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THE EFFECTS OF INTERNAL AND INTERNATIONAL MIGRATION AND REMITTANCES ON INCOME DISTRIBUTION IN RURAL PAKISTAN

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Summary

Internal and international migration are important socio-economic phenomena throughout the developing world. The remittances -- money and/or goods sent home by migrant workers -- can have a salient impact upon income distribution in rural Third World areas.

Using the results of a three-year (1986-89) household survey in rural Pakistan, this study analyzes the determinants of migration and the effects of remittances on rural income distribution.

The study has three findings. First, it shows that education is positively related to migration: males educated to middle school or above are more likely to migrate. Second, the study reveals that the relationship between irrigated land and migration is that of a flat, U-shaped curve: males from households with less than one acre of irrigated land are more likely to migrate. Third, the data reveal that both internal and international remittances have an essentially neutral effect on rural income distribution. When internal remittances are included, the Gini coefficient of inequality only rises from 0.298 to 0.305; when international remittances are included, it increases from 0.298 to 0.300. In this study remittances have a neutral effect on income distribution because they are distributed fairly equally through the income order. The latter result is surprising, given the high "entry costs" to international migration in Pakistan: approximately 21,000 rupees (US $1,302) at the time of this study.

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Internal and international migration can have a profound impact upon the rural economies of most Third World countries. In many African, Asian and Latin American countries the bulk of the labor force still lives in the countryside. As the Harris-Todaro model (1970) has shown, in these countries it is the difference between expected rural and urban incomes that causes workers to migrate, either to urban centers or abroad. The remittances -- defined as the money and/or goods sent home by migrant workers -- can have a significant effect on rural income distribution. If these remittances provoke a sharp increase in rural inequality, this may have an important impact on consumption and investment in the countryside. For example, a rise in rural income inequality may have the effect of reducing already "basic" consumption for those at the lower end of the income distribution and of increasing "status-oriented" consumption for those at the upper end.

Despite these considerations, there is still no general consensus about the effect of internal or international remittances on rural income distribution in the Third World. On the one hand, Lipton (1980) argues that in India internal remittances worsen rural inequality because they are earned mainly by upper-income villagers. With respect to international remittances, Gilani, Khan and Iqbal (1981) in Pakistan and Adams in Egypt (1991, 1989) produce similar

findings. On the other hand, some empirical studies suggest a very different outcome. For example, Oberai and Singh (1980) find that internal remittances in India have an egalitarian effect on rural income distribution. Stark, Taylor and Yitzhaki (1986) arrive at a similar conclusion for the impact of internal and international remittances in two Mexican villages.[1]

Two major reasons appear to account for such lack of consensus on the effect of remittances upon rural income distribution: the use of local-level data collection techniques that preclude making unambiguous empirical judgements about the effects of remittances; and the reluctance or inability to use predicted income functions to accurately estimate income before and after remittances.

This paper attempts to overcome these, and similar, problems by presenting a framework for analyzing the impact of internal and international migration and remittances on rural income distribution. This framework uses predicted income equations to predict (estimate) the incomes of households in two situations: excluding and including remittances. The results are then used to evaluate the changes in income distribution that occur when internal and international remittances are excluded, compared to when they are included.

The analysis presented here is quite focused. Most notably, the study concentrates on the direct, first-order effects of migration and remittances on income distribution. While the author is quite aware of the second- and third-rounds effects of remittances on income distribution through wage and employment linkages, these issues are largely ignored. Given the confusion which surrounds the first-order

effects of remittances on income distribution, it seemed advisable to limit the scope of the investigation.

This study proceeds in six sections. The first section presents the data set. Section 2 specifies and estimates the econometric model, and sections 3 and 4 present the empirical results. Section 5 uses the results of the model to pinpoint the impact of remittances on rural income distribution and the final section presents concluding policy recommendations.

1. Data

Data come from a three-year study (1986-87 to 1988-89) of 727 households in three provinces in rural Pakistan.[2] This study was not designed as either a migration/remittances study or as one representative of rural Pakistan as a whole. Rather the primary purpose of the study was to analyze the determinants of rural poverty. In each of the three survey provinces the "poorest" district was selected on the basis of a production and infrastructure index elaborated by Pasha and Hasan (1982). The selected districts included Attock (Punjab province), Badin (Sind province) and Dir (Northwest Frontier province). Since rural poverty also exists in relatively prosperous areas, a fourth district Faisalabad (Punjab province) was added to the survey.[3]

In the third year of the study (1988-89) a migration module was administered to all survey households. In this migration module detailed data were collected on each household member including age, sex, education and occupation. Data were also collected on household landowning status, household income, and presence/absence of a

household member working as an internal or international migrant during the period 1986-89. Internal or international remittances were valued in terms of the income that households reported receiving from returned or current migrants. Remittance figures in this study are therefore net figures (i.e. net of all migration expenses) and do not include the savings held outside the household by migrants.

Of the total 727 households in the survey, 25 were excluded because of incomplete data. The analysis is therefore based on data from 702 households.[4]

Two aspects of this study need to be noted. First, this study focuses on remittances received by migrant households. While this may seem axiomatic, in this study a surprising number of non-migrant households also receive remittances. However, since these remittances are sent by extra familial members -- mainly male relatives -- and tend to be quite small,[5] they are not included. Second, the emphasis here is on economic migrants, that is, on people who left their households to work either inside or outside of Pakistan. Thus, none of the female migrants recorded in the survey are considered, because most of these women left their households to marry.[6] Similarly, males below the age of 15 years are excluded, since most of them migrated for educational purposes.

