Poverty, Risk, and Human Capital in the Rural North-West Frontier Province, Pakistan

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Abstract

This paper analyzes the interaction of poverty, risk, and human capital in a descriptive way using micro household data from rural areas in the North-West Frontier Province, Pakistan. The key emphasis is on the potential of human capital in overcoming two symptoms of poverty—low income and vulnerability to income risk. We have found that, in the sample villages where land per capita is too small both quantitatively and qualitatively, human capital, especially education, plays an important role in overcoming the two symptoms through expanded opportunities of non-farm employment. Another important finding is that lack of mechanisms to cope with income risk is likely to result in low accumulation of human capital. A policy implication of these findings is that public interventions to reduce the cost of income risk such as employment guarantee schemes, provision of primary education and primary health care, may yield large social benefit in the long run.

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1 Introduction

To understand poverty in developing countries, it is imperative to pay sufficient attention to the microeconomic mechanism of poverty, such as how a household has been fallen into poverty, how it will react to changes in external environments including public policy, and how aggregate measures of poverty will change after households' reaction. Although a number of empirical researches have been implemented on household behavior in developing countries, there are few studies that directly link household behavior with the poverty problem (Kurosaki 1998a; Lipton and Ravallion 1995). This paper is an attempt in this direction, in which we analyze the interaction of poverty, risk, and human capital in a descriptive way using micro household data from rural areas in the North-West Frontier Province (NWFP), Pakistan. The key emphasis is on the potential of human capital in overcoming two symptoms of poverty—low income and vulnerability to income risk.

As was discussed in Kurosaki (1998a), the most important determinant of poverty is lack of assets, including land, livestock, financial assets, human capital, etc. In the case of Pakistan, the distribution of land is highly skewed, resulting in the fundamental disparity in asset positions in rural people (Hirashima 1996). At the same time, from a development policy perspective, it is unlikely that the government will seriously attempt radical land reforms. An implication of this assessment is that raising human capital and thereby increasing non-farm income are key to the enhancement of welfare positions of the rural poor in the NWFP.

In the literature of development economics, interaction of human capital and economic growth has been a well investigated issue. Schultz (1961) emphasized the role of education in improving farm efficiency and in modernizing agriculture. His theory was empirically supported (Lockheed et al. 1980; Jamison and Lau 1982; Yang 1998). Recent theories of endogenous growth models have shed new light on the role of human capital as a source of sustained growth (Barro and Sala-i-Martin 1995).

On the other hand, looking back from the field, these studies seem to pay little attention to the individual motivation of investing in human capital. When farmers choose to send their children to schools, they are usually motivated by the desire of finding non-farm, lucrative

jobs for their children. Therefore, investment in human capital in rural areas is likely to be closely related with non-farm activities and higher economic returns there (Lanjouw and Lanjouw 1997; Lanjouw 1997; Yang 1997; Huffman 1980; Fafchamps and Quisumbing 1997). This phenomenon may lead to diversification of a rural economy.

At the same time, in developing countries, it is likely that individual decisions with respect to job choices are jointly decided at the household level (Yang 1997; Newman and Gertler 1994). Especially when households' ability to smooth consumption is limited, the diversification of a rural economy might occur simultaneously with the diversification of a household economy. Note that the rural poor are usually more vulnerable to income risk because of their low income and low accumulation of physical assets (Kurosaki 1998a). An implication of this statement to the study of human capital and poverty is that the risk factor should be carefully incorporated in the analysis (Kurosaki 1998b).

With these issues in mind, we carried out our original household survey in 1996, on which the empirical analysis of this paper is based. The survey was implemented jointly by the Institute of Development Studies (IDS), N.W.F.P. Agricultural University, Peshawar, and the Institute of Developing Economies (IDE), Tokyo, as a part of the project "Trade and Investment Policies in Pakistan." One of the original motivations of the IDS-IDE survey was to investigate how the poverty trap currently working in the province can be escaped. The field survey was designed to obtain insights to this broad issue by sampling three villages which were in sharp contrast with respect to the stage of development. Since the report based on the household data for that project was very preliminary (see Hussain et al. 1997), this paper is prepared as one of the final reports for the IDS-IDE household survey. Although only two names of the principal authors are on the front page, we view this paper as the product of all those involved in the project (see Appendix 2 for the full list of project participants).

