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Microdeterminants of Consumption, Poverty, Growth, and Inequality in Bangladesh

Quentin T. Wodon

What are the gains from a better education, more land ownership, or a different occupation in Bangladesh? Do the gains differ in urban and rural areas? Have they remained stable over time? Do household size, family structure, and gender affect well-being? Do consumption, poverty, and inequality depend more on characteristics of households or on the areas in which those households are located?

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Summary findings

Using household data from five successive national surveys, Wodon analyzes the microdeterminants of (and changes in) consumption, poverty, growth, and inequality in Bangladesh from 1983 to 1996.

Education, demographics, land ownership, occupation, and geographic location all affect consumption and poverty. The gains in per capita consumption associated with many of these household characteristics tend to be stable over time.

Returns to demographics (variables in household size) have the greatest impact on growth, perhaps because of improving employment opportunities for women.

Education (in urban areas) and land (in rural areas) contribute most to measures of between-group inequality. Location takes second place, in both urban and rural areas.

Wodon introduces the concept of conditional between-group inequality. Existing group decompositions of the Gini index along one variable do not control for other characteristics correlated with that variable. Conditional between-group Ginis avoid this pitfall. He also shows how to use unconditional and conditional between-group Ginis for simulating policies.

This paper — a product of the Poverty Reduction and Economic Management Sector Unit, South Asia Region — was written as part of background work for the Bangladesh poverty assessment. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Jillian Badami, room MC10-336, telephone 202-458-0425, fax 202-522-2428, Internet address jbadami@worldbank.org. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/html/dec/Publications/Workpapers/home.html.The author may be contacted at qwodon@worldbank.org. March 1999. (33 pages)

Micro determinants of consumption, poverty, growth, and inequality in Bangladesh

Quentin T. Wodon[1]

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Correspondence: qwodon@worldbank.org

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I Introduction

What are the gains from a better education, more land ownership, or a different occupation in Bangladesh? Do the gains differ in urban and rural areas? Have they remained stable over time? Do household size, family structure, and gender matter for well-being? Do consumption, poverty, and inequality depend more on household characteristics, or on the characteristics of the areas in which they live? What are the micro determinants of growth in per capita consumption over time? While the answers to such questions have important policy implications, they have been missing because of a lack of access to nationally representative household data covering a period long enough to analyze trends over time.

Using in a consistent way five comparable and successive national surveys, this paper analyzes at once the micro determinants (and changes thereof) of consumption, poverty, growth, and inequality in Bangladesh for the period 1983 to 1996. The analyzis of the determinants of consumption is carried in a straightforward way by regressing log per capita consumption on household and area characteristics, and by interpreting parameter estimates as the returns to these characteristics. Assuming normal errors, the parameter estimates can also be used to predict the probability of being poor. By running the same regressions for various survey years, one can easily decompose the growth in per capita consumption into the impact of changes in household characteristics, and the impact of changes in the returns to these characteristics. Finally, and this is a new idea, conditional between group inequality measures can be computed from the same regression estimates so as to assess the micro determinants of inequality. These conditional inequality measures avoid the pitfalls of standard group decompositions of the Gini index which, when applied to one a variable at a time such as education, cannot assess the impact of education on inequality without bias since they do not control for characteristics correlated with education.

The methodology is applied to five rounds of the nationally representative Household Expenditure Surveys (hereafter HES) of the Bangladesh Bureau of Statistics (hereafter BBS) spanning the years 1983 to 1996. Bangladesh is an important case study because of the extent of poverty there and the lack of research on inequality. For poverty, this paper follows up on work by Rahman and Haque

(1988), Ahmed et al. (1991), Khundker et al. (1994), Rahman et al. (1995), Ravallion and Sen (1996), Ravallion and Wodon (1999), and Wodon (1997). Among these, Ravallion and Wodon (1999) and Wodon (1997) are the only studies using household level data, but only up to the survey year 1991-92. For inequality, published results are much fewer. Osmani (1982) presented estimations based on surveys conducted between 1963-64 and 1973-74. The contributions of Khan (1986) and Rahman (1988) were based on surveys up to the early 1980's. Rahman and Huda (1992) considered inequality between occupational groups using the 1983-84 HES. The BBS (1998) does report estimates of inequality for the urban and rural sectors as a whole, but these measures are over-estimated because the BBS does not adequately take into account price differentials between areas. Using group data for 1991-92, Ravallion and Sen (1996) also estimated urban and rural Ginis, but they could not investigate in any further detail the impact of household characteristics such as education, land ownership, location, and occupation on inequality (or on poverty) because they did not have access to the household level data.

Section two sketches the big picture as to what happened to poverty and inequality in Bangladesh between 1983 and 1996. Section three analyzes the micro determinants (and changes thereof) of consumption, poverty, growth, and inequality, while introducing the method to compute conditional indices of between group inequality. Section four extends the work on inequality. A conclusion follows.

II The big picture: poverty, inequality, and decompositions

II.1. Methods

Five rounds of the Household Expenditure Surveys of the BBS are used, corresponding to the years 1983/84, 1985/86, 1988/89, 1991/92, and 1995/96. The five rounds cover from 3,840 to 7,240 households per round. Poverty lines are used not only for computing poverty measures, but also as price deflators for estimating growth and inequality in real per capita consumption, which is preferred to income as an indicator of standards of living. The methodology used for estimating the regional lower (identifying the very poor) and upper (identifying the poor) poverty lines is described in Wodon (1997).

Welfare ratios are used for measuring consumption. They are defined as the household's per capita consumption normalized by the appropriate regional poverty line so that differences in costs of living between regions are taken into account. A welfare ratio equal to one indicates that the household has consumption at the level of the poverty line. The simplest poverty measure is used throughout: this is the headcount index or share of the population below the poverty line (for higher order poverty measures, see Wodon, 1998a). Growth is measured at the aggregate level by changes in average welfare ratios over time. Finally, Gini indices are used as measures of inequality: they are also computed using per capita consumption normalized by the poverty lines to compare real rather than nominal standards of living.

Headcount indices (as well as welfare ratios) are additive, which ensures that the measure for a group is equal to the sum of the measures for its subgroups when the subgroup measures are weighted by the population shares of the subgroups. Sectoral decompositions (e.g. Ravallion and Huppi, 1991) use this feature to account for the impact of various sectors on national changes in headcounts. Denote the national headcount P^t and P^{t+1} between two dates t and t+1. Denote by P_k^t the poverty measure for sector k (k = urban, rural), and by w_k^t the population share of sector k in t. It follows immediately that:

$$P^{t+1} - P^t = w_u^t(P_u^{t+1}-P_u^t)+w_r^t(P_r^{t+1}-P_r^t)+\Sigma_k (w_k^{t+1}-w_k^t)P_i^t+\Sigma_k (w_k^{t+1}-w_k^t)(P_k^{t+1}-P_k^t) \quad (1)$$

Intra-sectoral changes in poverty between the two years are captured by the first two terms, while the third term captures the impact of intersectoral population shifts, i.e. migration. The fourth term, accounting for covariance, is typically small and can be neglected. The results of this decomposition will be presented in a slightly different form below, by computing what national poverty would have been if one takes into account urban changes only, rural changes only, or migration only. For example, taking into account changes in urban poverty only, national poverty at t+1 would be $P^t + w_u^t(P_u^{t+1} - P_u^t)$.

Gini indices are not additively decomposable. To measure the contribution of urban and rural areas to the national Gini, a decomposition proposed by Yitzhaki and Lerman (1991) is used[2]. Denote by y the per capita consumption of households, F their rank in the cumulative distribution of consumption of their own group (F is 0 for the poorest and 1 for the richest household), F_N their rank in the cumulative distribution of all households except those of their own group, and y_k the mean per capita consumption for households in group k. Denoting by cov_k (y, F) the covariance between y and F over the members of group k, the Gini index G_k and the stratification index Q_k for group k are defined as:

$$G_k = 2cov_k (y, F)/y_k \qquad (2)$$

$$Q_k = cov_k [y, (F - F_N)]/cov_k (y, F) \qquad (3)$$

The Gini index takes a value between 0 (complete equality within the group) and 1 (extreme inequality). The stratification index takes a value between -1 and 1. When $Q_k = 1$, group k forms a perfect stratum, so that no household in the group has consumption lower (higher) than the best (worst) off household in the previous (next) group. When $Q_k = -1$, the households in group k have consumption levels at the two extremes of the distribution, with all households from other groups falling in between. That is, group k consists of two perfect strata. When $Q_k = 0$ for all k's, the groups overlap completely: they do not form any strata at all. Using (2) and (3), Yitzhaki and Lerman (1991) proved that the Gini can be decomposed into three components:

$$G = \Sigma_k S_k G_k + \Sigma_k S_k G_k Q_k (P_k - 1) + 2 cov(y_k, F_k)/y_T \qquad (4)$$

where F_k is the mean rank of households in group k, P_k is the population share of group k, S_k is the consumption share of group k, and y_T is the mean consumption in the country as a whole. The first term in equation (4) is the within group inequality. It is a weighted sum of the within group Ginis with the

[2] Other group decompositions of the Gini index of inequality indices have been proposed, but the interest of the decomposition by Yitzhaki and Lerman (1991) lies in that its remainder has an intuitive interpretation as a

weights defined as the consumption shares. The second term accounts for stratification or overlap between the groups. It is typically negative because the stratification indices Q_k tend to be positive, and because the population shares P_k are less than one. The third term accounts for the between group inequality. It is a direct extension of the covariance based expression for the Gini index given in (2) as applied to group mean consumption and ranks. Given equation (4), changes in the Gini index over time can be decomposed into changes in within group inequality, between group inequality, and stratification.

