Poverty and BRAC's Microcredit Programme: Exploring Some Linkages

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FOREWORD

Empirical evidence point to a causal relationship between the socioeconomic status of individuals and communities and their health. Indeed improvement in health is expected to follow socioeconomic development. Yet this hypothesis has rarely been tested; at least it has not undergone the scrutiny of scientific inquiry. Even less understood are the processes and mechanisms by which the changes are brought about.

The Rural Development Programme (RDP) of BRAC is a multisectoral-integrated programme for poverty alleviation directed at women and the landless poor. It consists of mobilization of the poor, provision of non-formal education, skill training and income generation opportunities and credit facilities. The programme is the result of 20 years of experience through trial and error. However evaluation of its impact on human well-being including health has not been convincingly undertaken.

The Matlab field station of ICDDR,B is an area with a population of 200,000 half of whom are recipients of an intensive maternal and child health and family planning services. The entire: population is part of the Center's demographic surveillance system where health and occasionally socioeconomic indicators have been collected prospectively since 1966.

A unique opportunity arose when BRAC decided to extent its field operations (RDP) to Matlab. ICDDR,B and BRAC joined hands to seize this golden occasion. A joint research project was designed to study the impact of BRAC's socioeconomic interventions on the well-being of the rural poor, especially of women and children, and to study the mechanism through which this impact is mediated.

In order to share the progress of the project and its early results, a working paper series has been initiated. This paper is an important addition in this endeavour. The project staff will appreciate critical comments from the readers.

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Abstract

This paper looks at BRAC's Rural Development Programmes' (RDP) interventions and consumption based poverty using household expenditure data collected from 3518 households in fourteen villages in Matlab between April and August 1995. Poverty lines and measures are constructed to compare the socioeconomic status of BRAC members relative to non-members. These poverty measures are also used to compare BRAC members according to membership length, type of inputs received and loan size. The bivariate analysis suggests that the poorest members of the village are selected towards the beginning of RDP's operations with newer members coming from the moderate poor group. The multivariate analysis focuses on the relative impact of RDP's inputs, particularly credit, and caters for the crucial issue of selectivity bias. The results suggest that whilst borrowing beyond a certain loan threshold (10000 taka) is significantly associated with improvements in welfare for the 'typical' BRAC member this result does not hold for the poorest members.

1.1 Introduction

BRAC's fundamental goal is poverty alleviation in Bangladesh. The provision of micro credit to the poor, as a central componant of BRAC's Rural Development Programme (RDP), in tandem with its nationwide health, education, extension and social mobilization interventions is one of its key strategies in achieving its mission. This paper seeks to add to the growing literature on the impact of micro credit programmes by looking at the relationship between BRAC's RDP interventions and rural poverty in Matlab (see Mustafa *et al.* 1996, Khandker 1996, Hulme and Mosely 1996, Wood and Sharif 1997 for recent impact assessment work).

At the outset it is important to clarify the type and scale of interventions that RDP had in place in Matlab in the three years between the start of programme operations (1992) and the time the data used in this paper was collected (1995). RDP's nationwide interventions, working with 2.1 million households[1] (BRAC 1997), can be divided into two broad wings namely the income and employment generating programmes and the social development interventions. Given that the Human Rights and Legal Education Programme, the central componant of the 'social mobilization' wing, was not in place in Matlab when the data was collected and the fact that this paper will focus on a households material well-being, the emphasis here will almost exclusively be on the effect of the income generating wing of RDP in Matlab. RDP's efforts in this area are primarily a mixture of providing microcredit to

[1] BRAC targets households with less than 0.5 acres of land and whose heads are employed as labourers for more than 100 days a year.