Table 1 presents summary data from the survey. It shows that 239 households (34.0 percent) of the sample have an internal male migrant over 15 years of age and 74 households (10.5 percent) have an international male migrant. These figures include both returned and current migrants. With respect to current migrants alone, the data reveal that 14.2 percent of all households have a current internal

migrant and 7.0 percent have a current international migrant. These recorded rates of current migration are higher than those reported by other studies in Pakistan, to which migration data were incidental. For example, data from the 1987-88 Pakistan Household Income and Expenditure Survey (HIES), which covers 18,100 urban and rural households, show that only 7.0 percent of all households have a current internal migrant and 2.8 percent have a current international migrant.[8]

Table 1 shows that remittances play an important role in the economies of the surveyed households. For internal migrants, remittances account for 4.6 percent of mean per capita annual household income; for international migrants, remittances account for 12.8 percent of such income. These findings appear reasonable when compared to data from the 1987-88 Pakistan HIES Survey. According to that survey, internal remittances account for 4.0 percent of mean per capita annual income for internal migrant households and 5.5 percent of such income for international migrant households.

In comparing the socio-economic characteristics of non-migrant, internal migrant and international migrant households, Table 1 discloses several outcomes which are consistent with migration and human capital theory. For instance, Table 1 shows that households with internal and international migrants are significantly larger than non-migrant households in terms of both household size and in the mean number of males over 15 years of age. According to the migration literature, larger families, and especially larger families with more males, are more likely to produce migrants (Adams, 1991; Roberts, 1982; Moock, 1973). Table 1 also shows that households with internal

and international migrants have higher mean levels of male education than non-migrant households. This outcome reflects the type of educational selectivity that is hypothesized by the human capital model of migration. According to that model, since educated people enjoy greater economic returns to migration, they are more likely to move to urban areas or abroad.

2. Model Specification and Estimation

In analyzing the direct, first-order effects of migration and remittances on rural income distribution in Pakistan, it seems useful to use four equations to determine: (1) who are internal and international migrants; and (2) how internal and international remittances affect pre- and post-migration income.

The first equation specifies the socio-economic determinants of internal (INTM) and external migration (EXTM). Each of these migration variables is dichotomous (one if migrant, zero otherwise) and can be hypothesized to be a function of the following variables:

$$\begin{aligned} \text{INTM, EXTM} = {} & \beta_0 + \beta_1 \text{AGE} + \beta_2 \text{AGESQ} + \beta_3 \text{EDUC1} + \beta_4 \text{EDUC2} + \\ & \beta_5 \text{AGEHH} + \beta_6 \text{AGEHHSQ} + \beta_7 \text{MALE15} \\ & \beta_8 \text{IRLAND} + \beta_9 \text{IRLANDSQ} + \beta_{10} \text{LNDLS} \qquad (1) \end{aligned}$$

where AGE = age of male (for migrants, measured at time of migration)

AGESQ = age of male squared

EDUC1 = educational status of male (one if no schooling, zero otherwise) (for migrants, measured at time of migration)

EDUC2 = educational status of male (one if middle school or higher, zero otherwise) (for migrants, measured at time of migration)

AGEHH = age of household head (for migrants, measured at time of migration)

AGEHHSQ = age of household head squared

MALE15 = number of males over 15 years in household

IRLAND = irrigated land owned in village by household

IRLANDSQ = irrigated land squared

LNDLS = landlessness (one if male is from landless household, zero otherwise)

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$, and β_{10} are parameters to be estimated.

Table 2 presents the means and standard deviations of the independent variables in equation (1). It is useful to explain these variables in relation to outcomes hypothesized by general economic theory.

In equation (1) the variables AGE and AGESQ capture the ages of the male. Since younger males enjoy greater lifetime returns to migration and lower migration costs, it is often found that the propensity to migrate peaks at age 30 to 35. It is therefore hypothesized that these variables will have a inverted U-shaped relationship with migration. Because some analysts (Lipton, 1980; Connell et al., 1976) believe that migration is in part a life-cycle phenomenon in which younger males are more likely to participate, it is hypothesized that the age of household variables -- AGEHH and AGEHHSQ -- will also have an inverted U-shaped relationship with migration. In equation (1) the variables EDUC1 and EDUC2 capture the

effects of education on migration. Since human capital theory generally predicts the migration of the more educated, it is expected that EDUC1 (no schooling) will be negative and EDUC2 (middle school or above) will be positive. The variables IRLAND and IRLANDSQ in equation (1) capture the effect of irrigated land owned on migration. Some analysts (Bilsborrow et al., 1987) find an inverted U-shaped relationship between land and migration, with peasants owning medium-sized plots of land being the most likely to migrate. It is therefore hypothesized that IRLAND and IRLANDSQ will be positive and negative, respectively. Finally, since landless people have few economic ties to the community, they are ofter more likely to migrate (Adams, 1992; El-Dib, Ismael and Gad, 1984). To test this hypothesis, the variable LNDLS (one if from landless household, otherwise zero) is added to the equation.