II.2 Results

Tables 1 to 3 give the welfare ratios, poverty measures, and Gini indices at the national, rural, and urban levels for the five survey years, as well as the results of the above decompositions.

Looking first at the sectoral decomposition for poverty, it is seen that urban and rural poverty moved hand in hand in all years, first decreasing from 1983-84 to 1985-86, then increasing from 1985-86 to 1991-92, and then decreasing again from 1991-92 to 1995-96. Given these joints movements, national trends are probably at work. Note that there may be problems with the 1985-86 survey since the growth in per capita consumption observed for that year is not observed in the National Accounts of Bangladesh. Downplaying the results for that year, one finds relatively stable poverty in both urban and rural areas between 1983-84 and 1991-92, and a significant decrease thereafter. Note also that migration contributed to the decrease in poverty over time, but only for about half a percentage point. In the decomposition, it is assumed that households migrating to urban areas face a change in their probability of being poor equal to the difference in poverty between the two sectors. While this is ad hoc, it is coherent with expected positive returns from migration. All results are similar with the lower and upper poverty lines.

What happened to inequality? It increased in both sectors over time (with a small drop in 1991-92, see Table 1), but more so in urban than in rural areas. The group decomposition of the Gini index in Table 3 indicates that the increase in the national Gini was due in part to the increase in inequality

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measure of stratification or overlap between groups (see also Formby et al., 1997).

between urban and rural areas since the between group component of the decomposition increased over time, especially in 1995-96 for the lower poverty lines. Over time, the increase in the within group and between group components of the decomposition were of a similar order of magnitude.

III Micro determinants of consumption, poverty, growth and inequality

III.1. Methods

In the previous section, we have presented a big picture as to what happened to poverty and inequality in Bangladesh from 1983 to 1996. But what are the determinants of poverty and inequality, as well as of per capita consumption and growth in average consumption over time? To answer this question, a single set of regressions can be used for each one of the HES surveys. Following standard practice, we use the semi-log specification since per capita consumption (the dependant variable) is not normally distributed. These regressions in urban (U subscript) and rural (R subscript) areas are simply:

$$\text{Urban equation: } \text{Log } y_{Ui} = \beta_U' \mathbf{X_i} + \varepsilon_{Ui} \qquad (5.1)$$

$$\text{Rural equation: } \text{Log } y_{Ri} = \beta_R' \mathbf{X_i} + \varepsilon_{Ri} \qquad (5.2)$$

Separate regressions are used for both sectors because the returns to household characteristics may differ between sectors. The dependent variables are the log welfare ratios (logs of nominal per capita consumption divided by the poverty line of the area in which the household lives). The independent variables are the same for both sectors. Apart from a constant, they include: (a) geographic location according to 17 districts (each household, whether urban or rural, lives in one of these districts); (b) household size variables: the number of babies, children, and adults, as well as the square of the number of babies, children, and adults; (c) other demographic and gender variables: the age of the household head and its square, the sex of the household head, and the family structure of the household, such as a head with a spouse, a head without a spouse but nevertheless married, a head without a spouse and single, or a head without a spouse and divorced or widowed; (d) education variables: the education level of the head

and the spouse along five categories (illiterate, some primary school, primary school completed, some secondary school, and secondary school completed or higher); and (e) occupation variables: the household head's main occupation or field of employment (twelve occupational classifications are used: five agricultural, six non agricultural, and a classification for non working heads). In addition, for the survey years 1988-89, 1991-92, and 1995-96, we also know (f) the amount of land owned by the household (five categories are considered, from the landless to those with more than 2.50 acres of land); and (g) the religion of the household.

The regressions (5.1) and (5.2) can be used for assessing the impact of household characteristics on consumption since the parameters in β_U and β_R give the percentage increase in consumption associated with these characteristics. The regressions can also be used to asses the impact of changes in household characteristics on the probability of being poor. Denoting the cumulative normal density by F, its first derivative (the density function) by f, and the standard error of, say, the urban regressions by σ_U, the impact on the probability of being poor of a marginal change in a continuous characteristic X_A is $-\beta_A f(-\beta_U'\mathbf{X_i}/\sigma_U)/\sigma_U$ since the urban probability of being poor for a household with characteristics $\mathbf{X_i}$ is obtained through:

$$\text{Prob}\,[\text{Log}\, y_{Ui} \leq 0] = \text{Prob}\,[\beta_U'\mathbf{X_i} \leq \varepsilon_{Ui}] = F[-\beta_U'\mathbf{X_i}/\sigma_U] \qquad (6)$$

Due to properties of the linear regressions, the expected consumption levels in the urban and rural sectors obtained by conditioning on each sector's sample means must equal the actual mean values observed in the two sectors. This in turn provides for a way to assess the impact of household characteristics and the returns to these characteristics on growth. Consider a change in mean per capita consumption from time t to t+1. Denoting by $\mathbf{X_U}$ the mean characteristics of all urban households, the growth in urban (or rural) per capita consumption between t and t+1 can be decomposed as follows:

$$\text{Growth} \approx E^{t+1}\,[\text{Log}\, y_U] - E^t\,[\text{Log}\, y_U] = (\beta^{t+1}{}_U' - \beta^t{}_U')\mathbf{X}^t{}_U + \beta^t{}_U'(\mathbf{X}^{t+1}{}_U - \mathbf{X}^t{}_U) + R \qquad (7)$$

The first term in this decomposition accounts for the impact of changing returns over time, while the second term accounts for the impact of changing household characteristics. There is a reminder (covariance term) which is typically small. The decomposition can be implemented to assess the impact of changes in returns and characteristics for sub-groups of variables by partitioning the vector **X**.

Finally, the regressions can be used to assess the micro determinants of inequality. When using the unconditional group decomposition of the Gini index, we found that in 1995-96, the between group inequality term accounted for fifteen percent of the national Gini (see Table 3). This does not mean that urban-rural location in itself makes such a difference. The inequality between urban and rural households may be due to difference in household characteristics, and/or in returns to these characteristics (which are sector specific). An example will make this clear.

To estimate the inequality between households differing only in terms of sectoral location, the national sample means $\mathbf{X_N}$ can be used to compute the urban and rural expected consumption for nationally representative households. These are given by $\exp(\beta_U'\mathbf{X_N})$ and $\exp(\beta_R'\mathbf{X_N})$, which were equal to 1.479 and 1.236 in 1995-96. These conditional values are lower than the actual welfare ratios in the two sectors given in Table 1 (2.318 in urban areas and 1.286 in urban areas). This is because urban (rural) households tend to have characteristics such as education (land) which have a higher return in urban (rural) areas. When conditioning on national means, we impose nationally representative household characteristics which are less favorable in each sector than the sample mean characteristics of the sectors themselves. Next, note that if all rural households are assigned the same expected welfare ratio of 1.236, the mean expected rank for rural households, denoted by $E(F_R)$, must be equal to half the rural population share (0.4173 in 1995-96), and the mean rank for urban household, $E(F_U)$, must be equal to the rural population share plus half the urban population share (0.9173 in 1991-92). Given the expected consumption and rank for nationally representative households in the two sectors, and recalling the formulae for the between group Gini in equation (4), the urban-rural conditional between group Gini, denoted as CBGG, can be computed as $2\ \mathrm{cov}[\exp(\beta_k'\mathbf{X_N}), E(F_k)]/E(y_T)$, where k = U, R and $E(y_T)$ is

the national mean welfare ratio (given in Table 1 as equal to 1.456) and appropriate weights are used in the covariance. It turns out that the CBGG[3] is equal to for 1995-96 to 0.0230, which is about half the unconditional between group inequality (0.0479) as reported in Table 3.

Two lessons can be learned from this exercise. First, conditional between group Ginis tend to be lower than their counterparts obtained using unconditional decompositions because these decompositions over-estimate the contribution of sectoral location to inequality since they do not account for the fact that urban households have better characteristics (fewer children, better education, and better occupations) than rural households. Rural households do have some advantages (more land), but this does not compensate for the loss in per capita consumption due to larger household sizes, lower education, and less remunerative occupations. The second lesson is that comparisons over time of unconditional between group Ginis may be deceptive since there is no guarantee that conditional between group inequality measures (which better represent the impact of given characteristics on between group inequality) will increase or decrease when unconditional measures do. Or at least, the order of magnitude in the changes in CBG Ginis may differ from that observed for the changes in unconditional between group Gini.