individual borrowers ('minimilist credit') and integrating credit with training, input supply and marketing support in six specific sub sectors ('sector programmes') to stimulate the growth of profitable microenterprises. The six sub sectors are poultry, livestock, fisheries, vegetable cultivation, sericulture and social forestry. However due to the relatively short period that RDP had been present in Matlab the sectoral programmes were still at an infant stage given that initial years in a branch office are spent selecting members, forming village organizations (VO's) and implementing the basic package of savings mobilization and loan disbursement. Out of the cumulative credit disbursed by Matlab RDP between 1992-95 only 10.9% was for 'sectoral loans' out of which the livestock sub sector itself absorbed 6.9% of the credit (Hussain and Moore 1996). The activity which absorbed the largest share of RDP credit in Matlab is 'crop agriculture' and in particular paddy cultivation. Off farm activities such as rural trading and food processing in Matlab constitute a far smaller share than the national average for all BRAC loans[2]. However aside from the sectoral programmes where BRAC field workers ensure that the bulk of the loan amount is invested in that particular sub sector the stipulated purpose of the loan may well not be where the money was actually spent. Field observations in Matlab and elsewhere confirms the well established fact that money is fungible and that loans are used for a variety of purposes often for multiple income generating activites as well as for repaying debt, social obligations and household consumption. This paper focuses on the role of BRAC's credit in affecting household welfare on the premise that a large share of the loan disbursed goes towards developing microenterprises that augment a household's range of income earning sources whilst being cognisant of the reality that loans may also be used for other purposes. This paper starts by making the case for measuring, or ranking, the poverty of individuals by using consumption based measures rather than other possible indicators. Next, the question of how poverty interacts with BRAC RDP members' characteristics is explored. In other words, are long-standing or substantially-borrowing RDP members' likely to start poorer (or with 'worse' correlates of poverty) or end up less poor (or with 'better' correlates) than others? How is the latter question affected by the determinants of poverty and by possible selectivity bias? Finally are the gains from RDP membership distributed evenly across socioeconomic classes?

It is also important to remember the limitations of this paper; the ideal scenario for impact analysis work is 'before-after' comparisons using panel data and given the extent of 'transient poverty' (Lipton 1983) inferences made from 'one shot' surveys can only be tentative. The impact analysis is also

[2] Out of total disbursement in Matlab between 1992-95, 44% went to crop agriculture, 26.8% to rural trading, 9.8% to rural transport and 6.9% to livestock (Hussain and Moore 1996). Overall countrywide RDP figures are 40% for rural trading, 18% for food processing, 18% for poultry and livestock, 9% for agriculture, 4% for rural transport. Other activities make up the remaining portion.

partial in the sense that the data is collected from only one region of the country. However this paper argues that another factor that was perceived as a potential constraint to this analysis, namely the relatively short amount of time that BRAC's RDP has been in operation in Matlab (forty months) does not in fact turn out to be such a hindrance in that the results suggest that it is loan size (along with other standard determinants of welfare) and not duration of membership that is particularly strongly associated with poverty reduction particularly for the 'modorate poor' members.

1.2 Measuring poverty: some basic concepts

There are three broad approaches to the measurement of poverty.

The 'income approach' views material well-being as the primary welfare criteria and poverty lines are set with reference to income or consumption thresholds. Consumer theory (see Deaton and Muellbauer 1980) allows one to express an individual's objective of maximizing utility subject to various constraints in terms of the minimum expenditure needed to attain a certain level of utility. Hence a logical extension of the poverty literature is the setting of poverty line(s) by estimating the minimum cost of obtaining a food bundle necessary to escape nutrient-deficient poverty. The 'basic needs approach' stresses other critical facets of an individual's quality of life such as health, food, education, water and shelter to name but a few. The 'basic needs approach' was away station on the path to Amartya Sen's pioneering contribution to the literature (Sen 1982) on measuring welfare in terms of his 'capabilities approach' where goods are not an end in themselves but as one determinant of people's capabilities to function. Examples of 'functionings' include basic needs such as good health, access to education, quality housing and access to clean water. However Sen's 'capability approach' extends the material 'basic needs' approach by including 'functionings' such as social status, self confidence etc. In short, the basic argument against using consumption as the unit of poverty measurement is that of 'reductionism' i.e. that the holistic nature of poverty is reduced to only one measure[3].

[3] Poverty can also be seen either in 'absolute' or 'relative' terms. Poverty lines which are constructed to demarcate the poor and non poor using a minimum calorific threshold for dietary intake or a minimum expenditure needed to meet basic needs fall in the realm of 'absolute' poverty measurement. On the other hand when poverty measures are set relative to the rest of society (e.g. the bottom quartile of consumption per adult equivalent or households who do not own certain 'basic assets' prevalent in that society) the issues of' relative poverty or even 'social exclusion' are relevant. The literature on poverty in developing countries generally uses absolute poverty lines; this is justified by the extent of prevailing malnourishment and the considerable degree of arbitrariness in the setting of a threshold for relative poverty (however. setting absolute poverty standards also entails making certain subjective judgments e.g. on food bundles, relative prices and the value of non purchased items).