The second, third and fourth equations are needed to solve the following methodological problems. In this study 130 of 702 households (18.5 percent) have an internal or international migrant currently working outside of the household. Thus, in attempting to determine income without remittances for all households, it is not known what the per capita incomes of these 130 households would have been had these migrants stayed home. It therefore becomes necessary to <u>predict</u> the per capita incomes of all migrant households excluding remittances. And then, to be consistent in the treatment of incomes, it is also necessary to <u>predict</u> the per capita incomes of all migrant households including remittances.

In pursuit of these ends, the parameters predicting per capita household income (excluding remittances) (PREX) were estimated from

the 416 non-migrant households. These parameters were then applied to internal migrant and international migrant households in order to predict per capita household incomes (excluding remittances) for all migrant households.[9] The equation used was:

$$PREX = \beta_0 + \beta_1 IRLAND + \beta_2 RNLAND + \beta_3 HS + \beta_4 PROMALE15 + \beta_5 EDUC15 \qquad (2)$$

where RNLAND = rainfed land owned in village by household[10]

HS = household size

PROMALE15 = males in household over 15 years as proportion of household size

EDUC15 = mean education of male household members over 15 years (one if preparatory school or higher, zero otherwise)

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ and β_5 are parameters to be estimated

In order to predict per capita incomes <u>with</u> remittances for migrant households, it is necessary to address another methodological problem. In this study a number of migrant households receive both internal and international remittances;[11] thus, using a single equation to estimate per capita incomes with remittances would have the effect of overestimating the internal or international remittances of households with both sets of income. To overcome this problem, it is necessary to predict incomes with remittances by revising equation (2) into equations (3) and (4). In equation (3), the dependent variable becomes predicted per capita annual income (including internal remittances) for internal migrant households (PRINTMIG). In equation (4), the dependent variable becomes predicted per capita annual income (including international remittances) for international

migrant households (PREXTMIG).[12] Migration dummy variables -- INTMIG and EXTMIG -- are also added to each equation.[13] The revised equations can be written as:

$$\text{PRINTMIG} = \beta_0 + \beta_1\text{IRLAND} + \beta_2\text{RNLAND} + \beta_3\text{HS} + \beta_4\text{PROMALE15} + \beta_5\text{EDUC15} + \beta_6\text{INTMIG} \quad (3)$$

$$\text{PREXTMIG} = \beta_0 + \beta_1\text{IRLAND} + \beta_2\text{RNLAND} + \beta_3\text{HS} + \beta_4\text{PROMALE15} \quad \beta_5\text{EDUC15} + \beta_6\text{EXTMIG} \quad (4)$$

where INTMIG = internal migrant household (one if have internal migrant, zero otherwise)

EXTMIG = international migrant household (one if hav international migrant, zero otherwise)

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \ldots \beta_6$ are parameters to be estimated.

In equations (2), (3) and (4), it is hypothesized that the variables irrigated land (IRLND) and rainfed land owned in village (RNLND) are positively correlated with per capita household income. In the equations the household size variable (HS) captures the effect of family size on household income. This variable includes migrants when the equations are applied to migrant households. In the equations it is expected that the variables proportion of males over 15 years (PROMALE15) and mean education of male household members (EDUC15) are positively correlated with per capita household income. The migration dummy variables -- INTMIG and EXTMIG -- capture the impact of internal and international migration on incomes in the including remittances situation. It is hypothesized that these migration dummy variables will be positively correlated with per capita household income.

3. Empirical Results: The Determinants of Migration

To identify the determinants of migration, equation (1) was estimated on all males over 15 years of age using a logit regression. The equation was estimated separately for internal and international migrants, and the results are presented in Table 3.

Beginning with internal migrants, and focusing on those variables which are statistically significant, Table 3 (column (1)) reveals several variables with outcomes which are consistent with economic theory. For example, the EDUC2 variable (middle school or above) is positive and significant. This result is consistent with human capital theory and suggests that more educated males are more likely to be internal migrants. The variables AGEHH and AGEHHSQ are also significant, and positive and negative, respectively. These results are consistent with migration theory and suggest that internal migration is a life-cycle phenomenon, with males from families with older heads being more likely to pursue internal migration.

However, the results for IRLAND and IRLANDSQ are not consistent with hypothesized outcomes. Rather than being positive and negative, respectively, IRLAND and IRLANDSQ have just the opposite signs; moreover, both variables are statistically significant. These findings suggest that the relationship between irrigated land and internal migration is that of a flat, U-shaped curve; males from households with less than one acre of irrigated land have the highest propensity to migrate.[24] The results for the LNDLS variable, however, show that there is no statistically significant relationship between landlessness and internal migration. On the whole, the findings indicate that while some irrigated land is needed to provide the

economic means to pursue internal migration, larger amounts of irrigated land bring increased opportunities (and responsibilities) which serve to keep men at home.

Table 4 extends and refines the logit results reported in Table 3 by presenting a list of predicted probabilities for internal migration. The table shows that when all the variables are at the mean, any male in the sample of 1,936 males has a 19.3 percent of internal migration. Yet when the values of different statistically significant variables are varied from the mean, the probability of internal migration also changes. For example, while a male from a household with a family head who is 60 years old has a 32.9 percent probability of migration (row (1)), a male from a household with a head of 30 years only has a 9.0 percent probability of migration (row (8)). These figures serve to emphasize the life-cycle character of internal migration in Pakistan.