Conditional between group Ginis can be estimated for groups defined along any one dimension (such as education, land ownership, etc.), and this can be done within urban anr rural areas, as opposed to nationally. To show this algebraically, partition **X** in, say, the urban regression into **G** (the vector of dummies for the groups for which the CBGG measure is to be computed) and **Z** (all other variables), so that the regression can be rewritten as:

$$\text{Log } y_{Ui} = \gamma_U' \mathbf{G_{Ui}} + \delta_U' \mathbf{Z_{Ui}} + \varepsilon_{Ui} \qquad (8)$$

[3] As for the unconditional between group Gini, each of the two terms in the covariance formula for the conditional between group Gini (CBGG) must be multipled by the sectoral population shares w_k in order to weight each of the two observations (one per sector) by its size. Note also that the mean rank is 0.50, which is the value to be used in the covariance. Thus, CBGG=2*[0.8346(1.236-1.456)(0.4173-0.5)+0.1654(1.479-1.456)(0.9173-0.5)]/1.456.

Let the sample mean of **Z** in urban areas be denoted by $\mathbf{Z_U}$. Conditioning on the urban sample mean characteristics, the expected consumption for group k can be computed as:

$$E[\text{Log } y_U \mid \mathbf{Z_i} = \mathbf{Z_U}, \mathbf{G_i} = \mathbf{G^k}] = \gamma_U'\mathbf{G^k} + \delta_U'\mathbf{Z_U} \qquad (9)$$

where $\mathbf{G^k}$ is a vector with zeroes except for the kth row which has value one. By ranking the expected values for the various groups obtained from (9), one finds the expected ranks $E(F_{Uk})$ in the overall distribution of consumption in the urban sector. Denoting by y_U the mean urban welfare ratio, the conditional between group Gini in the urban sector is computed as (as before, all households in group k are assigned the same conditional consumption and rank):

$$CBGG_{U(\text{for groups G})} = 2\ \text{cov}[\exp(\gamma_U'\mathbf{G^k} + \delta_U'\mathbf{Z_U}), E(F_{Uk})]/E(y_U) \qquad (10)$$

III.2 Results

The regressions (5.1)-(5.2) were estimated with robust standard errors. Tables 4 and 5 provide the results for the rural and urban sectors. The coefficients represent percentage changes in per capita consumption associated with household characteristics. The following comments can be made:

- Location: Households living in the Dhaka district (excluded dummy in the regressions) are better off than households living in other districts, especially for urban areas. Yet, the districts of the Chittagong division (Chittagong, Comilla, Sylhet, Noakhali) also perform very well.
- Demographics: Larger families tend to have lower levels of per capita consumption (but as is well known, this ranking could be reversed with a different equivalence scale). There is some evidence that household with female heads have lower consumption (e.g. in rural areas in 1996-96). Heads without a spouse who are either married, or single, fare better than households with a spouse.
- Education: The returns to education are large, and they are similar for both the household head and its spouse. In urban areas in 1995-96, a household with both the head and the spouse having completed secondary school ("higher level" in the regression) have an expected per capita consumption almost

double that of a similar household with illiterate head and spouse (excluded dummies in the regressions). In rural areas, the corresponding differential is lower, but still high at about 60 percent.

- Occupation: There are also large differences in standards of living by occupation (the excluded category is agricultural workers without land), with non-farm households being better off than many farm households in rural areas (especially when compared to agricultural workers).
- Land and religion: The returns to land are significant and large, especially in rural areas where a household with more than 2.50 acres of land has a per capita consumption 40 percent higher than a landless household. By contrast, religion has no major impact on standards of living.
- Urban-rural differences: Different models are clearly at work in the two sectors, for example with statistically larger returns to land in rural areas, and statistically (at the 5 percent level) larger returns to education in urban areas. The impact of location also varies by area within each of the two sectors.

The impacts of household characteristics on poverty need not be discussed separately since they are proportional to the estimated parameters once the value of the density functions $f(-\beta_U'\mathbf{X_i}/\sigma_U)$ and $f(-\beta_U'\mathbf{X_i}/\sigma_R)$ are estimated, for example at the mean of the urban ($\mathbf{X_U}$) and rural ($\mathbf{X_R}$) samples.

What about the micro determinants of growth? Table 6 provides the results of the decomposition (7) for the period 1983 to 1996 and also for the last five years 1991 to 1996. The results for 1983 to 1996 must be interpreted with caution since the variables in the regressions are not exactly the same (land and religion information became available in the data after 1988). Key findings are as follows:

- Location: Looking at the whole period, one can see that the differential in standards of living between the capital district of Dhaka and all other areas has widened over time, especially for rural areas where this gap contributed to a negative growth of 13.87 percentage points. This widening gap took place between 1983 and 1991 however, since for the last five years, the difference in the returns is close to zero. Note that the difference in location characteristics (share of the households in the various areas) should not be given a causal interpretation since these result from the sampling frame rather than from household behavior such as migration.

- Demographics: Changes in the returns to demographic variables account for the lion's share of the change in per capita consumption over time. Unfortunately, these changes are difficult to interpret. The negative coefficient for the number of adults has decreased in absolute value over time, which may signify that a lager share of adults bring income to the household (e.g. increased participation by women in the labour force). The rising positive coefficient for the age of the head variable indicates that households with older heads fare better. Yet even if the changes in the returns to demographics are not easy to interpret, it is important to know that these changes rather than any other contributed the most to the increase in per capita consumption. Finally, note that as expected, the decrease in household size (reduced fertility over time) also contributed to the rise in standards of living.
- Education: The returns to the education of the head have increased in urban areas, and decreased in rural areas. For the education of the spouse, the returns have remained stable in urban areas, and increased in rural areas. These result are somewhat puzzling since the proportions of households falling in the various education groups have been relatively stable (the increase in primary and secondary enrollment in Bangladesh over the last fifteen years has not yet shown up in the education levels of heads and spouses). If the proportion of heads having completed primary school had increased dramatically, the returns to education could have been expected to decrease because of the additional pressure on wage markets of adult primary school graduates. But this has not been observed in urban areas where wage markets are more extended. It is in rural areas where many heads are self employed that the returns moved downward. It could however be that the higher returns to education for heads in rural areas in 1983-84 and 1985-86 are due to a positive correlation between education and land ownership (omitted variable bias for these years). The increasing returns to education for spouses in rural areas may also denote a larger participation by women in income generating activities over time. Still, the changes overe time in the returns to education remain relativelly small, so that we may expect the returns to remain high at least in the near future.

- Occupation: Overall, the returns to occupation are also rather stable over time. In rural areas, they are decreasing for 1983 to 1996, but increasing over the last five years of that period. It is however difficult to make judgments on these changes and on the changes in characteristics because despite efforts to codify the variables in a consistent way, there are still differences between 1983-84 and 1985-86 and the following years due to survey design (for example, it is unlikely that the actual share of owner farmers increased dramatically between 1985-86 and 1988-89, or that the actual share of factory workers and artisans decreased dramatically at the same time as indicated in the data).
- Land and religion: The returns to land are also remakebly stable from 1988 to 1996. In rural areas, while the share of large landowners (more than 2.50 acres) has decreased, the share of other groups has remained stable, with a small increase in near landlessness (0.05 to 0.49 acres). This indicates fragmentation of land probably due to inheritance. Religion has little impact on consumption.
- Urban-rural differences: Changes in the returns to demographic characteristics have had an even larger impact in urban than in rural areas. The other major differences have been noted above: they relate for example to the returns to location and to the education of the head for the period 1983-1996. Still, overall, there is a lot of stability in both returns and characteristics for the two sectors.

Finally, what about the determinants of inequality? Table 7 provides the conditional between group Ginis for various sets of household characteristics in the urban (conditioning on mean urban characteristics) and rural (conditioning on mean rural characteristics) sectors for the five years. Within each sector, the sum of the CBGGs need not equal the unconditional Gini of the sector. In the urban sector, education of the head has the highest CBGG (at least in 1995-96), while in the rural sector land ownership matters more. In 1995-96, each of these groups of variables accounted for about 30 percent of the sectoral Ginis, followed closely by location. The CBGGs for other variables are smaller. The CBGG for education of the head increases (decreases) over time in urban (rural) areas, mirroring the increase (decrease) in the returns to education in urban (rural) areas. Occupation contributes less to inequality over time in both sectors, while geographic location has a rising CBGG.