Greeley (1997) presents a strong case for measuring poverty using food consumption based indicators, especially when carrying out impact assessment work of microcredit programmes. There are several arguments used to support this stance. This first is based on the 'hierarchy of needs' notion that meeting basic food requirements is a prime concern in both welfare theory and in findings from empirical research. A second key point that the author makes is that impact assessment work requires the use of indicators that can be aggregated and are comparable over space and time. Consumption based poverty measures can be aggregated over individuals or over households and hence conclusions on the welfare levels of programme participants can be derived. Moreover given the 'globalization' of microcredit there is a need to compare programmes across countries and over time to track performance. Whilst there are regional differences in calorie adequacy norms measuring poverty, using food consumption allows for a far greater scope for comparability than other indicators of living standards such as housing conditions, which are more sensitive to local conditions. However Greeley by no means dismisses other dimensions of poverty; on the contrary the author suggests that consumption based measures ought to be used in allocating development resources to a given area or to a certain group but 'poverty correlates' such as housing quality, employment status and female empowerment ought to be used for project design and for '*fine tuning poverty reduction interventions'* (pg 89).

Chambers (1995 cited in Sharif 1997) addresses several aspects of poverty which the poor identify that are difficult to quantify or measure. These include social inferiority, isolation, powerlessness, humiliation and accepting low status work. UNDP has given a strong institutional backing to the 'multidimensionality of poverty' camp with the development of the Human Development Index (HDI) and the Human Poverty Index (HPI). Both indices are composed of the same major dimensions of human development namely knowledge, longevity and standard of living. However the indicators[4] measuring these dimensions vary as does the 'targeting of the index'. The HDI focuses on change in human development of the country or region as a whole whereas the HPI looks at this change only from the standpoint of vulnerable groups. This chapter follows the traditional approach by measuring poverty using consumption as its basis. The rationale is similar to Greeley but the approach differs in that it not only uses food consumption but it also uses total consumption per adult equivalent as its measures of welfare. The food poverty line is used to construct 'poverty measures' in order to demarcate the poor from the non-poor and to evaluate the depth and severity of poverty. This avoids

[4] The HDI is a weighted average of life expectancy, educational attainment (adult literacy and combined primary, secondary and tertiary enrolment) and real GDP per capita (in PPP$). HPI uses the percent of people expected to die before age 40, the percentage of adults illiterate, the percentage of people without access to health services and safe water and the percentage of underweight children under five (UNDP 1997).

making subjective judgements as to the value of non food basic needs when determining a per capita total consumption poverty line. Ravallion and Sen (1996) also discuss the somewhat arbitrary allowances made for 'non food basic needs' by claiming that *'...there is no anchor analogous to the role played by food energy requirements in setting the food componant of the poverty line'* (pp *771).*

However 'non-food' items are incorporated in the multivariate analysis when the actual non food expenditures are added to the food expenditures of each household and deflated by the number of adult equivalents in order to construct a welfare measure that takes into account 'nutritional requirements' (food items) as well as 'basic needs' (non food items) in addition to catering to the age and sex composition of the household[5]. Appendix 1 discusses some of the methodological issues arising in constructing consumption based poverty measures.

1.3 The data

The data was collected by the BRAC-ICDDR,B Matlab project between April and August 1995. Fourteen villages were purposively sampled in order to comply with the 'four cell design' of the Matlab project; out of the fourteen villages, four had BRAC-ICDDR,B interventions, four had only BRAC, two had only ICDDR,B and two had neither. In ten of these villages all the households were surveyed and in four only BRAC eligible households were interviewed, 3518 households were interviewed in total. The household head's spouse (in a male headed household) was the main respondent to the expenditure survey though in a small number of cases she was assisted by other members of the household. In female headed households the household head provided the answers. The expenditure survey covered both food and non food items using different reference periods for the various items (see Scott and Amenuvegbe 1990 for a discussion of the importance of varying reference periods). The reference periods were determined after four rounds of pretesting in order to ascertain the frequency of purchase of the different items. As such rice was asked using one-day recall, vegetables, spices, flour, small fish, milk, wheat all one week recall and meat items one month recall. In terms of non food items, kerosene was asked with one week recall, fuel wood one month recall, health expenditure six month recall, household durables, education, clothing and household 'capital expenditure[6] items all using one year recall. The survey incorporated questions on the amount and value of the goods purchased, the amount and value consumed from own production (calculated using

[5] The equivalence scales are constructed as follows: adult male (10, adult female (0.83), 10-14 year olds (0.83), 5-9 year olds (0.7), 1-4 year olds (.5), babies (0)(source: Scarlet Epstein *'South India: Yesterday, Today and tomorrow')*

[6] These 'capital expenditures' include expenditure on land and non-land 'productive assets' (e.g. poultry, fishing nets etc) but not including households' utensils and consumer goods, which fall under the 'household durables' category.

current market prices in Matlab) and the amount and value of products received as gifts/relief. Different varieties of items were coded e.g. coarse versus fine rice.