In the followings, sample villages and sample households are described in Section 2. In Section 3, measures of consumption poverty are analyzed to show the importance of distinguishing village and household types. From Section 4 to 7, important variables of concern are analyzed in a descriptive way, such as human capital (Section 4), agriculture (Section 5), labor force allocation (Section 6), and risk-coping ability (Section 7). Section 8 summarizes the findings. In Appendix, details of the household survey and the data set are given, including definitions of variables.

2 Sample Villages and Sample Households

The data set used in this paper was compiled from a sample household survey carried out in three villages in Peshawar District, NWFP, in 1996 under the leadership of Prof. S. Hirashima, Meiji Gakuin University (see Appendix 2).

Before explaining samples, a short note on the NWFP economy is given. The NWFP is geographically the smallest province among the four provinces in Pakistan, accounting for about 12% of Pakistan's total area and 16% of its total population.[1] Compared with Punjab, which is the center of agriculture and related industries, and Sind, where a metropolitan city of Karachi is located, the NWFP is an economically backward province.[2] The share of manufacturing industries in labor force in the province in 1992/93 was only 5%, in contrast to 10+% in Punjab and Sind; electricity consumption per capita was only half the level enjoyed in Punjab and Sind; the adult literacy rate in 1980 Census was only 25.9% for male (compared to close to 40% in Punjab and Sind) and only 6.5% for female (compared to close to 17% in Punjab and 22% in Sind). The provincial economy is more dependent on service sectors and remittances than on commodity sectors including agriculture and manufacturing industries.

We focus on this province since a household survey from such an area is expected to shed light on development issues for areas with adverse land-man ratios and with a relatively limited scope for agriculture-led sustained growth. In choosing sample villages, we put three major conditions—called as the conditioning factors, viz., 1. village size, i.e., the selected villages be the same in terms of total population and number of households, 2. social organization, i.e., the selected villages would need to have similar ways of handling their social, political, cultural and economic problems and that they would need to have the same language and ethnic background and 3. tenancy structure, i.e., the relative proportions of owner, owner-cum-tenant and tenant households be the same. At the same time, to ensure that the cross section data thus generated would provide dynamic implications, we carefully chose villages with different levels of economic development. The first criterion was agricultural technology. One of the three sample villages would be rain-fed (*barani*), another semi-irrigated, while the other as fully-irrigated. This condition helped ensure that

[1] These numbers include Federally Administered Tribal Areas on the Afghan border. All the sample villages are in non-tribal, settled areas of the province.

[2] Data sources for the following provincial numbers are government statistics whose details are given in Hussain et al. (1997).

all major farming systems practiced in the NWFP are represented as much as possible. Another criterion was that the selected villages be located along the rural-urban continuum so that it would be possible to decipher the subsistence versus market orientation of farming communities in the project area.

Table 1 summarizes characteristics of the sample villages and the size of sample households. Village A is rain-fed and far away from main roads. This village serves as an example of the least developed village. Village C is fully irrigated and close to a main road, which serves as an example of the most developed village. Village B is in between.

Sample households in each village are further classified into non-farm households (with no operated land for cropping)[3] and farm households that include owner, owner-cum-tenant, and tenant farm households. The distinction among farm households enables us to decipher effects of land assets on household welfare.

3 Poverty Measures

Since consumption is a better measure of household welfare than income considering its more stable nature, we begin the analysis from consumption. In the survey, consumption data were collected on weekly basis for each food item and on monthly basis for each non-food expenditure item. For major food items, quantity consumed, unit price, total expenditure including imputed values of domestically produced food, and the share of consumption met by own production were recorded. From this information, annual household consumption expenditure per capita was calculated. As shown in Table 2, the average consumption level was about 5800 Rs., or about US Dollar 150. As was expected, Village A had the lowest consumption level followed by Village B. The highest consumption expenditure was observed in Village C. Among household types, non-farm households had the lowest consumption.