Turning to the results for international migrants, Table 3 (column (2)) discloses several outcomes which are consistent with theoretical expectations. For instance, the variables AGE and AGESQ are significant and positive and negative, respectively. These findings indicate that the relationship between age and international migration is that of an inverted U-shaped curve, with males 32 years of age having the highest propensity to pursue international migration. Similarly, the outcome for the EDUC2 variable (middle school or higher) -- positive and significant -- is also consistent with a priori expectations. This outcome suggests that educated males are more likely to seek work abroad.

In Table 3 (column (2)) the results for the MALE15 variable show that the number of males over 15 years in the household has a positive and significant effect on international migration. This outcome is expected. According to the migration literature, large families or families with more males are more likely to produce migrants because they have more "bodies" to assume the work of the migrant member.

However, in Table 3 (column (2)) the results for the land variables -- IRLAND, IRLANDSQ and LNDLS -- are not consistent with hypothesized outcomes. Rather than being positive and negative, respectively, IRLAND and IRLANDSQ have just the opposite signs; moreover, the LNDLS variable is negative and significant. Considered together, these outcomes indicate that males at both ends of the land spectrum -- those who are landless and those who have a lot of irrigated land -- are less likely to go work abroad. Landless males apparently lack the economic means to go work abroad, while males with much irrigated land lack the economic incentive to pursue international migration. For males from households with irrigated land, the propensity to migrate peaks below the level of one acre.

Table 5 extends this analysis by presenting a list of predicted probabilities of international migration. These values are calculated from statistically significant variables in equation (2) in Table 3 using the procedures outlined above.

When all independent variables are at the mean, Table 5 (row (4)) reveals that the predicted probability of international migration is quite low: 3.8 percent. This figure is much lower than that recorded when all independent variables are at the mean for internal migrants in Table 4: 19.3 percent. In rural Pakistan males evidently have a

much higher probability of becoming internal -- rather than international -- migrants.

4. Empirical Results: Predicted Income Equations

Equation (2), which is designed to pinpoint predicted per capita household income (excluding remittances), was estimated on all non-migrant households. The results are presented in Table 6. All of the variables in this table are statistically significant at the 1 percent level.

Table 6 discloses that both of the land variables -- IRLND and RNLND -- are positively correlated with predicted per capita household income (excluding remittances). This is to be expected, given the importance of land in this, and most other rural Third World areas. The variables EDUC15 (mean education of males over 15 years) and PROMALE15 (male members over 15 years as proportion of household size) are also strongly and positively correlated with predicted per capita household income (excluding remittances). These relationships are also to be expected in an environment where education has positive rates of return, and social custom and tradition normally "permit" only males to earn income outside of the household.

Table 7 reports the results obtained from using equation (3) to estimate predicted per capita income (including internal remittances) for internal migrant households. Five of the six coefficients are statistically significantly at the 1 percent level. The only variable which is not significant -- the internal migration variable (INTMIG) -- has a positive sign, as expected. The results for the INTMIG variable suggest that the presence of an internal migrant raises

predicted per capita annual household income (including remittances) by 103.4 rupees (US $6).

Table 8 reports the results obtained from using equation (4) to estimate predicted per capita income (including international remittances) for international migrant households. As in the previous table, all of the coefficients are statistically significant except the international migration dummy variable (EXTMIG). The coefficient for the EXTMIG variable suggests that the presence of an international migrant raises predicted per capita annual household income (including remittances) by 407.7 rupees (US $25).[15]

It is now possible to take the results of attempts to predict per capita annual household in the two situations: excluding and including remittances. Table 9 presents actual mean per capita incomes for non-migrant households, and predicted mean per capita incomes for internal migrant and international migrant households. It is interesting to note how little the mean per capita incomes of these three sets of households differ. For example, even when remittances are included, the mean per capita annual income of international migrant households is only 8.2 percent higher than that of internal migrant households and 10.0 percent higher than that of non-migrant households. None of these income differences between households are statistically significant at the 5 percent level.

5. Remittances and Income Distribution

The first-order impact of remittances on rural income distribution depends on answers to two questions. Which income groups of households produce migrants? And how much do different income groups of migrants remit?

Table 10 attempts to answer these questions by using the results of the predicted income equations. Column (1) ranks all 702 households by income quintiles on the basis of their predicted per capita annual income (excluding remittances). Columns (2) and (4) show the percent of internal and international migrant households in each quintile. Columns (3) and (5) reveal the mean per capita annual remittances received by internal and international migrant households in each quintile. In this analysis remittances include the income contributions of both returned and current migrants.

On the question of who produces migrants, Table 10 shows that both internal and international migrants are distributed fairly equally through the income order. For internal migrants, column (2) shows that only the two lowest quintile groups produce less than their quintile share of migrants. Similarly, for international migrants column (4) shows that only the lowest and the highest income groups fail to produce their quintile share of migrants.

Table 10 also addresses the question of how much do different income groups remit. For internal migrants, column (3) shows that -- with the exception of the top quintile group -- the level of mean per capita internal remittances rises by quintile group. This pattern, however, does not hold true for international migrants. According to

column (5), the second quintile actually receives the highest level of mean per capita international remittances.