There were certain items where generally the respondent could identify both the quantity consumed and amount spent on that product during the reference period (e.g. rice). In other cases the respondent could only determine one of the two (e.g. amount spent on fish and not the weight or for instance the quantity of home produced paddy and not its value). In such situations the interviewer would use village level prices collected in Matlab during the time to impute a value on the item to either work out the quantity consumed or the amount spent. This imputation was done primarily for the food items and carried out at the end of a day's work in conjunction with the field based team supervisor. In the non food case the value in taka of the product/service was collected. Several steps were taken to ensure the quality of the data. The questionnaires were checked at the end of each day by the interviewer and team supervisor. They were then sent to the head office and those, which had inconsistent estimates, were sent back to the field for re interview. A separate quality control team resurveyed 5% of the households and the main survey data was crosschecked with the resurvey teams' findings in order to ascertain the validity of the large sample.

1.4 Applying the theory: constructing poverty measures and correlates in Matlab

The cost of basic needs (CBN) approach was used to compute the poverty line (see appendix 1 for a discussion of the different methods of setting the poverty line).

Appendix table 2.1 illustrates the goods used, the prices used to cost the various items (these prices were derived from the independent price survey carried out in Matlab between April and August 1995) and the poverty line expenditure per head. As Ravallion and Sen point out, whilst there is considerable controversy with regards to whether to use the CBN or FEM method, there is little disagreement in Bangladesh with the composition of the 'typical' bundle of goods and their individual weights within the food bundle. The expenditure required on food to cross the moderate poverty line based on a calorific threshold of 2112 calories per person per day was calculated to be 13.51 taka and the ultra poverty line (hard core poor) based on a threshold of 1805 calories was 11.50 taka.

In the ten villages that were fully sampled[7] 47.7% of the population appeared to be below the food poverty line and 30% of the population were considered to be hard-core poor.

[7] As mentioned in the section 2.5 ten of the fourteen sampled villages had their entire population included in the survey whereas the other four only had BRAC TG households' included.

However, apart from the simple headcount measure of the number below the poverty line, poverty can also be measured with respect to the depth and severity of poverty as discussed earlier. The P 1 figure for the ten Matlab villages where all the households were surveyed suggests that the typical poor person needs to raise his expenditure by 12% to reach the food poverty line. The P2 'poverty severity' figure is 5%. Appendix 2 discusses some aspects of rural poverty estimates in Bangladesh and comparisons are made between the Matlab poverty figures and correlates with nationwide estimates.

Table 1.1 provides a socioeconomic breakdown of the characteristics of those below and above the food poverty line in Matlab as well as disaggregating those below the food poverty line into the 'moderate poor' and the 'ultra-poor'. The last column in table 1. 1 is a comparison of the average value of a typical 'poor households' characteristic (i.e. a weighted average of the reported values for the ultra and moderate poor) and the value for the 'non poor' household.

The findings presented are in general fairly intuitive. A typical 'non-poor' household in our Matlab sample is significantly wealthier[8], more educated, smaller in size, has a lower dependency ratio, and an older head of household with a smaller chance of being a manual labourer compared to a 'poor household.' However the differences between the 'moderate' and 'ultra' poor are less marked. A 'typical' moderate poor household is significantly wealthier, has a lower dependency ratio, is better educated and has a lower chance of being headed by a manual labourer compared to an ultra poor household. However there are no significant differences between an average 'moderate poor' household and an average 'ultra-poor' household in terms of household size, earners ratio, age and sex of household head.

Interestingly, non poor households in our sample have a significantly larger percentage of households headed by females compared to poorer households contrary to the conventional wisdom of the reverse being the case (e.g. BBS 1995 reports that the average female headed household's income level in rural areas is 67.2% of a typical rural male headed household). Moreover one notes that the dual criteria of landownership and main occupation show a reasonably good degree of correlation with poverty status; hence as relatively 'easy to use' targeting instruments the BRAC criteria perform well[9].