Foster-Greer-Thorbecke (FGT) poverty measures were calculated for our sample (Foster, Greer, and Thorbecke 1984), with the poverty line of 7140 Rs. per capita.[4] The FGT measure is defines as:

[3]We define "non-farm" households by the land operation status. Therefore, a number of households who did not operate any land but worked on farm labor for wage or kept livestock were classified as "non-farm" households in this paper.

[4]Based on the data from *1991 Pakistan Integrated Household Survey*, Lanjouw (1996) estimated a poverty line of 3998 Rs. per capita for the NWFP, using the basic-needs-food-expenditure method. This figure was deflated using consumption price indices, resulting in our estimate of the poverty line at 7140 Rs. See also World Bank (1995) for more discussion on poverty lines in Pakistan.

$$P(\alpha) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^{\alpha} = \frac{1}{n}\sum_{i=1}^{q} P_i(\alpha), \tag{1}$$

where α is a parameter of the FGT measures, n is the number of households, q is the number of households below the poverty line z, y_i is per-capita consumption of household i which is below the poverty line. When $\alpha = 0$, the FGT measure becomes head count index (HCI), which was estimated at 74% for the whole sample (Table 2). When $\alpha = 1$, the measure becomes poverty gap ratio (PGR), estimated at 0.27. Squared poverty gap ratio (SPGR) with $\alpha = 2$ was estimated at 0.12.

Among the three sample villages, poverty incidence (HCI) decreased in the order of Village A, B, and C, whereas poverty depth (SGR) and poverty severity (SPGR) were similar in Village A and B but lower in the more developed Village C. In all measures, non-farm households experienced higher poverty. The rank among owner farms, owner-cum-tenant farms, and tenant farms differ depending on which measure to use.

This observation is confirmed by regression results in Table 3. $P_i(\alpha)$ in the right hand side of equation (1) at the household level as well as y_i were regressed on village and household-type dummies. The results clearly show that Village C had significantly higher level of consumption and lower level of poverty and non-farm households had significantly lower level of consumption and higher level of poverty.

Considering a possibility that the consumption data could be underestimates due to the omission of less frequently consumed items, a more robust method of stochastic dominance is applied (Atkinson 1987). The horizontal axis shows per-capita consumption level and the vertical axis shows cumulative distribution of households. If one curve is above the others, that group is said to stochastically dominate the others, implying that it suffers from higher poverty regardless of the choice of the poverty line. Across the villages, the poverty ranking of villages (A-B-C) was found robust above the consumption level of approximately 4000 Rs. (Figure 1). Non-farm households had higher poverty than the other three groups in relevant ranges (Figure 2).

To summarize, in the study area, a clear disparity in welfare exists depending on the economic development level in the village and the asset position of each household. How is this profile related with other variables of concern, namely, human capital, occupational structure, and risk? This is addressed in the following sections.

4 Human Capital

4.1 Demographic Composition

The average household size in the project area ranges from 7.4 to 12.4 persons (Table 4), with the total average at 9.3 persons. Distinguished on the basis of rain-fed versus irrigated area and type of households as farm and non-farm, there are differences—farm households are generally larger than non-farm households and households in rain-fed Village A are generally larger than irrigated villages (B and C).

A possible reason for the large household size in Village A is that labor markets in rain-fed areas are of casual character and hence risky. Not all family members may have job at the same time and hence the need and tendency to stay together. In other words, we can interpret the large size of a household as a reflection of household strategy to diversify risk or to share risk within an extended family. As to why farm households are larger, it may be due to the labor intensive character of farm operations.

The total number of male household members[5] in the sample is 1725 versus female's 1584. Drèze and Sen (1989) called "missing women" a phenomenon of low female/male ratio, which is common in developing countries with adverse environment for women, such as found in South Asia. The ratio from our data was 0.918, which is really a low number although it is slightly higher than Drèze and Sen's estimate for Pakistan at 0.905. Since the NWFP economy depends on remittances which are sent by men, a figure higher than the national average is reasonable. A point to remark is that average figures for male and female mixed together need to be interpreted carefully, considering the big disparity between the two genders. This applies especially to human capital such as health and education.

4.2 Health and Education

About health, a subjective opinion survey revealed that the ratio of people with health problems was higher in a more developed Village C (Table 4). This might be a reflection of perception changes toward health induced by higher living standards and better access to health institutions in economically developed villages.[6]

In the survey, the education level was asked for all individuals including family workers

[5]Family members living away and sending remittances are not included in the household members.

