otherwise
Dummy: middle to secondary	=1 if passed middle to secondary; 0 otherwise
Dummy: higher secondary and above	=1 if higher secondary and above; 0 otherwise
Dummy: other castes (reference category)	=1 if social group is OBC and others; 0 otherwise
Dummy: ST castes	=1 if social group is ST; 0 otherwise
Dummy: SC castes	=1 if social group is SC; 0 otherwise
Household size	Household Size
Land owned	Land owned by household (in hectares)
Dummy: normalized rainfall for the year 2004-05	=1 if normalized rainfall exceeds 0; 0 otherwise
Dummy: SE in Non-agriculture household	=1 if household is self-employed in non-agriculture; 0 if *agricultural labour, or other labour3, or self-employed in agriculture or any other hhtype*
Dummy: Agriculture laborers household	=1 if household is *agricultural labour*; 0 otherwise
Dummy: SE in agriculture household	=1 if household is self-employed in agriculture; 0 otherwise
Dummy: other laborers household (reference)	=1 if household is *other labours*; 0 otherwise
Dummy: others household	=1 if household is *others type*; 0 otherwise
Financial accessibility index	Financial allocation composite index for year 1997 or 1993
Road availability index	Road availability Index for year 1997 or 1993
Power accessibility index	Power accessibility index for year 1997 or 1993

Appendix 2: Normalized rainfall for the year 1993 and 2004 in Indian States

State Name	Normalized Rainfall in 1993	Normalized Rainfall in 2004
Andhra Pradesh	-0.4209	-0.8370
Arunachal Pradesh	0.6912	-0.2591
Assam	1.0418	0.1383
Bihar	0.2139	-0.8681
Gujarat	0.7299	0.3622
Goa	-0.7795	-0.4123
Haryana	0.3627	0.2512
Himachal Pradesh	-0.4280	-0.3934
Jammu & Kashmir	0.3500	-0.1448
Karnataka	0.7553	-0.8401
Kerala	0.0564	-0.1499
Madhya Pradesh	-0.1015	-0.9572
Maharashtra	0.1182	-0.5248
Manipur	1.5678	0.9493
Meghalaya	1.0418	0.1383
Mizoram	1.5678	0.9493
Nagaland	1.5678	0.9493
Orissa	0.1861	-0.5736
Punjab	0.6585	-1.0725
Rajasthan	0.0648	-0.4919
Tamil Nadu	1.1341	1.1003
Tripura	1.5678	0.9493
Uttar Pradesh	-0.6103	-0.8371
West Bengal	0.5907	-0.1681
Chandigarh	0.3627	0.2512
Lakshdweep	-0.7539	1.9663
Pondicherry	1.1341	1.1003
All India	**0.0848**	**-0.0798**