[8] 'wealth' in this context, refers to the value of land and non land assets.
[9] Appendix 2 discusses Ravallion and Sen's (1996) views on land based targeting.

Table 1.1: Differences in means and proportions between the poor and non poor in Matlab (n = 3518)

	Below food poverty line		Above poverty line	Comparison (ultra vs moderate poor)	Comparison (below vs above poverty line)
	Ultra poor (n = 1052)	Moderate poor (n = 664)	Non poor (n = 1802)	p value	p value
Variables					
Land owned in decimals	40.5	51.0	86.8	0.04	0.00
Value of non land assets in taka	23059	30823	62718	0.00	0.00
Total savings in taka	2632	3906	7820	0.00	0.00
Household size	5.6	5.43	5.0	0.12	0.00
Earners as a proportion of household size	0.23	0.22	0.27	0.70	0.00
Dependency ratio*	0.36	0.34	0.30	0.05	0.00
Age of household head	46.6	45.84	48.5	0.68	0.00
Female headed household	0.16	0.19	0.19	0.27	0.04
Average education in household	1.45	1.88	2.80	0.00	0.00
Education of household head	1.70	2.23	3.29	0.00	0.00
Manual labourer household head	0.28	0.22	0.14	0.04	0.00
Distress sale in last four months**	0.03	0.02	0.025	0.21	0.36

* dependency ratio: those aged below ten and over sixty divided by total members
** 'distress sale' is defined as the sale of land and non land assets due to a household crisis

1.5 BRAC members: a poverty profile

63% of BRAC members are below the moderate food poverty line and 38% are below the ultra food poverty line. Table 1.2 provides a breakdown of poverty levels by 'eligibility status'. It is interesting to note that TG BRAC members appear significantly worse off than target (TG) non members in all four poverty measures. Zaman (1997) suggested that TG non members were wealthier than TG members in terms of land and non land assets; the poverty figures reinforce this view. This is also in line with Khandker's (1996 pp 47) finding that '*...more landless households participate in BRAC than in other programmes. About 65% of BRAC participants are landless compared with 58% for RD-12 and 55% for the Grameen Bank. This suggests that BRAC is better targeted to the ultra poor than Grameen Bank and RD-12 programme* ' . Moreover the poverty indicators also suggest that the NTG

member group are part of the lower/middle class in village society[10].

The issue of causality will be addressed in the following section; for now we can only comment on the state of the 'typical' BRAC member (with an average membership length of twenty three months) vis a vis other groups in the village. It is important to note that a simple comparison of means also does not address the fact that certain members may have self selected themselves into BRAC groups according to certain unobservable characteristics e.g. ability to use credit. These issues will be discussed in greater depth in the following sections but for now the limitations of the difference in means analysis ought to be borne in mind.

Table 1.2: A comparative assessment of poverty status by BRAC eligibility status

	TG BRAC member n = 369	NTG BRAC member n = 176	TG non member n = 1592	NTG non member n = 1339	t-test col. 1 vs col. 2	t-test col. 1 vs col. 3
	1	2	3	4	p value	p value
% below moderate poverty line (P0)	71.5	44.9	57.4	31.9	0.00	0.00
% below hard core poverty line	52.6	26.1	38.5	18.9	0.00	0.00
Poverty depth (P1)	0.19	0.09	0.16	0.07	0.004	0.00
Poverty severity (P2)	0.07	0.03	0.06	0.02	0.33	0.00

Tables 1.3-1.5 disaggregate BRAC members by length of membership, 'type' of member and the total amount of BRAC credit. Table 1.3 suggests that the members selected by BRAC more recently are less poor than the members who joined at the start of RDP's operations; this is clearly reflected in the landholding figures. However this pattern is by no means linear. The (21-30) month cohort appear to be the most disadvantaged group. This is reflected in the higher poverty figures and by their relatively adverse dependency ratios, lower education levels and the value of non land assets. The households which were the first to join (31-40 months cohort) were 'better endowed' (higher education of the household head, higher average education and lower dependency ratio) compared to this 21-30 month which joined immediately after. The lower poverty incidence in the oldest group may be attributed in part to the effect of BRAC membership given that this group's observable 'initial endowment'

[10] The term target group and 'eligible' will be used interchangeably in this paper. For a more in-depth discussion of the TG/NTG issue see Zaman(1997)

position is similar if not worse that the 1-10 month and 11-20 month cohorts. It is particularly interesting to note that the oldest members have on average the least land but also the highest value of non land assets; the obvious explanation is that borrowing from BRAC led to investment in productive capital (e.g. rickshaw, poultry, grocery shop) thereby improving their non land asset position. Moreover the proportion of manual labourer households is lower in the oldest category suggesting that the growth of non land assets may have induced a shift from on-farm activities to off-farm self employment. Longer membership in BRAC also induces a growth in savings as shown in table 1.3 due to the requirement that members have to save at least two taka a week.