[6]Similar phenomena are often observed in opinion surveys on health in rural developing countries (Strauss and Thomas 1998). Our survey did not include objective assessment of health, which should have yielded more relevant results regarding health conditions in the area.

away from villages who remit a part of their income. In Table 4, the ratio of literate persons in the working population in the villages is reported. In this table, the "working" population includes those who are mainly engaged in domestic works (see below). The average literacy ratio in the study area ranges from 14 to 45%, with the overall average at 24%. This is indeed a low figure but comparable to the provincial average.

Among the villages and household types, those with higher than the average include non-farm households in less-developed Village A, owner farm households in Village B, and all the three types of farm households in more developed Village C. In other words, a general pattern is that the literacy rate is higher in more developed villages and higher among farm, especially owner farm, households.

An interesting observations is that non-farm households in Village A were more educated than the overall average. Our interpretation is that it is a reflection of strategy pursued by non-farm households in a rain-fed village to seek more non-farm jobs outside the village to enhance and diversify their income through education. We will come back to this point in Section 6.

4.3 Labor Force

The average number per household of working population excluding domestic works was 2.3 persons and the number was higher in Village A and among farm households (Table 4). This pattern could be explained by the importance of family labor in farming and the motivation of diversification in a rain-fed village.

In the table, the number of population working domestically is also reported, with the overall average at 2.5 persons per household. They are mostly female. They are engaged not only in household works such as cooking and child care but also in productive pursuits, including livestock tending and small crop operations. We may call them the hidden work force and this study is especially limited when it comes to this aspect since we cannot record the details of these domestic works due to resource constraints. Because of the prevalence of "*purdah*", male household heads in the study area do not prefer female family members to work outside; when the female members work domestically in productive activities, the heads do not recognize their work as economically productive works unless they are engaged in the marketing stage also, which is very rare. Therefore, as a second best measure, we recorded these persons as semi-working population in Table 4.

5 Characteristics of Agriculture

5.1 Land Holding Patterns

Average farm holding varies both across villages as well as tenure status (Table 5). In the rain-fed village, owner households have average land holding of 23 jaribs,[7] that is two to three times larger than the tenant or owner-cum-tenant households. However, a large part of this owned land in Village A is left uncultivated as a waste land. The average size of cultivated land under operation is only 16 jaribs. Since land renting arrangements do not make sense on waste land, the difference of farm sizes among tenancy types becomes smaller in terms of cultivated land.

In a semi-irrigated and fully-irrigated village, average land holding is much smaller at around 5 jaribs. The difference between owner farms and tenant farms (or owner-cum-tenant farms) is small and statistically not significant. This is indeed a small farm size compared with average farm holding of 15 to 25 jaribs in irrigated tracts of Punjab.

Broad differences exist with regard to the nature and pattern of tenancy. The rain-fed village is characterized by share tenancy. On the other hand, the irrigated villages have a mixture of both fixed cash and share tenancy arrangements. While share tenancy arrangements prevail in both the irrigated and rain-fed areas, the underlying reasons are quite different: in the rain-fed village farmers rent land on share basis because it is risky otherwise; on the other hand in the irrigated villages it is more a matter of working capital. Specifically, in Village C, one of the irrigated village, where land is allocated to nurseries as well as annual crops, it is very burdensome for enterprising tenants to pay fixed cash rent and wait till the crop matures after three years. In fact if it was not for working capital these farmers would prefer fixed rent tenancy because the nursery farming is very lucrative. Risk may be a factor as well but it is not yield risk inherent in rain-fed agriculture—rather it is market risk.

5.2 Cropping Patterns

Crop portfolio changes drastically as we make a transition from rain-fed to irrigated villages. In Table 6, we show this in two ways: first, by the percentage of households who planted each crop; second, by the share of each crop to net cultivated area. Wheat, which is a staple food crop, is grown by the largest number of households with substantial areas allocated.

[7] One jarib is approximately 0.5 acre.

Nevertheless, more than half of the farm households in Village C did not grow wheat at all.