Since internal and international migrants are distributed fairly equally through the income order, and poorer groups tend to receive a larger share of international remittances, the results of Table 10 suggest that remittances may have a favorable effect on income distribution. To evaluate this effect, it is necessary to compare the first-order changes that occur in income distribution when internal and international remittances are excluded with those that occur when such remittances are included. This is done in Table 11.

Column (1) of Table 11 ranks the 702 households according to their predicted per capita annual income (excluding remittances). Column (2) shows the share of income going to each quintile group excluding remittances. The next two columns show the share of income going to each quintile group when internal remittances (column 3) and international remittances (column 4) are included. The final two columns summarize the percentage changes in shares of income between the excluding and including remittances situation for internal and international remittances.

Table 11 is instructive because it shows that both internal and international remittances have an essentially neutral effect on income distribution. Column (5) reveals only very small percentage changes in income for the different quintile groups when internal remittances are included. In fact, none of the percentage changes in income recorded in column (5) exceed 5.0 percent. The same situation prevails for international remittances.

contribution of remittances -- both internal and international -- to total household income is relatively small. For migrant households, the share of internal remittances in mean annual predicted per capita household income is only 3.0 percent, while the share of international remittances in such income is only 10.5 percent. By contrast, a recent study using similar methodology in rural Egypt found that for migrant households the share of international remittances in mean annual predicted per capita income was 30.4 percent (Adams, 1991: Table 2).[18] In the Egyptian case both the large size of international remittances and their unequal distribution among upper income groups led remittances to have a decidedly negative impact on rural income distribution.

6. Conclusion and Policy Recommendations

This study has identified the socio-economic determinants of internal and international migration in rural Pakistan. It has also used predicted income functions to pinpoint the changes in rural household income distribution that occur between two situations: when remittances are excluded and when internal and international remittances are included. From these analyses, three key policy conclusions emerge.

First, consistent with human capital theory, the data reveal that education is positively and significantly related to migration. The findings show that males in rural Pakistan who are educated to middle school or above are more likely to become either internal or international migrants. Since education is a variable which is amenable to policy manipulation, Pakistani decisionmakers who wish to

encourage migration would be well-advised to pay more attention to rural education.

Second, the findings reveal that for both internal and international migrants the relationship between irrigated land owned in the village and migration is that of a flat, U-shaped curve. For both sets of migrants, males from households with less than one acre of irrigated land have the highest propensity to migrate. This is an important finding because it suggests that poorer households -- that is, those with less land -- are more likely to migrate. However, it should be stressed that the study also finds no positive (or significant) relationship between landlessness and internal migration. On the whole, the findings indicate that while some irrigated land is needed to provide the economic means to pursue either internal or international migration, larger amounts of irrigated land bring increased opportunities (and responsibilities) which serve to keep men at home.

The third conclusion is perhaps the most important. According to the data, both types of remittances -- internal and international have an essentially neutral effect on rural income distribution. When internal remittances are included, the Gini coefficient of inequality rises less than 3.0 percent, while the Theil entropy measure increases less than 9.0 percent. Virtually the same results hold for international remittances. When international remittances are added, the Gini coefficient increases by less than 1.0 percent, while the Theil measure rises less than 8.0 percent.

In this study remittances have a neutral effect on income distribution because they are distributed fairly equally through the

income order. With the exception of the lowest income quintile, most quintile groups of households manage to produce their percentage share of both internal and international migrants. The latter result is particularly surprising, given the high -- and ostensibly prohibitive -- "entry costs" to international migration in Pakistan. At the time of this study, the average estimated cost of international migration in Pakistan was 21,000 rupees (US $1,302).[15] The results of this study suggest that international migrants from the lower income quintile groups actually were able to either find or borrow such large sums of money in order to migrate. This finding has important policy implications, as government officials in Pakistan now consider ways in which to return the level of international migration to the level of the early 1980s.

Notes

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1. For international remittances alone, Stark, Taylor and Yitzhaki (1986) find that remittances from abroad had an equalizing influence on incomes in one village and an unequalizing influence in another.

2. This study was undertaken by the International Food Policy Research Institute (IFPRI) working in collaboration with Pakistani research institutes -- Applied Economic Research Centre (University of Karachi), Punjab Economic Research Institute (Lahore) and the Center for Applied Economic Studies (University of Peshawar). For more information on this study, see Alderman and Garcia (1991).

3. The sample was randomly drawn with all rural residents in the selected districts having an equal probability of being included. Landowners who reside in urban areas, therefore, are not included in the sample. Since unweighted samples generally tend to miss the apex of a distribution, the fact that there are, for example, far fewer households owning 3,000 acres of land than there are households owing 3 acres may lead to a slight underrepresentation of the skew of landholding in any moderately sized sample.

4. The 702 households were distributed among the districts as follows: 147 from Attock District (Punjab), 234 from Badin District (Sind), 176 from Dir District (Northwest Frontier) and 145 from Faisalabad District (Punjab).

5. In this study 279 of the 416 non-migrant households report receiving remittances. However, actual mean per capita internal and international remittances for these 416 non-migrant households are only 37 rupees (US $2.30) and 10 rupees (US $0.62), respectively.