The above results have implications for public policies. For example, Bangladesh has a number of education programs designed to boost school enrollment and attendance. Food for Education providers rice rations to poor kids in poor villages as incentives for them to attend primary school. The program has been shown to increase school attendance by twenty percent. There is also a national program providing stipends for girls to attend secondary school. Without going into a cost-benefit analysis here, the fact that the returns to education have remained high (and relatively stable) over a fifteen year periods calls for pursuing such investments in education. Bangladesh also has a number of well known semi-public (Grameen Bank, PKSF) and non governmental organisations (BRAC, ASA, Proshika) providing micro-credit for the poor. Micro-credit can be seen as a tool to promote occupational choice, so that landless agricultural workers can work in fisheries, live stock, and forestry, or join the rural non farm sector. The high returns to occupation observed here after controlling for education indicate that micro-credit programs can be effective in enhancing the prospects of the landless through occupational shift.

IV Further results on between group inequality

While the above results are important for policy, the main methodological contribution of this paper consists in the concept of conditional between group inequality. The concept can be used for assessing the micro determinants of inequality. It can also be used for policy simulations. Below, we compare the use unconditional and conditional measures of between group inequality for policy.

IV.1 Unconditional between group Gini

Extensions to the decomposition (4) can be used for policy simulations. Consider the introduction of a tax targeted to one group which has the effect of reducing the consumption of the households belonging to that group. For simplicity, if the new tax imposed on group g is equal to t_g (taking a value between 0 and 1), it will be assumed that the households of that group will consume $(1- t_g)$ times their

previous consumption. Then, as shown in Wodon (1999), as t_g tends to zero, the impact on the Gini of implementing the new tax on group k can be computed as:

$$\frac{\partial G}{\partial t_g} = S_g[G_g - \sum_k S_k G_k + G_g Q_g (P_g - 1) - \sum_k S_k G_k Q_k (P_k - 1) + \frac{2y_g}{S_g y_T}(F_g - 0.5) - 2\sum_k (F_k - 0.5)\ ] \quad (1$$

The two key assumptions for this result are, first, that the consumption of other groups is not affected when the consumption of group k is modified at the margin, and next, that the changes in consumption induced by the tax are sufficiently small so as to not affect ranks. Then, the sectoral Ginis and stratification indices will not change, and only the sectoral consumption shares will be affected, which can be used to derive (11). In (11), the change in the within group component is S_g (G_g - Σ_k $S_k G_k$). If urban households are taxed (negative t_g), the urban and rural Ginis will remain unchanged but the within group inequality component will decrease since for Bangladesh the urban Gini is larger than the rural Gini. The change in stratification is S_g [$G_g Q_g$ (P_g - 1) - Σ_k $S_k G_k Q_k$(P_k - 1)]. If the urban group is taxed, it can be shown that stratification will increase (decrease in absolute value). The changes in the within group and stratification terms are typically small and offset each other. The change in the between group Gini is larger, and it represents a good approximation of the change in the national Gini. When multiplied by the share S_g, the last two terms in (11) account for the change in the between group term. In other words, denoting the unconditional between group Gini by UBGG, this change is simply:

$$\frac{\partial UBGG}{\partial t_g} = \frac{2y_g}{y_T}(F_g - 0.5) - 2S_g \sum_k (F_k - 0.5) \qquad (12)$$

An urban tax will reduce the between group Gini. Table 8 gives the values of the partial in (12) for the various years and for urban and rural areas. Using the lower poverty lines measures of real consumption, a one percent reduction in rural consumption following a rural tax would increase the unconditional urban-rural between group inequality (and to a good approximation the national Gini) by -

0.21 percentage points in 1983-84, which given the national Gini for that year of 25.53, would result in an absolute increase of about 0.05 points. A one percent reduction in urban consumption following an urban tax would reduce the national Gini by approximately 0.31 percentage points, translating into an absolute reduction of the national Gini of about 0.075 points. It is interesting to note that urban taxes (and rural transfers) would be more effective in reducing national inequality in 1995-96 than fifteen years before, since the partial for 1995-96 is 0.74, more than double its value in 1983-84. This is of course due to the fact that the inequality between urban and rural areas has increased over time. The impacts are smaller with the consumption measures adjusted with the upper poverty lines, but inequality is then smaller too.

Given (12), we can also assess the impact of a marginal increase in taxes for urban households used to provide a marginal transfer for rural households. Denoting by g the rich group (urban) and by k the poor group (rural), it must be for deficit neutrality that $dt_k = - (S_g / S_k) dt_g$. In 1983-84, a one percent tax on urban households would provide funds for a rural transfer of 0.18 percent (S_g / S_k). In 1995-96, due to higher standards of living and larger population in urban areas, the corresponding expenditure share ratio is 0.36. Then, still with the lower poverty lines, and still using the change in the between group Gini as a good approximation of the change in the national Gini, one finds that the combination of the two marginal changes would reduce the national Gini in 1995-96 by 0.74 + 0.36*0.33 = 0.85 percent.

IV.2 Conditional between group Gini

The conditional between group Ginis can also be used for policy simulations. Consider a central government wishing to invest in the infrastructure of less well endowed areas so as to equalize the standards of living of households living in different locations but otherwise identical in terms of their characteristics. Some of the government's motivation might be to simply provide better infrastructure and access to basic services in poor areas. But the government may also want to reduce migration within the country. In Bangladesh itself, the population of Dhaka city is increasing very rapidly, which tends to create large slums and brown environmental issues among other problems. If the government cares about

migration, its objective will not be to target the areas which have lower standards of living due to the concentration of households with poor characteristics (e.g. less education), but rather to target the areas where inhabitants are at a disadvantage due to their location (controlling for other characteristics).

The conditional impact of location on consumption is captured in (5.1) and (5.2) by the coefficients of the district dummies. Negative values for these parameters indicate less well endowed district, as compared to the excluded district of Dhaka (the capital). Denote the per capita investment in, say, the urban areas of district g by $i_g = I_g/N_g$ where I_g is the total investment and N_g is the urban population in the district. The rate of return is r_g, and pre-investment mean consumption is y_g. If all inhabitants benefit from the investment in proportion of their current consumption, each household sees its consumption multiplied by $(1 + t_g)$ where $t_g = r_g\, i_g /y_g$. Then, the expected standard of living of a representative urban household living in the urban areas of district g after the investment is:

$$E[\text{Log } y_U \mid \mathbf{Z_i} = \mathbf{Z_U}, \mathbf{G_i} = \mathbf{G^k}, I_g] = \gamma_U'\mathbf{G^k} + \delta_U'\mathbf{Z_U} + t_g \qquad (13)$$

In (13), $\gamma_U'\mathbf{G^k}$ represents the parameter estimate for the kth dummy among the geographic identifiers. Setting $t_k = t_g$ for district g, and zero otherwise, the new conditional between group Gini for geographic location in the urban sector is (if the investment is sufficiently small not to modify the ranks):

$$CBGG_U = 2\, \text{cov}[\exp(\gamma_U'\mathbf{G^k} + \delta_U'\mathbf{Z_U} + t_k), E(F_{Uk})]/E(y_U) \qquad (14)$$

To completely avoid urban to urban migration, assuming free mobility and zero costs for moving, the CBGU must be set to zero. In other words, to nullify the conditional contribution of location to inequality within the urban sector, the investment (and possibly corresponding taxes in rich areas, so that t_k can be negative) should be set such that $\gamma_U'\mathbf{G^k} + t_k$ are equal to a common value δ for all k's, in which case all conditional ranks will also be equal. Such a policy would help in stopping migration since households could not expect better standards of living by moving to better endowed areas. The same

reasoning could be applied to rural to rural migration using the parameter estimates from the rural regression, and to rural to urban migration as well by combining the results of both regressions[4].

Providing policy simulations using the above methodology would go beyond the scope of this paper because more detailed work would have to be prepared regarding various assumptions and policies. But it is worth noting again that the regression coefficients in Tables 4 and 5 give an idea of the magnitude of the transfers which would be needed in order to nullify (costless) migration and conditional between group inequality. In order to avoid urban to urban migration from the Mymensingh to the capital city of Dhaka, per capita consumption in urban Mymensingh would have to rise by 39.75 percent. If investments in urban Mymensingh were to generate a fifteen percent increase in consumption, this might not be sufficient to stop migration to Dhaka, but it could result in migration into Mymensingh from adjacent districts such as Tangail/Jamalpur who with the policy would then be conditionally poorer than Mimensingh (the conditional difference in consumption between the two areas is 7.5 percent in 1995-96).

One could also assess the impact on conditional between group inequality of investments in household characteristics such as education. If the returns stay the same (which is not unrealistic in the near term given their stability so far), and if the policy consists in decreasing the share of the illiterate and increasing the share of those completing primary school, all that will change are the conditional ranks for each education group, so that the new conditional between group Gini can be computed.

V. Conclusion

This paper analyzed the micro determinants (and changes thereof over time) of consumption, poverty, growth, and inequality in Bangladesh from 1983 to 1996 using simple regressions. Education, demographics, land ownership, occupation, and location all affect consumption and poverty. The gains in

[4] More generally, given a budget B for geographic investments (provided by the government or by international donor agencies), the budget constraint is $B= \Sigma_k I_k$. The k equations $\delta_k + t_k = \delta$ and the budget constraint form a linear system from which, given B and the δ_k's, δ can be computed or alternatively, given the objective δ and the estimated δ_k's, the necessary budget B can be obtained.

per capita consumption associated with many of these household characteristics remained stable over time. The returns to demographics (household size variables) had a large contribution to growth, which could be a result of improving employment opportunities for women. Education and land contribute the most to inequality, in respectively urban and rural areas, followed by location in both sectors.