Farmers in the rain-fed area grow mainly wheat, maize, fodder crops, and some vegetables. In irrigated villages, more commercial crops such as sugarcane, orchards (plum, pear, persimmon), nurseries (floral, orange, plum/pear), and woodland can be found. The resulting cropping pattern in the irrigated villages just described did not develop by accident: rather it evolved, mainly, in response to the needs of the rapidly growing population, both indigenous as well as that of Afghan migrants, in the nearby major urban center, Peshawar. In Village C, where nursery flourishes, informal contacts of farmers with public research facilities made some impact. Nevertheless, the research station close to Village C did not have official extension services regarding nursery. Technology transfer occurred only informally.

5.3 Land Productivity of Wheat

Table 7 shows grain yields of wheat per acre. To facilitate international comparison, the unit is kilogram per hectare (kg/ha).

A surprisingly low average was reported for Village A, a completely rain-fed village—about 700kg/ha. Further, coefficient of variation among farmers is also large at 67 to 81%. Although the average is low, the maximum yield achieved by one household at 2300kg/ha is not a low figure in the context of Pakistan's agriculture. Low average and high variability characterize rain-fed agriculture.

In semi-irrigated Village B, the average yield is from 1200 to 1600kg/ha and that in fully-irrigated Village C is around 2000kg/ha. This contrast clearly shows the role of irrigation in improving grain productivity per land. Cross-section variability of yields is also drastically reduced by irrigation. Coefficients of variation are in the range from 40 to 70% in Village B and about 30% in Village C.

In the rice-wheat zone of Pakistan Punjab, where irrigated farming has a century old tradition, cross-section variability is much smaller. According to Kurosaki (1998b), the average yields in 1988/89 to 1990/91 among about a hundred farmers in Sheikhupura District were 2000 to 2700kg/ha, with coefficients of cross-section variation from 18 to 25%. Therefore, low average-high variability is not the characteristic of unirrigated villages but could be the characteristic of the NWFP agriculture as a whole.

6 Labor Force Allocation and Income Sources

6.1 Income Sources

With this background information, we now investigate labor force allocation and income sources of the sample households. Table 8 reports the percentage of households with each income source regardless of the absolute amount the source yields.[8]

Agriculture-related sources are divided into five categories. Income from own crop farming is available only for farm households by definition. Livestock income is very common among the sample households including non-farm households. Indeed, Pakistan's agriculture is characterized by mixed farming and livestock are indispensable part of farming system as well as farmers' consumer life (Kurosaki 1998b). In the non-irrigated village, sheep and goats are important whereas cow and she-buffaloes for milk are important in the irrigated villages. Casual farm labor and full time farm labor are activities for non-farm households and smaller farms. Some households have agricultural rent income.

Five categories of non-agricultural income sources are listed in Table 8. They include own non-farm business enterprises, casual non-farm wage work, full time wage/salary work, remittances,[9] and other un-earned income.

An important finding is that the percentage of own business enterprises is the lowest in Village A and the highest in Village C. In other words, the level of own business activities is closely related with development stage of villages. Another important finding is that non-farm business is not restricted to non-farm households. Rather, owner farm households are as important as non-farm households in running non-agricultural enterprises. In the NWFP agriculture where land-man ratio is very small, a typical owner farm household may not be able to make living from farming only. Our data seem to suggest that such a farm household intentionally diversifies its income sources through entering into own non-farm business.

Non-farm enterprises found in the sample households are diverse. They can be classified into three types: traditional services in rural South Asia such as carpenters, barbers, blacksmiths, etc.; low-capital, low-end jobs such as snack hawkers and shoe polishers; and

[8]For own crop farming and livestock, we count them as an income source even if their net income was negative.

[9]They are mostly remittances from abroad. In some households, domestic remittances are also included. However, even if a family member works away from villages, he is regarded as a household member as long as he comes back to his village house very often, say, more than once a month. In such a case, he was recorded as a household member and his income was included in "full-time wage/salary work," not in "remittances" in the data files. More detailed classification is left for further study.

those require relatively large initial capital such as arms traders, general shops, wheat mills, nursery shops, sewing machine shops, etc. Transportation service is also common, which includes all three types listed above. As has been pointed out in Lanjouw and Lanjouw (1997) and Lanjouw (1997), non-farm enterprises in our data are really a mixture of diverse activities from subsistence, low-end jobs to high income jobs.