6. For more on this point, see Irfan (1986: 744).

16. It can be argued that the use of predicted income figures to calculate these changes in inequality may have the effect of underestimating the actual degree of increase in income inequality. According to this argument, depending on the percentage of variance explained by the predicted equations, the predicted income figures will have a smaller variance than actual incomes. This in turn may cause estimates of changes in the degree of inequality to be smaller than they actually were. However, when actual -- rather than predicted -- per capita household incomes are used in calculate these changes in inequality the results are almost identical to those reported in the text. When actual income figures are used, neither the Gini coefficient nor the Theil measure increase more than 6.0 percent when internal or international remittances are included.

17. See, for example, Gilani, Khan and Iqbal (1981) and Adams (1991, 1989).

18. There are at least two reasons why the contribution of international remittances to total household income is so much higher in the Egyptian study (Adams, 1991). First, in the Egyptian study 33.9 percent of the survey households have an international migrant, as compared to 10.5 percent in this study. Second, while in the Egyptian study remittances are defined to include savings held by migrants outside of the household, in this study remittance figures exclude migrant savings held outside of the household.

19. During the period 1986-89 the costs of international migration in Pakistan included the expenses of travel (8,000 rupees) plus the fees (13,000 rupees) paid to an labor-recruiting agent in Pakistan for visa, work permit and other documentation in the country of destination.

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Table 1 -- Selected Characteristics of Non-Migrant, Internal Migrant and International Migrant Households in Rural Pakistan, 1986/87 - 1988/'89 Survey.

Item	Non-Migrant Households	Internal Migrant Households[a]	International Migrant Households[a]
Migration and Remittances			
1. Number of households	416	239	74
2. Actual mean per capita annual household income (including remittances) (rupees)	3,269.75	3,121.43 (-0.69)	4,314.80 (-3.04)**
3. Actual mean per capita remittances (rupees)	-	142.96	552.72
4. Share of remittances in actual mean per capita annual household income (percent)	-	4.58	12.81
Socio-economic			
5. Mean irrigated land owned in village (acres)	5.25	2.00 (4.10)**	2.36 (2.12)*
6. Mean rainfed land owned in village (acres)	1.76	4.30 (-2.87)**	4.20 (-1.96)
7. Mean household size	8.67	9.99 (-3.76)**	11.98 (-6.24)**
8. Mean number of males over 15 years old in household	2.39	3.14 (-6.08)**	3.58 (-6.44)**
9. Mean education of males over 15 years in household (one in middle school or higher, zero otherwise)	0.26	0.38 (-4.18)**	0.44 (-3.96)**

Notes:

N= 702 households. 1 Rupee = US$0.062. Sum of households in row (1) exceeds 702 because 27 households have both an internal and an international migrant. Household means are those recorded in 1987.

Numbers in parentheses are t-statistics (two-tailed), which measure differences between non-migrant households and internal migrant or international migrant households.

[a]Includes both returned and current migrants.

*Difference between households is significant at the .05 level.
**Difference between households is significant at the .01 level.

Table 2 -- Means and Standard Deviations of Independent Variables for Non-Migrants, Internal Migrants and International Migrants.

Variable	Non-Migrant Males (N=1423)	Internal Migrant Males (N=391)	International Migrant Males (N=122)
Age of male (AGE)[a/] (years)	35.79 (16.61)	29.79 (14.26)	32.72 (11.37)
Age of male squared (AGESQ)[a/]	1556.20 (1422.33)	1090.15 (1180.40)	1198.92 (881.54)
Educational status of male (EDUC1) (one if no schooling, zero otherwise)[a/]	0.54 (0.50)	0.41 (0.49)	0.27 (0.45)
Educational status of male (EDUC2) (one if middle school or higher, zero otherwise)[a/]	0.21 (0.41)	0.36 (0.48)	0.49 (0.50)
Age of household head (AGEHH)[a/] (years)	46.62 (14.97)	50.74 (13.49)	49.64 (15.52)
Age of household head squared (AGEHHSQ)[a/]	2397.89 (1438.33)	2755.60 (1360.24)	2703.78 (1506.11)
Number of males over 15 years in household (MALE15)	3.29 (1.77)	3.41 (1.76)	3.86 (1.62)
Irrigated land owned in village (IRLAND) (acres)	5.22 (11.45)	1.92 (6.36)	2.21 (5.77)
Irrigated land squared (IRLANDSQ)	158.22 (655.86)	44.07 (330.76)	37.96 (325.60)
Landless (LNDLS) (one if male is from landless household, zero otherwise)	0.40 (0.49)	0.43 (0.50)	0.18 (0.39)

Notes: Includes 1936 males over 15 years of age. Numbers in parentheses are standard deviations.

[a/]For migrants, the variables AGE, AGESQ, EDUC1, EDUC2, AGEHH and AGEHHSQ are measured at time of migration.

Table 3 -- Logit Regression Analysis of Internal and International Migration For All Males Over 15 Years of Age.