From a methodological point of view, the concept of conditional between group inequality was introduced. While existing group decompositions of the Gini index along one variable do not control for other characteristics correlated with that variable, conditional between group Ginis avoid this pitfall. It was also shown how to use unconditional and conditional between group Ginis for simulating policies.

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Table 1: Measures of growth, inequality, and poverty (Bangladesh, 1983-84 to 1995-96)

	Headcounts					Welfare ratios					Gini indices				
	83-84	**85-86**	**88-89**	**91-92**	**95-96**	**83-84**	**85-86**	**88-89**	**91-92**	**95-96**	**83-84**	**85-86**	**88-89**	**91-92**	**95-96**
	Lower poverty lines					**Lower poverty lines**					**Lower poverty lines**				
Nation	40,91	33,77	41,32	42,69	35,55	123,46	135,47	128,77	124,97	145,63	25,53	25,66	27,94	27,15	31,01
Rural	42,62	36,01	44,30	45,95	39,76	118,89	128,19	120,86	116,88	128,56	24,33	23,8	25,96	25,06	26,43
Urban	28,03	19,90	21,99	23,29	14,32	157,82	180,72	180,06	173,18	231,78	29,46	29,87	31,78	31,09	36,03
	Upper poverty lines					**Upper poverty lines**					**Upper poverty lines**				
Nation	58,50	51,73	57,13	58,84	53,08	103,11	113,05	108,94	102,39	116,36	25,38	24,73	27,02	25,92	29,34
Rural	59,61	53,14	59,18	61,19	56,65	101,05	109,97	104,75	97,82	107,76	24,62	23,58	25,71	24,34	26,47
Urban	50,15	42,92	43,88	44,87	35,04	118,62	132,19	136,1	129,57	159,79	29,31	29,34	31,35	30,68	35,28

Source: Author's estimates using the Household Expenditure Surveys of the Bangladesh Bureau of Statistics

Table 2: Sectoral decomposition of changes in poverty measures

			1983-4	1985-6	1988-9	1991-92	1995-96
Population		Rural share	88,25	86,14	86,64	85,62	83,46
		Urban share	11,75	13,86	13,36	14,38	16,54
Decomposition	**HL**	Actual	40,91	33,77	41,32	42,69	35,55
		Rural only	-	35,08	42,39	43,85	38,39
		Urban only	-	39,95	40,20	40,35	39,30
		Migration only	-	40,60	40,68	40,53	40,21
	HU	Actual	58,50	51,73	57,13	58,84	53,08
		Rural only	-	52,79	58,12	59,89	55,89
		Urban only	-	57,65	57,76	57,88	56,72
		Migration only	-	58,30	58,35	58,25	58,05

Source: Author's estimates using the Household Expenditure Surveys of the Bangladesh Bureau of Statistics.
Urban population shares in the HES are lower than in the census due to differences in definitions

Table 3: Group decomposition of national Gini and impact of marginal taxes and transfers

	1983-84		1985-86		1988-89		1991-92		1995-96	
	Term in decomp.	% of nat. Gini	Term in decomp.	% of nat. Gini	Term in decomp.	% of nat. Gini	Term in decomp.	% of nat. Gini	Term in decomp.	% of nat. Gini
Lower poverty line										
National Gini	25,53	-	25,66	-	27,94	-	27,15	-	31,01	-
Within group Gini	24,93	0,98	24,64	0,96	26,74	0,96	25,93	0,95	28,02	0,90
Stratification	-0,29	-0,01	-0,54	-0,02	-0,79	-0,03	-0,84	-0,03	-1,80	-0,06
Between group Gini (BGG)	0,89	0,03	1,56	0,06	1,99	0,07	2,06	0,08	4,79	0,15
Upper poverty line										
National Gini	25,38	-	24,73	-	27,02	-	25,92	-	29,34	-
Within group Gini	25,17	0,99	24,38	0,99	26,46	0,98	25,25	0,97	27,93	0,95
Stratification	-0,02	0,00	-0,01	0,00	-0,19	-0,01	-0,27	-0,01	-0,52	-0,02
Between group Gini (BGG)	0,23	0,01	0,36	0,01	0,75	0,03	0,94	0,04	1,93	0,07

Source: Author's estimates using the Household Expenditure Surveys of the Bangladesh Bureau of Statistics.

Table 4 Regressions for log consumption in rural areas

	83-84			85-86			88-89			91-92			95-96		
	Coeff.	St. Er.	Mean	Coeff.	St. Er.	Mean	Coeff.	St. Er.	Mean	Coeff.	St. Er.	Mean	Coeff.	St. Er.	Mean
Geographical area															
Mymensingh	-15,13 *	4,06	0,08	-27,30 *	3,81	0,08	-12,41 *	3,16	0,08	-21,41 *	3,03	0,08	-30,41 *	5,75	0,08
Faridpur	-8,00 *	4,02	0,06	-21,95 *	4,26	0,06	-24,72 *	3,48	0,06	-36,29 *	3,10	0,06	-28,87 *	5,88	0,05
Tangail/Jamalpur	-21,93 *	4,05	0,06	-26,19 *	3,98	0,06	-19,21 *	3,60	0,06	-36,60 *	3,05	0,06	-30,78 *	6,90	0,06
Chittagong	5,40	4,43	0,05	9,44 *	4,51	0,07	0,39	3,71	0,05	15,11 *	3,15	0,05	0,03	6,89	0,05
Comilla	0,41	3,68	0,08	-9,62 *	3,88	0,08	-10,99 *	3,19	0,08	-6,24 *	2,92	0,08	-13,10 *	6,33	0,08
Sylhet	19,34 *	4,32	0,07	14,81 *	4,00	0,07	15,63 *	3,43	0,07	17,32 *	3,09	0,07	-5,54	7,69	0,07
Noakhali	-7,10	4,33	0,05	-3,35	4,52	0,05	-9,09 *	3,60	0,05	-2,29	3,40	0,05	-9,08	7,30	0,04
Khulna	0,47	4,32	0,05	-18,02 *	3,95	0,04	-7,77 *	3,90	0,05	-22,75 *	3,46	0,05	-20,84 *	6,96	0,04
Jessore	-20,65 *	5,32	0,05	-21,05 *	5,10	0,04	-6,23	3,48	0,05	-8,05 *	3,37	0,05	-19,44 *	6,08	0,05
Barisal/Patuakhali	-1,34	3,99	0,08	-10,50 *	3,74	0,08	-16,94 *	3,17	0,08	-22,43 *	3,00	0,08	-28,15 *	6,45	0,10
Kushtia	-9,48	5,57	0,03	-23,45 *	4,93	0,03	-17,44 *	3,88	0,02	-16,57 *	4,03	0,03	-29,64 *	5,60	0,03
Rajshahi	-17,58 *	4,41	0,06	-24,48 *	4,77	0,06	-8,39 *	3,28	0,07	-32,92 *	3,10	0,07	-21,63 *	6,35	0,06
Rangpur	-12,21 *	3,71	0,08	-4,31	4,03	0,07	-16,23 *	3,18	0,09	-46,66 *	2,91	0,09	-35,08 *	6,85	0,09
Pabna	2,50	4,79	0,04	-10,97 *	4,30	0,04	-23,28 *	3,47	0,03	-29,02 *	3,48	0,03	-27,30 *	6,69	0,04
Dinajpur	-11,15 *	5,43	0,04	-16,81 *	4,42	0,04	-22,71 *	3,56	0,05	-30,01 *	3,47	0,05	-18,21 *	5,81	0,04
Bogra	-8,71	4,90	0,04	-30,03 *	4,34	0,04	-10,01 *	3,81	0,04	-28,11 *	3,73	0,04	-20,75 *	7,94	0,04
Demographics															
Number of babies	-16,18 *	1,76	1,14	-15,49 *	1,70	1,10	-20,47 *	1,61	1,06	-20,01 *	1,26	0,96	-20,77 *	1,25	0,84
Number of babies squared	1,42 *	0,50	2,43	1,92 *	0,49	2,25	2,33 *	0,53	2,15	2,84 *	0,41	1,90	2,72 *	0,42	1,53
Number of children	-13,82 *	1,66	1,44	-15,55 *	1,81	1,53	-15,35 *	1,28	1,45	-15,32 *	1,05	1,40	-14,13 *	1,02	1,48
Number of children squared	1,26 *	0,39	3,88	2,24 *	0,47	4,16	1,94 *	0,29	3,92	1,93 *	0,24	3,70	1,45 *	0,24	3,84
Number of adults	-10,08 *	2,14	3,12	-4,82 *	2,17	3,22	-8,84 *	1,61	3,03	-9,10 *	1,62	2,99	-6,68 *	1,31	2,94
Number of adults squared	1,11 *	0,24	12,21	0,49 *	0,24	13,04	0,82 *	0,16	11,58	0,77 *	0,18	11,39	0,66 *	0,14	10,78
Age of the head	0,89 *	0,39	42,98	0,64	0,40	43,85	0,90 *	0,33	42,73	0,57 *	0,26	42,62	1,05 *	0,27	43,24
Age of the head squared	-0,01	0,00	2054	0,00	0,00	2113	-0,01 *	0,00	2020	0,00	0,00	2009	-0,01 *	0,00	2053
Female head	-11,96	7,72	0,06	5,52	9,14	0,06	-1,01	4,75	0,04	-5,83	4,42	0,08	-12,60 *	4,01	0,10
No spouse, married	15,10 *	5,15	0,03	11,35	7,58	0,04	6,96	5,61	0,03	21,25 *	4,11	0,05	17,70 *	4,23	0,06
No spouse, single	8,54 *	4,32	0,05	10,25	5,37	0,04	10,46 *	3,89	0,04	11,60 *	3,52	0,04	7,01 *	3,30	0,03
No spouse, divorced/widowed	2,02	5,90	0,06	-3,58	8,21	0,06	-3,74	4,64	0,05	-0,70	4,33	0,05	1,41	4,03	0,06
Education of head															
Below class 5	11,79 *	2,25	0,20	10,91 *	2,08	0,17				6,23 *	1,47	0,20	6,19 *	1,59	0,14
Class 5	15,22 *	3,27	0,08	12,91 *	3,00	0,09	9,01 *	1,51	0,26	8,00 *	1,91	0,10	7,27 *	2,21	0,07
Class 6 to 9	17,05 *	2,97	0,12	16,12 *	2,95	0,12	18,65 *	2,41	0,11	10,39 *	2,23	0,10	12,65 *	2,09	0,12
Higher level	32,65 *	4,06	0,07	30,16 *	4,75	0,08	21,01 *	3,68	0,08	16,01 *	3,04	0,07	17,35 *	2,85	0,07