Table 1.4 separates members into three categories, non borrowers, borrowers and borrowers with training. Members who borrow from BRAC appear significantly better endowed than non borrowers measured in terms of land and dependency ratio. As such even though a fair share of the ultra poor join BRAC, as discussed earlier, they are less likely to take the risks of borrowing from the organization. The table also suggests that those who borrowed were given training by BRAC are significantly less poor as a group when compared to the other two categories. The members who received training as well as taking credit have been members for significantly longer than the 'typical' member in the other two categories: aside from this difference there is little in the other 'characteristics' that can explain the marked difference in poverty status between the 'credit plus training' members and the other two categories. However there is no significant difference in poverty measures between the 'non borrowers' and the 'loanees without training' category. This is despite the fact that the latter category has significantly greater land assets and a lower dependency ratio and hence one would expect these 'favourably endowed' borrowers to be significantly less poor than the non borrowers. This puzzling feature along with the relatively lower poverty figures for the 'credit plus' members could suggest that credit may need to be 'packaged' with other complementary inputs like training before it makes a dent on poverty. However such conclusions are premature and need to be verified with the multivariate analysis that follows.

Table 1.5 points to the fact that the highest loan size category i.e. those who have borrowed more than 10,000 taka, are less poor compared to BRAC households who have borrowed less. Means tests on the expenditure data indicate that those who borrowed more than 10,000 taka spent significantly more money on 'capital goods' (land, livestock, poultry etc. at the 1% level) compared to non-borrowers and those who had borrowed less than this amount. Expenditure on clothing for the '10000 plus' group was also significantly higher than non borrowers; interestingly there was no significant difference in food expenditures. This section of borrowers have been in BRAC significantly longer than the other

groups and their proportion of household heads who are manual labourers is lower than other groups. In terms of 'initial endowment' factors such as dependency ratios and education the '10000 plus' group is similar to the other groups except that it has a significantly lower dependency ratio than the 'no loan' category. Another noticeable result is the comparatively large proportion of people below the food poverty line for the cohort of members who have taken cumulative loan sizes of between 5000-10,000 taka. This result is all the more surprising given the fact that this group did not on average suffer from an adverse initial endowment position as measured by education levels, dependency ratios or land owned. This result is also reflected in the figures for poverty depth and severity although the differences are not significant at the 5% 1evel[11].

We now move onto multivariate analysis which may shed more light on some of the less intuitive results offered by the comparison of means and proportions tables.

[11] Tables 1.3-1.5 used food poverty lines to determine the poverty measures. The same tabulations were also done using a 30%' mark-up' for basic non food items in order to arrive at a total consumption per capita poverty line. The basic trend did not differ from the food poverty line except for the breakdown according to loan size. The headcount figures for the 'no loan', 'less than 5000 taka', '5000-10,000 and 'greater than 10,000 are 46.9%, 60.5%, 62.7% and 50.8%.

Table 1.3 Socioeconomic characteristics of BRAC members and membership length

	Length of membership				ANOVA	Differences in means and proportions (5% significance)			
Column number	1	2	3	4		Column differences			
	1-10 months (n=79)	11-20 months (n=127)	21-30 months (n=231)	31-40 months (n-110)	p value of F ratio	vs1	vs2	vs3	vs4
Moderate poor % (P0)	57	55	69	52	0.00		3	2,4	3
Ultra-poor %	38	39	46	30	0.04			4	3
Poverty depth % (P1)	15.0	14.9	18.1	12.3	0.03			4	3
Poverty intensity % (P2)	5.5	5.2	6.5	4.1	0.14				
Land owned in decimals	54.9	48.9	31.4	27.2	0.02	4	4		1,2
Value of non land assets (Tk.)	29221	26222	19886	31716	0.00	3	3	1,2,4	3
Total savings (Tk.)	2137	3759	4408	6331	0.13	3,4		1	1
Household size	5.38	5.26	5.48	5.31	0.69				
Number of earners in household	1.95	1.90	2.21	2.51	0.00	4	3,4	2,4	1,2,3
Earners to household size ratio	0.23	0.23	0.21	0.22	0.41				
Dependency ratio*	0.32	0.31	0.35	0.29	0.05			2,4	3
Age of household head	47.5	44.2	43.8	43.2	0.08	3,4		1	1
Female headed household %	8.9	13.4	15.1	10.0	0.38				
Average education in household in years	2.02	2.08	1.35	1.87	0.00	3	3	1,2,4	3
Education of household head in years	2.43	2.90	1.43	2.5	0.00	3	3	1,2,4	3
Manual labourer household head%	25.3	29.1	26.8	17.3	0.17		4	4	2,3