Variable	Internal Migrant (1)	International Migrant (2)
Age of male (AGE)[a]	-.039 (-2.119)*	.228 (5.098)**
Age of male squared (AGESQ)[a]	.001 (.912)	-.003 (-4.791)**
Educational status of male (EDUC1) (one if no schooling, zero otherwise)[a]	.007 (.044)	-.493 (-1.826)
Educational status of male (EDUC2) (one if middle school or higher, zero otherwise)[a]	.418 (2.621)**	.655 (2.629)**
Age of household head (AGEHH)[a]	.068 (2.801)**	-.035 (-.965)
Age of household head squared (AGEHHSQ)[a]	-.001 (-1.971)*	.001 (1.031)
Number of males over 15 years in household (MALE15)	-.041 (-1.103)	.195 (3.588)**
Irrigated land owned in village (IRLAND)	-.098 (-4.878)**	-.118 (-3.729)**
Irrigated land squared (IRLANDSQ)	.001 (3.594)**	.001 (2.225)*
Landless (LNDLS) (one if male is from landless household, zero otherwise)	-.110 (-.833)	-1.379 (-5.329)**
Constant	-2.177 (-3.153)**	-5.892 (-4.915)**
Log-likelihood	-908.62	-392.48

Notes: Includes 1936 males over 15 years of age. Numbers in parentheses are t-statistics (two-tailed). The following independent variables were tried and dropped for lack of significance: rainfed land owned in village and rainfed land squared. In equation (1) the dependent variable is one if internal migrant, otherwise zero; and in equation (2) the dependent variable is one if international migrant, otherwise zero.

[a]For migrants, the variables AGE, AGESQ, EDUC1, EDUC2, AGEHH and AGEHHSQ are measured at time of migration.

*Difference is significant at the .05 level.
**Difference is significant at the .01 level.

Table 4 --- Predicted Probabilities of Internal Migration Using Logit Results.

	Predicted Probability of Internal Migration[a] (Percent)
1. All independent variables at the mean, except age of household head is 60 years (AGEHH=60)	32.9
2. All independent variables at the mean, except male is educated to midole school or higher (EDUC2=1)	26.4
3. All independent variables at the mean, except age of male is 25 years (AGE=25)	26.0
4. All independent variables at the mean, except irrigated land owned is 2 acres (IRLAND=2)	22.6
5. All independent variables at the mean	19.3
6. All independent variables at the mean, except irrigated land owned is 10 acres (IRLAND=10)	15.3
7. All independent variables at the mean, except age of male is 50 years (AGE=50)	12.3
8. All independent variables at the mean, except age of household head is 30 years (AGEHH=30)	9.0

Notes: Includes 1,936 males over 15 years of age.
This sample includes 391 internal migrants.

[a]Predicted probability of migration (PR) is calculated from equation (1) in Table 3 using the formula:

$$PR = e^{\beta x}/(1 + e^{\beta x}),$$

where β = the coefficient of logit regression and x = the value of independent variables.

Table 5 --- Predicted Probabilities of International Migration Using Logit Results.

	Predicted Probability of International Migration[a] (Percent)
1. All independent variables at the mean, except male is from a household which is <u>not</u> landless (LNDLS=0)	6.6
2. All independent variables at the mean, except male is educated to middle school or higher (EDUC2=1)	6.3
3. All independent variables at the mean, except number of males over 15 years in household is 5 (MALE15=5))	5.3
4. All independent variables at the mean	3.8
5. All independent variables at the mean, except age of male is 25 years (AGE=25)	3.3
6. All independent variables at the mean, except male is from landless household (LNDLS-1)	1.7
7. All independent variables at the mean, except age of male is 50 years (AGE=50)	1.3
8. All independent variables at the mean, except irrigated land owned is 10 acres (IRLAND=10)	1.2

Notes: Includes 1,936 males over 15 years of age.
This sample includes 122 international migrants.

[a]Predicted probability of migration (PR) is calculated from equation (2) in Table 3 using the formula:

$$PR = e^{\beta x}/(1 + e^{\beta x}),$$

where β = the coefficient of logit regression and x = the value of independent variables.

Table 6 -- Regression to Estimate Predicted Per Capita Annual Household Income (Excluding Remittances)

Variable	Regression Coefficient	t-Ratio
Irrigated land owned in village (IRLAND)	125.564	14.217**
Rainfed land owned in village (RNLAND)	78.499	8.050**
Household size (HS)	-106.808	-4.214**
Males in household over 15 years as proportion of household size (PROMALE15)	2442.472	3.549**
Mean education of male household members over 15 years (EDUC15) (one if middle school or higher, zero otherwise)	1388.828	4.950**
Constant	2320.399	6.655**

Adj. R^2 = 0.442
F Stat.= 66.7

Notes: Regression is based on 416 non-migrant households. The parameters are used to estimate predicted per capita annual income (excluding remittances) for internal migrant and international migrant households. The dependent variable is per capita annual household income (excluding remittances) (PREX).

**Difference is significant at the .01 level.

Table 7 -- Regression to Estimate Predicted Per Capita Annual Income (Including Internal Remittances) for Internal Migrant Households.

Variable	Regression Coefficient	t-Ratio
Irrigated land owned in village (IRLAND)	125.855	19.510**
Rainfed land owned in village (RNLAND)	77.970	13.532**
Household size (HS)	-106.960	-7.135**
Males in household over 15 years as proportion of household size (PROMALE15)	2487.458	5.706**
Mean education of male household members over 15 years (EDUC15) (one if middle school or higher, zero otherwise)	1445.406	8.039**
Internal migrant (INTMIG) (one if internal migrant, zero otherwise)	103.417	0.762
Constant	2293.159	10.437**

Adj. R^2 = 0.530
F Stat. = 123.9

Notes: Regression includes 655 households: 416 non-migrant and 239 internal migrant households. The parameters are used to estimate predicted per capita income (including remittances) for internal migrant households. The dependent variable is per capita annual household income (including internal remittances) (PRINTMIG).