Table 2: continued

	83-84			85-86			88-89			91-92			95-96		
	Coeff.	**St. Er.**	**Mean**	**Coeff.**	**St. Er.**	**Mean**	**Coeff.**	**St. Er.**	**Mean**	**Coeff.**	**St. Er.**	**Mean**	**Coeff.**	**St. Er.**	**Mean**
Education of spouse															
Below class 5	4,93	2,58	0,13	0,06	2,54	0,11				5,04 *	1,70	0,12	4,32 *	1,86	0,09
Class 5	-0,78	4,09	0,06	7,21	4,08	0,07	3,54	1,98	0,16	11,92 *	2,51	0,07	9,21 *	2,33	0,07
Class 6 to 9	11,44 *	4,48	0,04	15,17 *	5,19	0,05	9,41 *	3,78	0,05	16,94 *	2,99	0,05	22,16 *	2,99	0,06
Higher level	28,98 *	10,72	0,01	40,66 *	12,38	0,01	19,45 *	9,67	0,01	25,11 *	7,91	0,01	39,41 *	6,75	0,01
Occupation of head															
Agricultural worker with land	4,58	3,40	0,17	2,93	2,93	0,13	9,38 *	2,62	0,07	9,51 *	2,09	0,07	10,76 *	2,14	0,09
Fisheries/forestry/live stock	44,16 *	8,37	0,00	-4,03	4,69	0,00	16,02 *	3,30	0,03	16,68 *	3,17	0,03	15,70 *	3,41	0,03
Tenant farmer	24,68 *	4,00	0,07	31,26 *	3,78	0,07	17,75 *	2,25	0,13	18,96 *	2,39	0,07	18,23 *	2,14	0,07
Owner farmer	19,63 *	4,77	0,04	28,60 *	4,78	0,04	14,07 *	2,53	0,18	17,55 *	2,02	0,26	23,46 *	2,36	0,21
Servant, day-laborer (non ag.)	15,70 *	7,91	0,01	17,66 *	6,01	0,01	8,74 *	3,44	0,04	8,71 *	3,06	0,04	11,24 *	2,90	0,05
Transportation, communiaction	14,27 *	4,16	0,08	21,07 *	3,00	0,07	21,59 *	3,35	0,04	19,13 *	2,75	0,05	19,06 *	2,69	0,07
Salesman, service, broker	24,32 *	5,64	0,02	20,61 *	4,73	0,03	21,91 *	3,21	0,04	19,14 *	2,99	0,03	22,15 *	2,71	0,05
Factory worker, artisan	37,23 *	3,33	0,29	34,56 *	2,73	0,28	20,86 *	2,85	0,05	14,88 *	3,21	0,03	20,28 *	3,77	0,03
Petty trader, small business	23,73 *	3,66	0,11	31,28 *	3,12	0,13	24,21 *	2,73	0,07	25,46 *	2,45	0,08	28,70 *	2,45	0,10
Executive, official, professor	22,88 *	4,61	0,06	25,46 *	4,85	0,07	23,84 *	3,82	0,06	26,46 *	3,39	0,05	23,79 *	3,46	0,04
Retired, student, not working	19,07 *	7,42	0,05	9,53	6,52	0,07	12,43 *	3,80	0,06	10,17 *	2,82	0,10	21,99 *	3,21	0,10
Land and religion															
0.05 to 0.49 acres							8,66 *	1,77	0,33	7,91 *	1,53	0,31	7,04 *	1,90	0,37
0.50 to 1.49 acres							13,23 *	2,37	0,18	17,11 *	1,86	0,21	15,83 *	2,17	0,21
1.50 to 2.49 acres							21,90 *	2,59	0,10	28,18 *	2,39	0,10	22,99 *	2,80	0,10
2.50 acres or more							39,86 *	2,91	0,20	41,99 *	2,47	0,16	42,81 *	2,94	0,14
Non Muslim							1,82	1,88	0,13	-5,04 *	1,75	0,10	0,82	2,45	0,11
Constant	10,44	9,62		12,67	10,39		11,29	7,91		17,60 *	6,50		10,76	8,91	
Number of observations	2108			1936			3770			3817			5039		
Adjusted R2	38,77			40,90			39,21			51.68			45,32		

Source: Author's estimates using the Household Expenditure Surveys of the Bangladesh Bureau of Statistics.

* indicates significance at 5% level. See text for excluded dummies.