Table 1.4: Socioeconomic characteristics and 'type' of member

	No loan n=49	Loan without training n=327	Loan and training n=171	ANOVA p value of F ratio	Differences in means and proportions (5% significance)		
Column number	1	2	3		vs1	vs2	vs3
Moderate poor % (P0)	61	65	53	0.03	3		1
Ultra-poor %	33	43	37	0.26			
Poverty depth (P1)	14.7	17.2	13.3	0.06	3		1
Poverty intensity (P2)	5.2	6.3	4.3	0.06	3		1
Length of BRAC membership in months	23.6	21.0	27.2	0.00	3	3	1,2
Land owned in decimals	22.15	40.7	37.4	0.32	2	1	
Value of non land assets (Tk.)	23058	24615	26561	0.71			
Total savings in taka	8224	3910	3971	0.06			
Household size	4.53	5.53	5.33	0.00	2,3	1	1
Number of earners	1.69	2.20	2.23	0.01	2,3	1	1
Ratio of earners to household size	0.25	0.21	0.22	0.16			
Dependency ratio	0.39	0.33	0.30	0.03	2,3	1	1
Age of household head	37.1	45.1	44.9	0.00	2	1	
Female headed household percent	16	10	16	0.12			
Average education in household in years	1.50	1.66	1.92	0.16			
Education of household head in years	2.27	2.0	2.33	0.52			
Manual labourer household head %	20.4	27.8	21.6	0.23			

Table 1.5: Socioeconomic characteristics and loan size

Variables	No loan (n=49)	< 5000 taka (n=162)	5000-10000 taka (n=212)	> 10000 (n=124)	ANOVA p value of F ratio	Differences in means and proportions (5% significance)			
	1	2	3	4		vs1	vs2	vs3	vs4
Moderate poor (P0) %	61	59	67	52	0.05			4	3
Ultra-poor %	33	41	43	36	0.46				
Poverty depth (P1) %	14.7	15.2	17.4	14.0	0.33				
Poverty severity (P2) %	5.2	5.3	6.2	4.9	0.60				
BRAC membership in months	23.6	20.9	22.6	26.9	0.00	4	4	4	1,2,3
Land owned in decimals	22.1	37.3	43.8	35.3	0.36	2,3	1	1	
Value of non land assets (Tk.)	23058	26359	24330	25680	0.87				
Total savings (Tk.)	8225	3900	3915	4001	0.14				
Household size	4.53	5.12	5.52	5.81	0.00	2,3	1,3	1,2	1,3
Number of earners	1.69	1.96	2.24	2.46	0.00	3,4	3,4	1,2	1,2
Earners as a proportion of household size	0.24	0.23	0.21	0.19	0.00	3,4	3,4	1,2,4	1,2,3
Dependency ratio	0.39	0.29	0.34	0.32	0.01	2,4	1,3	2	1
Age of household head	37.1	45.6	45.02	44.14	0.00	2,3,4	1	1	1
Female headed household %	16	19	10	8	0.01		3,4	2	2
Average education in household in years	1.50	1.81	1.69	1.75	0.70				
Education of household head in years	2.27	1.67	2.43	2.15	0.14		3	2	
Manual labourers household heads %	20	28	27	19	0.24			4	3

1.6 Modeling the determinants of poverty: some conceptual issues

Whilst breakdowns of poverty incidence, gaps and severity are useful a further dimension is added when an analysis of the factors determining poverty is carried out.

Glewwe (1986) provides a comprehensive illustration of the theory and practice of estimating the determinants of household welfare. The author stresses the fact that reduced form estimations can explain variations in household welfare conditional on past decisions which affect a household's 'human capital' stock. Since this process of capital accumulation is not accounted for in this analysis one should be cautious in using the term 'determinants' of welfare. As Glewwe and others point out in the literature, assumptions of exogeneity of the explanatory variables are always debatable. Even seemingly obvious choices such as village infrastructure variables can be determined by underlying structural relations[12]. Household capital endowments, namely land and non land assets, are especially susceptible to the criticism that they are both a cause and effect of poverty.