**Difference is significant at the .01 level.

Table 8 -- Regression to Estimate Predicted Per Capita Annual Income (Including International Remittances) for International Migrant Households.

Variable	Regression Coefficient	t-Ratio
Irrigated land owned in village (IRLAND)	125.307	15.936**
Rainfed land owned in village (RNLAND)	78.034	9.121**
Household size (HS)	-107.230	-5.144**
Males in household over 15 years as proportion of household size (PROMALE15)	2377.704	3.983**
Mean education of male household members over 15 years (EDUC15) (one if middle school or higher, zero otherwise)	1381.204	5.715**
International migrant (EXTMIG) (one if international migrant, zero otherwise)	407.709	1.631
Constant	2347.128	7.822**

Adj. R^2 = 0.461
F Stat. = 70.8

Notes: Regression includes 490 households: 416 non-migrant and 74 international migrant households. The parameters are used to estimate predicted per capita income (including remittances) for international migrant households. The dependent variable is per capita annual household income (including international remittances) (PREXTMIG).

*Difference is significant at the .01 level.

Table 9 -- Predicted Mean Per Capita Annual Income of Non-Migrant, Internal Migrant and International Migrant Households

Household Group	Predicted Mean Per Capita Annual Household Income	
	Excluding Remittances	Including Remittances
	(Rupees)	
Non-Migrant (N= 416)	3,269.75	3,269.75
Internal Migrant (N= 239)[a]	3,184.18 (0.46)	3,327.12 (-0.31)
International Migrant (N=74)[a]	3,046.68 (0.71)	3,599.36 (-1.04)

Notes: N= 702 households. 1 Rupee = US$0.062

Numbers in parentheses are t-statistics (two-tailed), which measure differences between non-migrant households and internal migrant or international migrant households.

[a]Income figures for these households are predicted values and thus may not sum up to the actual figures recorded in Table 1.

Table 10 -- Distribution of Migrant Households and Mean Per Capita Remittances Among Income Quintiles Ranked by Predicted Per Capita Annual Household Income, Excluding Remittances.

(1) Percent of 702 Households Ranked by Predicted Per Capita Annual Income (Excluding Remittances)	(2) Percent of Internal Migrant Households[a/] in Group (N=239)	(3) Mean Per Capita Annual Internal Remittances Received by Internal Migrant Households in Group (rupees)	(4) Percent of International Migrant Households[a/] in Group (N= 74)	(5) Mean Per Capita Annual International Remittances Received by International Migrant Households in Group (rupees)
Lowest 20%	12.55	38.91	14.86	236.79
Second 20%	17.57	66.19	20.27	693.80
Third 20%	25.52	65.57	22.97	409.13
Fourth 20%	22.59	191.17	25.68	348.64
Top 20%	21.76	120.81	16.22	214.59
(Top 10%)	(6.70)	(89.81)	(5.41)	(138.97)
All	100.00	105.33	100.00	398.22

Notes: 1 Rupee = US$0.062.

[a/]Includes both returned and current migrants.

Table 11 -- Effects of Internal and International Remittances on Rural Per Capita Household Income Distribution

(1) Percent of 702 Households Ranked by Predicted Per Capita Annual Income (Excluding Remittances)	Percent of Predicted Per Capita Annual Income (2) Excluding Remittances	(3) Including Internal Remittances[a/]	(4) Including International Remittances[a/]	(5) Percent of Change Between Columns (2) and (3) for Internal Remittances[a/]	(6) Percent of Change Between Columns (2) and (4) for International Remittances[a/]
Lowest 20%	8.71	8.36	8.40	-4.06	-3.52
Second 20%	13.57	13.33	13.64	-1.72	0.54
Third 20%	17.14	16.88	16.97	-1.54	-0.97
Fourth 20%	21.85	22.16	21.95	1.42	0.49
Top 20%	38.74	39.27	39.08	2.47	0.95
(Top 10%)	(24.40)	(24.86)	(24.78)	(1.91)	(1.56)
Gini Coefficient[b/]	0.298	0.305	0.300	2.21	0.47
Theil's entropy measure[c/]	0.151	0.164	0.162	8.78	7.78

Notes:

[a/] Internal and international remittances include remittances from both returned and current migrants.

[b/] The Gini coefficient is an index commonly used to measure the inequality of a distribution of income. It can be represented as

$$G = 1 + \frac{1}{H} - \frac{2}{HY} \sum_{1}^{H} p(h)y^h,$$

where

H = number of units,
y^h = quantity over which inequality is measured,
Y = total inequality, and
$p^{(h)}$ = rank assigned to household h ranked by y.

[c/] Theil's entropy measure is another index used to measure inequality of distribution of income. Scaled to lie between 0 and 1, it can be expressed as

$$T = 1 - \underline{Y} \exp\left(- \sum \underline{y}^h \, Lny^h \right)$$