The most common income source in the non-farm categories is full-time wage/salary work (Table 8). Since this category has the most stable income, it is sought for by villagers.

In Table 9, income sources of households are shown in terms of monetary importance. The first row shows average household income. The rest of the table show its composition. For self-employed activities such as own crop farming, livestock, and own non-farm business, net income is calculated by subtracting the sum of costs actually paid by households actually from the gross value of output.[10] Therefore, it is the sum of operator's residual profit, imputed wage to family labor, and imputed rent to owned land and other capital. Crop and livestock income include the value of non-marketed food output consumed domestically.

The first finding from Table 9 is that income from own crop farming occupies a very small share. In low-productivity-high-risk Village A, crop income accounts for only 3 to 9% of the total household income of farmers. This share rise only up to 10 to 20% in irrigated villages (B and C). Therefore, the common view that associates farming with village economy interchangeably does not apply to the case of NWFP. The sample villages are rural but not agricultural in a sense that crop farming is not the dominant economic activity. Note that our survey year was more or less normal in terms of weather.

Second, the share of other income sources shows a pattern similar to that in Table 8. In agriculture-related sources, livestock are the most important. Non-farm business enterprises are more important in Village C. Among all the income sources, full time wage/salary work occupies the largest share. This is an another indicator of a non-agricultural character of those villages.

One thing to note is that the majority of those full-time non-farm working people in Village A work outside the village because there are very few work opportunities of that kind inside the village. They are forced to commute for a long distance with high welfare costs. This is in sharp contrast to situations in Village B and C, where full-time wage/salary jobs can be found inside or close to the village.

[10]Necessary data were collected at the household level. See notes in HY.WK1 file in Appendix 1 "Documentation of Primary Data Files (Revised)".

6.2 Job Diversification

To investigate labor force allocation from a different angle, the number of jobs per household was calculated, whose definition and groupwise results are shown in Table 10. In calculating the number of jobs per household, a self-employed activity is counted as one job regardless of the number of family members involved in that business; in the case of full-time wage/salary work and remittance senders, the number of such workers is added directly since each worker's job could be more independent in a stochastic sense. Among agriculture-related activities, casual farm labor and permanent hired labor are distinguished because their mode of payment is completely different.[11]

The overall average number of jobs per household was estimated at 2.24, a figure close to the average number of workers at 2.25 persons. As is shown in Table 10, the average number of jobs per household is highest in Village A. Therefore, in an unirrigated, high-risk village, not only the number of workers per household but also the number of jobs per household is high, which helps diversify their income sources. Among household types, the number of jobs per farm household is about 0.5 higher than that per non-farm household. Since farm households have "own crop farming", which is not available to non-farm households by definition, this is a natural result. It might be better to say that the number of jobs per farm household is about 0.5 lower than that per non-farm household after adjusting for the difference in crop farming basis. However, we would like to interpret this pattern as an advantage of farm household in income diversification—thanks to the existence of a crop income source, farm households can enjoy higher level of overall income diversification with lower level of non-farm income diversification. This is another and often overlooked welfare advantage of having land assets and being an owner farmer in a risky environment.

In the table, the frequency distribution of the number of jobs per household is also shown. In Village A and C, we find numerous households with three or more jobs; in Village B, there are very few households of such. The need to diversify is reflected in the high number in risky Village A; diversified job opportunities thanks to economic development are reflected in the high number in irrigated Village C.

In the last row of Table 10, the percentage of households with non-farm income sources is shown. It is the highest and close to 100% in Village A. Because of the low-productivity, high-variability nature of farming, diversification inside the village is very difficult in Village

[11] A casual farm laborer is usually paid on the spot in cash or in kind for the labor he/she does in the day. A permanent hired farm laborer is usually paid a fixed amount for a cropping season in cash or in kind.

A. For non-farm households in Village A, it is, therefore, a life-and-death matter to find non-farm jobs outside the village. As shown in Table 4, non-farm households in Village A have more literate workforce than the overall average. That phenomenon was linked with the high ratio of households with non-farm jobs in this village.