Table 5 Regressions for log consumption in urban areas

	83-84			85-86			88-89			91-92			95-96		
	Coeff.	St. Er.	Mean	Coeff.	St. Er.	Mean	Coeff.	St. Er.	Mean	Coeff.	St. Er.	Mean	Coeff.	St. Er.	Mean
Geographical area															
Mymensingh	-23,77 *	5,13	0,04	-29,69 *	4,78	0,04	-22,98 *	4,96	0,04	-6,59	4,82	0,04	-39,75 *	7,29	0,03
Faridpur	-36,73 *	6,34	0,02	-43,04 *	6,24	0,02	-32,68 *	4,24	0,03	-25,14 *	5,00	0,03	-49,34 *	6,06	0,02
Tangail/Jamalpur	-33,24 *	6,71	0,03	-44,05 *	6,05	0,03	-60,91 *	9,03	0,01	-48,53 *	6,68	0,01	-32,23 *	8,52	0,03
Chittagong	6,53 *	2,72	0,15	5,60	2,89	0,14	3,05	2,84	0,14	-12,25 *	2,70	0,14	-5,22	5,32	0,14
Comilla	19,25 *	5,66	0,03	-17,44 *	5,87	0,03	-19,84 *	4,35	0,05	-43,61 *	3,99	0,05	-20,33 *	5,51	0,03
Sylhet	-11,67 *	9,12	0,02	-6,63	6,86	0,02	10,43	9,08	0,02	-9,07	6,01	0,02	-25,00 *	3,99	0,02
Noakhali	-11,80	6,66	0,02	-22,39 *	7,21	0,02	-46,25 *	5,09	0,01	-60,71 *	9,13	0,01	-24,06 *	11,63	0,03
Khulna	-17,59	3,54	0,08	-11,87 *	3,91	0,09	-12,96 *	3,25	0,09	-26,24 *	3,25	0,10	-39,83 *	4,98	0,11
Jessore	-27,01 *	5,13	0,04	-4,01	4,26	0,04	-15,62 *	4,88	0,03	-30,56 *	4,56	0,03	-14,16 *	6,39	0,03
Barisal/Patuakhali	-25,72 *	5,39	0,04	-25,58 *	4,00	0,04	-38,51 *	4,22	0,03	-46,88 *	5,02	0,03	-39,59 *	8,21	0,08
Kushtia	-43,96 *	7,46	0,02	-31,61 *	7,60	0,02	-21,74 *	5,89	0,02	-41,93 *	7,48	0,02	-47,10 *	17,18	0,03
Rajshahi	-29,72 *	4,86	0,05	-28,58 *	4,58	0,05	-17,83 *	4,23	0,04	-31,00 *	3,81	0,04	-23,55 *	6,29	0,08
Rangpur	-36,96 *	5,36	0,04	-21,95 *	4,10	0,04	-22,60 *	4,70	0,03	-30,10 *	4,96	0,03	-8,26	5,45	0,03
Pabna	-31,20 *	4,98	0,02	-38,12 *	5,51	0,02	-11,95 *	5,22	0,03	-29,66 *	5,92	0,02	-10,64	11,83	0,03
Dinajpur	-20,63 *	6,68	0,03	-25,31 *	5,52	0,03	-34,30 *	3,50	0,03	-36,48 *	4,91	0,03	-40,32 *	5,47	0,02
Bogra	-16,22	8,98	0,01	-24,94 *	8,22	0,01	-49,09 *	7,99	0,01	-22,01 *	7,37	0,01	-15,26	9,73	0,02
Demographics															
Number of babies	-19,38 *	2,18	0,95	-14,91 *	1,44	0,96	-16,75 *	2,62	0,89	-24,21 *	2,41	0,81	-26,39 *	2,66	0,68
Number of babies squared	1,82 *	0,67	1,90	1,33 *	0,28	1,95	1,20	0,94	1,66	3,37 *	0,87	1,43	4,06 *	1,08	1,10
Number of children	-17,77 *	1,70	1,61	-16,30 *	1,99	1,67	-19,63 *	1,89	1,45	-15,87 *	1,74	1,38	-13,62 *	1,87	1,38
Number of children squared	2,33 *	0,36	4,49	1,94 *	0,44	4,65	2,66 *	0,45	3,86	1,64 *	0,42	3,65	1,35 *	0,46	3,47
Number of adults	-8,44 *	2,07	3,31	-9,18 *	2,02	3,45	-11,95 *	2,13	3,27	-8,65 *	2,29	3,15	-3,17	2,21	3,23
Number of adults squared	0,82 *	0,21	14,18	0,88 *	0,21	15,00	1,03 *	0,22	13,95	0,76 *	0,24	12,86	0,44	0,24	13,32
Age of the head	0,59	0,54	41,41	0,77	0,52	43,00	1,02 *	0,50	41,38	0,24 *	0,53	41,05	0,96 *	0,42	42,69
Age of the head squared	0,00	0,01	1863	0,00	0,01	2001	-0,01	0,01	1858	0,00	0,01	1826	-0,01	0,00	1976
Female head	-14,10	7,29	0,05	-20,17 *	9,87	0,05	-5,30	6,73	0,04	-0,42	6,18	0,07	2,24	5,02	0,11
No spouse, married	35,84 *	5,46	0,06	43,18 *	6,26	0,04	36,39 *	5,76	0,05	20,33 *	5,36	0,06	14,90 *	4,87	0,06
No spouse, single	21,30 *	6,63	0,05	26,74 *	5,62	0,04	28,93 *	5,39	0,05	3,95	5,52	0,03	19,69 *	6,15	0,03
No spouse, divorced/widowed	20,45 *	6,45	0,04	27,03 *	9,06	0,05	1,57	6,51	0,04	-2,92	6,58	0,04	1,41	5,75	0,06
Education of head															
Below class 5	2,51	3,07	0,15	9,40 *	3,25	0,11				14,96 *	2,66	0,16	13,46 *	2,58	0,13
Class 5	20,03 *	4,03	0,08	17,78 *	3,42	0,12	9,00 *	2,58	0,24	13,93 *	2,99	0,10	18,84 *	3,00	0,08
Class 6 to 9	18,75 *	3,55	0,17	25,79 *	3,26	0,18	15,71 *	3,25	0,16	24,65 *	3,04	0,15	23,68 *	2,69	0,17
Higher level	25,90 *	4,16	0,29	38,00 *	4,03	0,30	34,82 *	3,98	0,31	37,15 *	3,78	0,32	47,87 *	4,26	0,29

Table 5 Continued

	83-84			85-86			88-89			91-92			95-96		
	Coeff.	**St. Er.**	**Mean**	**Coeff.**	**St. Er.**	**Mean**	**Coeff.**	**St. Er.**	**Mean**	**Coeff.**	**St. Er.**	**Mean**	**Coeff.**	**St. Er.**	**Mean**
Education of spouse															
Below class 5	8,10 *	3,12	0,13	11,17 *	3,20	0,12				4,20	2,59	0,13	3,13	2,94	0,11
Class 5	13,07 *	3,72	0,10	12,87 *	3,58	0,12	2,09	2,65	0,19	8,38 *	3,42	0,10	8,11 *	2,98	0,10
Class 6 to 9	20,35 *	4,03	0,14	23,34 *	3,69	0,14	15,14 *	3,51	0,15	15,01 *	3,45	0,15	16,39 *	3,19	0,16
Higher level	43,32 *	4,91	0,11	43,43 *	4,36	0,10	39,84 *	4,49	0,12	38,13 *	4,36	0,14	41,82 *	4,47	0,12
Occupation of head															
Agricultural worker with land	12,87 *	5,72	0,03	-5,06	6,30	0,01	16,49 *	8,41	0,01	12,32	6,61	0,01	2,40	6,07	0,01
Fisheries/forestry/live stock	23,11 *	11,69	0,00			0,00	10,75	6,81	0,02	30,42 *	8,01	0,01	16,18	8,49	0,01
Tenant farmer	35,66 *	10,95	0,01	8,51	11,76	0,00	15,42 *	4,73	0,03	26,69 *	5,77	0,02	20,49 *	5,82	0,02
Owner farmer	26,40 *	11,80	0,00	21,80	12,74	0,00	21,89 *	6,79	0,03	34,42 *	6,74	0,03	32,69 *	6,92	0,03
Servant, day-laborer (non ag.)	23,64 *	5,88	0,04	15,68 *	5,36	0,05	15,88 *	4,61	0,07	16,46 *	4,53	0,08	10,57	5,51	0,10
Transportation, communiaction	13,48 *	4,06	0,15	12,70 *	3,80	0,12	7,98 *	4,05	0,09	25,43 *	4,33	0,12	17,20 *	5,34	0,14
Salesman, service, broker	28,22 *	4,57	0,09	18,94 *	4,29	0,08	13,85 *	4,08	0,13	19,25 *	4,23	0,10	22,07 *	5,26	0,10
Factory worker, artisan	39,96 *	5,86	0,04	30,57 *	6,44	0,02	24,40 *	4,44	0,08	29,73 *	5,17	0,05	22,15 *	5,54	0,05
Petty trader, small business	35,33 *	4,14	0,24	25,51 *	3,76	0,29	34,68 *	3,86	0,19	36,59 *	4,26	0,21	34,06 *	5,11	0,21
Executive, official, professor	23,75 *	4,24	0,28	18,59 *	4,03	0,29	20,02 *	3,98	0,25	29,98 *	4,46	0,24	27,44 *	5,73	0,18
Retired, student, not working	12,41	6,96	0,05	15,90 *	6,71	0,06	17,10 *	6,34	0,06	35,48 *	5,64	0,08	25,49 *	5,73	0,12
Land and religion															
0.05 to 0.49 acres							9,76 *	2,28	0,29	8,60 *	2,29	0,24	10,39 *	2,16	0,30
0.50 to 1.49 acres							7,84 *	3,02	0,10	8,20 *	3,12	0,12	9,56 *	3,38	0,10
1.50 to 2.49 acres							15,29 *	4,44	0,05	10,14 *	4,08	0,05	19,05 *	4,88	0,04
2.50 acres or more							21,69 *	3,23	0,12	26,82 *	4,05	0,08	24,24 *	4,21	0,07
Non Muslim							0,79	2,77	0,11	-3,43	3,11	0,08	-4,81	4,31	0,12
Constant	29,94 *	12,57		31,08 *	11,76		31,80 *	11,73		34,98 *	11,58		20,97	11,05	
Number of observations	1738			1641			1856			1908			2380		
Adjusted R2	49,84			55,09			56,48			5,44			58,49		

Source: Author's estimates using the Household Expenditure Surveys of the Bangladesh Bureau of Statistics.
* indicates significance at 5% level. See text for excluded dummies.

Table 6: Micro determinants of growth (using lower poverty lines)

	Urban				Rural			
	1983 to 1996		1991 to 1996		1983 to 1996		1991 to 1996	
	Returns	Charact.	Returns	Charact.	Returns	Charact.	Returns	Charact.
Geographical area total	**-4,75**	**-2,06**	**0,96**	**-4,10**	**-13,87**	**-0,05**	**-1,77**	**0,22**
Mymensingh	-0,59	0,08	-1,32	0,04	-1,28	0,06	-0,75	0,10
Faridpur	-0,23	0,06	-0,81	0,42	-1,27	0,07	0,43	0,23
Tangail/Jamalpur	0,03	0,08	0,14	-0,82	-0,53	0,02	0,36	0,11
Chittagong	-1,73	-0,03	1,00	-0,01	-0,29	-0,01	-0,75	0,03
Comilla	-1,09	0,12	1,17	0,73	-1,13	0,00	-0,57	0,03
Sylhet	-0,25	0,03	-0,27	0,00	-1,69	-0,01	-1,61	-0,05
Noakhali	-0,23	-0,08	0,31	-1,02	-0,11	0,10	-0,31	0,01
Khulna	-1,84	-0,47	-1,37	-0,23	-0,97	0,00	0,09	0,14
Jessore	0,50	0,37	0,55	0,25	0,06	-0,04	-0,57	0,02
Barisal/Patuakhali	-0,51	-1,22	0,24	-2,37	-2,23	-0,03	-0,45	-0,55
Kushtia	-0,06	-0,27	-0,09	-0,35	-0,61	0,02	-0,33	-0,04
Rajshahi	0,28	-1,13	0,31	-1,31	-0,25	-0,05	0,80	0,25
Rangpur	1,12	0,51	0,73	0,25	-1,74	-0,14	1,01	0,01
Pabna	0,38	-0,21	0,43	-0,08	-1,13	0,00	0,06	-0,18
Dinajpur	-0,54	0,22	-0,12	0,57	-0,26	-0,07	0,54	0,07
Bogra	0,01	-0,11	0,06	-0,19	-0,46	0,02	0,28	0,05
Demographics total	**20,43**	**4,94**	**32,16**	**1,67**	**6,09**	**3,22**	**13,68**	**0,68**
Number of babies	-6,64	5,11	-1,76	3,12	-5,22	4,89	-0,73	2,55
Number of babies squared	4,27	-1,45	0,99	-1,10	3,16	-1,29	-0,23	-1,04
Number of children	6,67	4,07	3,10	0,00	-0,44	-0,56	1,67	-1,24
Number of children squared	-4,37	-2,37	-1,06	-0,30	0,73	-0,06	-1,80	0,27
Number of adults	17,42	0,67	17,28	-0,66	10,63	1,90	7,27	0,51
Number of adults squared	-5,42	-0,71	-4,11	0,34	-5,44	-1,57	-1,22	-0,47
Age of the head	15,50	0,76	29,82	0,39	6,90	0,24	20,21	0,36
Age of the head squared	-5,78	-0,53	-12,63	-0,12	-4,16	0,01	-10,71	-0,16
Female head	0,86	-0,85	0,17	-0,02	-0,04	-0,49	-0,52	-0,12
No spouse, married	-1,16	0,34	-0,33	0,09	0,09	0,34	-0,17	0,15
No spouse, single	-0,08	-0,40	0,51	-0,01	-0,08	-0,18	-0,18	-0,12
No spouse, divorced/widowed	-0,85	0,30	0,18	-0,05	-0,04	-0,01	0,11	0,00
Education of head total	**8,82**	**-0,29**	**3,49**	**-1,46**	**-3,42**	**-1,01**	**0,24**	**-0,46**
Below class 5	1,63	-0,06	-0,25	-0,59	-1,12	-0,76	-0,01	-0,43
Class 5	-0,10	-0,15	0,49	-0,32	-0,66	-0,14	-0,07	-0,20
Class 6 to 9	0,82	0,10	-0,15	0,51	-0,53	-0,02	0,22	0,20
Higher level	6,47	-0,18	3,40	-1,07	-1,12	-0,08	0,10	-0,02
Education of spouse total	**-1,84**	**0,70**	**0,53**	**-0,68**	**1,08**	**0,18**	**0,12**	**0,07**
Below class 5	-0,63	-0,13	-0,14	-0,10	-0,08	-0,21	-0,09	-0,18
Class 5	-0,51	-0,10	-0,03	-0,02	0,65	0,00	-0,19	0,00
Class 6 to 9	-0,54	0,48	0,20	0,19	0,44	0,20	0,25	0,18
Higher level	-0,16	0,45	0,50	-0,75	0,07	0,19	0,15	0,06

Table 6: Continued

	Urban				Rural			
	1983 to 1996		1991 to 1996		1983 to 1996		1991 to 1996	
	Returns	Charact.	Returns	Charact.	Returns	Charact.	Returns	Charact.
Occupation of head total	**-0,13**	**0,94**	**-3,95**	**0,31**	**-3,23**	**-4,16**	**3,29**	**0,32**
Agricultural worker with land	-0,29	-0,23	-0,10	0,00	1,03	-0,35	0,09	0,18
Fisheries/forestry/live stock	-0,03	0,18	-0,13	0,08	-0,03	1,30	-0,03	0,01
Tenant farmer	-0,17	0,19	-0,13	-0,12	-0,47	0,01	-0,05	0,10
Owner farmer	0,02	0,63	-0,06	-0,16	0,15	3,34	1,55	-0,92
Servant, day-laborer (non ag.)	-0,47	1,52	-0,48	0,29	-0,06	0,63	0,10	0,12
Transportation, communiaction	0,56	-0,09	-0,97	0,67	0,36	-0,07	0,00	0,41
Salesman, service, broker	-0,53	0,41	0,29	-0,03	-0,05	0,70	0,10	0,37
Factory worker, artisan	-0,68	0,65	-0,40	0,05	-4,93	-9,86	0,18	-0,10
Petty trader, small business	-0,30	-0,83	-0,54	0,03	0,55	-0,34	0,26	0,39
Executive, official, professor	1,03	-2,29	-0,61	-1,80	0,05	-0,45	-0,13	-0,23
Retired, student, not working	0,71	0,80	-0,82	1,30	0,16	0,94	1,22	-0,01
Land and religion total			**0,70**	**-0,07**			**-0,33**	**-0,27**
0.05 to 0.49 acres			0,42	0,56			-0,27	0,52
0.50 to 1.49 acres			0,16	-0,16			-0,27	0,05
1.50 to 2.49 acres			0,44	-0,05			-0,54	-0,17
2.50 acres or more			-0,21	-0,31			0,13	-0,64
Non Muslim			-0,12	-0,12			0,61	-0,03
Constant	**-8,97**	-	**-14,01**	-	**0,32**	-	**-6,84**	-
Grand total			19,88	-4,33			8,40	0,57
Change in log consumption			16,78	16,78			8,84	8,84
% of Change			1,18	-0,26			0,95	0,06

Source: Author's estimates using the Household Expenditure Surveys of the Bangladesh Bureau of Statistics.

Table 7: Micro determinants of inequality (conditional between group Ginis using lower poverty lines)

	1983-84		1985-86		1988-89		1991-92		1995-96	
	CBGG	% of sect. Gini	CBGG	% of sect. Gini	CBGG	% of sect. Gini	CBGG	% of sect. Gini	CBGG	% of sect. Gini
Urban sector										
Urban Gini	29,46	-	29,87	-	31,78	-	31,09	-	36,03	-
Geographical areas	8,38	0,28	7,60	0,25	7,28	0,23	8,74	0,28	9,24	0,26
Education of head	6,09	0,21	8,54	0,29	7,78	0,24	8,11	0,26	10,86	0,30
Education of spouse	7,18	0,24	7,49	0,25	6,37	0,20	6,57	0,21	6,78	0,19
Occupation of head	5,76	0,20	3,67	0,12	5,03	0,16	4,34	0,14	4,52	0,13
Land ownership	-	-	-	-	3,95	0,12	3,71	0,12	3,90	0,11
Rural sector										
Rural Gini	24,33	-	23,8	-	25,96	-	25,06	-	26,43	-
Geographical areas	5,85	0,24	7,49	0,31	5,55	0,21	10,77	0,43	6,48	0,25
Education of head	5,16	0,21	4,91	0,21	3,96	0,15	2,66	0,11	2,90	0,11
Education of spouse	1,24	0,05	1,61	0,07	1,09	0,04	2,19	0,09	2,66	0,10
Occupation of head	7,29	0,30	6,84	0,29	4,55	0,18	4,37	0,17	4,62	0,17
Land ownership	-	-	-	-	7,51	0,29	7,98	0,32	7,33	0,28

Source: Author's estimates using the Household Expenditure Surveys of the Bangladesh Bureau of Statistics.

Table 8: Percentage change in unconditional between group Gini with marginal taxes and transfers

	1983-84	1985-86	1988-89	1991-92	1995-96
Lower poverty line					
Rural tax	-0,21	-0,24	-0,27	-0,26	-0,31
Urban tax	0,34	0,43	0,51	0,49	0,74
Urban tax and rural transfer	0,37	0,49	0,57	0,56	0,85
Upper poverty line					
Rural tax	-0,10	-0,11	-0,17	-0,18	-0,21
Urban tax	0,15	0,17	0,27	0,30	0,41
Urban tax and rural transfer	0,16	0,19	0,30	0,34	0,47

Source: Author's estimates using the Household Expenditure Surveys of the Bangladesh Bureau of Statistics.

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