On the other hand, in Village C, where the number of jobs per household was not low, the percentage of households with non-farm income sources is not as high as in Village A. This may reflect the fact that income diversification in this village is more locally based, linked with its high productivity farming inside the village.

7 Risk-Coping Ability

The need to diversify income risk depends on households' ability to cope with income risk *ex post*. If they can utilize efficient risk-coping mechanisms such as mutual insurance and credit markets, they may not need to diversify income risk individually even when they are faced with high variability of income. When such mechanisms are lacking, households have to rely on self-insurance mechanisms such as food storage, accumulation/decumulation of productive assets such as land and livestock, which could be expensive ways to cope with risk. When even such expensive mechanisms are lacking, households cannot smooth consumption *ex post* and their welfare levels co-vary with the fluctuation of income. This aspect of vulnerability to risk is an important feature of poverty.

7.1 Objective Measure 1: Credit Market

As a first measure of risk-coping ability of the sample households, rural credit markets were investigated. Table 11 reports household positions of outstanding debt and credit. When a household has an outstanding debt, it implies that the household had access to credit markets. When it does not have any outstanding debt, it did not need credit or it did not have access to credit markets.

First, overall, financial transactions are the most active in Village C and among farm households. That is, of the three sample villages, with minor exceptions, both the incidence and average household debt are higher in the developed and supposedly better-off villages (Village B and C). Distinguished by the type of household, again with minor exceptions, while the incidence of debt is higher in the case of non-farm households, average household debt is higher for the owner and owner-cum-tenant households.

Second, loans from institutional sources such as banks and cooperative societies are rare

and observed commonly only among farm households with land assets in Village C. This suggest that modern financial institutions are yet to penetrate into the study area. Land as a collateral plays an important role in determining access to credit from institutional sources.

Third, loans from friends and relatives were found common in every village and in every household category. Even in Village C with more developed credit markets, such loans are important. This makes sense because most of such loans are interest free and they function more as mutual insurance of consumption rather than as investment fund for production.

Fourth, loans from other informal sources such as commission agents and village traders are not so common and show a pattern similar to loans from institutional sources. Such loans are substantial only in Village C. This seems to suggest that these sources are complementary rather than substitutive to formal financial institutions in the study area.

To sum up, the development of credit markets is closely related with the level of economic activities in each village. In less developed Village A, there are very few credit sources except for friends and relatives. In more developed Village C, various financial sources are available, thereby providing more mechanisms to cope with risk *ex post*. Non-farm households have more difficulty in obtaining credit access than the landed class.

7.2 Objective Measure 2: Foodgrain Management

As another measure to cope with risk, aspects of foodgrain management, including own storage, were investigated. The average expenditure per household on annual wheat consumption was about 7000 to 10000Rs., or about 10% of the total household income in Table 9. If this staple food is supplied completely from own fields, the core of food consumption is stabilized and household welfare is more insulated from food price risk.

This idea, however, was not supported at all by our samples. Table 12 shows the share of wheat consumption met from own production. The average percentage is less than 30% in Village A where wheat yield is very low. Even in Village B and C where wheat yields are high, the average percentage is low in the range from 20 to 47%. In East Asian agriculture including Japan, farm households are almost synonymous to households with surplus of staple food. This common sense is not valid here. The majority of farmers have deficit in wheat. Only among owner farm households in Village C, we can find a substantial, though they are still a minority, number of self-sufficient households.

This situation is attributable to low productivity of wheat in Village A and meager size of land holding in Village B and C (Section 5). In the study area, however, grain markets are

well developed, where wheat is available all through the year at stable prices thanks to public intervention (Kurosaki 1996). Therefore, marginal farmers would be better off by growing vegetables on their land and by increasing non-farm employment, thereby diversifying and enhancing income, rather than by growing wheat to the limit on their marginal land. Since this diversification strategy is adopted by many households in the study area, farmers are not keen to increase wheat production marginally or to keep sizable storage of wheat. They also understand that the accumulation of human capital, especially education, is key to income diversification through non-farm employment.

7.3 Subjective Measure of Risk Coping

To substantiate the above description on risk-coping mechanisms from a different angle, subjective perception about risk was surveyed. This involved asking sample households i) about any good/bad year(s) over the period of past five years, ii) associated reasons/factors thereof, and iii) the possible adjustments, thus, they had to or could make to cope with the risk. To facilitate eliciting information to this effect, sample households were also provided with an exhaustive list shown in Table 13.

While, depending on one's perception of risk, different observers would get at different scenarios by looking at these tables on risk, one possible summary description is provided below. Although we have to be careful in interpreting these at face value in isolation, the pattern shown below is consistent with the findings so far presented above. Therefore, we conclude that the following findings are worth reporting.

First, we found more responses than expected in which households simply adjusted consumption level without going for *ex post* risk coping measures. This shows that households found the cost of *ex post* consumption smoothing higher than the welfare cost of changing consumption depending on income shocks. This supports the view that efficient risk coping mechanisms are lacking in the study area.

Second, depending on the level of transformation/development, the number and selection of adjustment mechanisms vary. Especially, we find that in Village A, the supposedly least developed of the three sample villages, households usually suggested fewer options to cope with risk as against households in Village C, the more advanced sample village. This is understandable as development expands one's opportunity set. For instance, villagers in Village A do not have easy access to formal lending institutions as compared to Village C, a finding consistent with Table 11. Likewise, labor market in Village A seems to be riskier

and does not offer broad range of seasonal jobs than the one in Village C. Weather-related risk such as yield variability is particularly high in Village A.

Third, the set of response adjustments does not seem to be strongly symmetric with regard to the state of nature. That is, in good states of nature, for instance households may opt to increase consumption (of durable and non-durable goods), in the bad state of nature, they may not necessarily reduce their consumption. We could thus say that in response to changes in the level of (permanent) income, consumption is downwardly rigid.

Fourth, the response strategies of farm and non-farm households are different. For instance when the income of a non-farm household rises, helping a friend is not frequently chosen as compared to the situation when the income of a farm household rises. This tendency is comparatively stronger for owner farm households especially in Village A. This probably has to do with social and political motivations. Land owners/owner farms have vested interest to help out monetarily and expect loyalty in return. This loyalty could mean a broader vote base beside extra hands in communal activities and free labor in times of need.

8 Conclusion

This paper analyzes the interaction of poverty, risk, and human capital in a descriptive way using the micro household data from rural areas in the NWFP, Pakistan. The key emphasis is on the potential of human capital in overcoming low income and vulnerability to income risk, the two adverse features of poverty.

We have found that, in the sample villages where land per capita is too small both quantitatively and qualitatively, households strategically choose to diversify their income sources to stabilize consumption rather than to seek self-sufficiency in food consumption. This strategy is necessary because grain production is risky and not productive; this strategy is feasible because grain markets are relatively stable. *Ex post* risk-coping mechanisms, including credit markets, are not well developed in the study area, especially in a rain-fed village and among non-farm households. In this environment, a key to improve household welfare and enhance the level and stability of household income is job diversification through non-farm employment and high value-added agriculture. These two variables are closely related with the level of economic development in each village and the education level of individual households.

Another important finding is that lack of mechanisms to cope with income risk is likely to result in low accumulation of human capital. Among the sample households, the welfare disparity is wide between those who have already accumulated human capital in terms of education and labor force and those who have not. The former have higher and more stable income and higher and more stable consumption whereas the latter suffer from vulnerability to income shocks.

A policy implication of these findings is that public interventions to reduce the cost of income risk such as employment guarantee schemes, provision of primary education and primary health care, may yield large social benefit in the long run. The Social Action Program (SAP) of the Government of Pakistan, which is currently implemented, seems to be in the right direction because its main focus is on education and other human capital. However, insurance elements, especially employment guarantee ideas, are very weak in the current setup. They should be incorporated as an indispensable part. Public investment in physical infrastructure such as rural roads and irrigation is also important since such investment directly reduces income risk faced by poor households.

The descriptive analysis in this paper based on cross tabulation has an obvious limitation in substantiating the above conclusions. It only shows that the pattern found among the villages and household types is consistent with the explanation of poverty dynamics that emphasizes risk and human capital. Rigorous quantitative analysis is left for further study.

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