Appleton (1995) provides an interesting discussion of the relative merits of using consumption versus poverty as the dependent variable. He feels that if the rates of return on assets (e.g. schooling) are constant between the poor and non poor then there is no real advantage to modelling poverty (as measured by the average shortfall in consumption below the poverty line - i.e. the poverty gap) as such and using a truncated sample of only those below the poverty line. Other authors such as Kyreme and Thorbecke (1991) have modeled the poverty gap but they used the 'positive gaps' of the non poor as well thereby avoiding the thornier econometric problem of estimating a distribution truncated at the poverty line. When participation in an anti-poverty programme is used as a determinant of welfare a further complication arises in the estimation namely that of selection bias. We now turn to this issue.

1.6.1 The 'selectivity problem'

Evaluating the effect of an institution (e.g. a trade union or an anti-poverty programme) on an outcome variable (e.g. wages or living standards) using regression analysis can lead to biased estimates if the underlying process which governs 'selection' into the institution is not incorporated in the empirical framework. The reason for this is that the effect of say the anti-poverty programme may be over (under) estimated if programme participants are more (less) able, due to certain unobservable characteristics, to derive these benefits compared to eligible non participants. One solution to this

[12] see Rosenzweig and Wolpin's (1988) seminal paper on how programme/community services can be endogenous to the prosperity of the area.

problem in econometric analysis is the use of the Heckman two step procedure. The first stage models a 'participation equation', which attempts to capture the factors governing membership in a programme. This equation is used to construct a selectivity term known as the 'Mills ratio' which is added to the second stage 'outcome' equation. If the coefficient of the 'selectivity' term is significant then the hypothesis that the participation equation is governed by an unobservable selection process is confirmed; moreover with the inclusion of the extra term, the coefficients in the second stage 'selectivity corrected' equation are unbiased. However, if the coefficient of the selectivity term is insignificant OLS estimates are used for the model. Coulcombe and McKay (1996) estimate poverty in Mauritania using this two stage procedure. First they estimate the probability that a household will belong to a particular occupational group and then they estimate separate welfare regressions for the different groups. Their rationale is that the determinants of poverty will differ between the socioeconomic groups (e.g. land ownership is more important for agricultural households) and that the extent of poverty is also determined by the household's occupational group.

However a major problem in practice with the Heckman procedure is that of identification, similar to the problem faced when using the instrumental variables (IV) technique. The first equation must be influenced by at least one variable that is not a significant determinant of the second stage outcome equation. This identification variable is not easy to find. Ravallion and Wodon (1997) model the gains to a farm household in Bangladesh from switching to a non farm occupation where the first stage is the 'occupational selection' equation and the second is the welfare equation. The variables used for identification are household life cycle variables as the authors postulate that the '*... stage of the life cycle is an important determinant of mobility across sectors within the rural economy but is of little consequence to consumption within sectors' (pg 9).* In another paper, Ravallion *et al.* (1996 footnote 8) suggest using '*... years of schooling in one case and degree obtained in the other'* in order to obtain identification for a Heckman procedure. However this is by no means a 'first best' solution to the problem given that both variables are likely to have a similar influence on both outcome variables.

Khandker (1996) addressed the 'selectivity problem' using an econometric technique that had as its basis the assumption that households with more than 0.5 acres of land are not included in micro credit programmes. Khandker's view was that there were no suitable identifying instruments, which would permit the use of techniques such as the Heckman procedure. However the 'half an acre restriction' has its limitations given that a sizeable proportion of credit programmes in Bangladesh include members who do not fulfill this land criterion as various studies have indicated (Mustafa *et al.* 1995, Zaman 1997).

The next section attempts to cater for the selectivity problem by using the 'number of target households in each village in 1992' as the 'identification' variable.[13] The rationale behind this is that while a larger number of potential members in a village will reduce the chance of any one eligible household from participating in a BRAC Village Organization'[14] it is difficult to see why this variable should affect an individual household's poverty status. However this assumption will need to be verified; a discussion of the empirical result ensues.

1.7 The basic model

Equation 1.0

$$b_i = \beta + \sum_{j=1}^{6} \beta_j h_{ij} + \sum_{l=1}^{3} \beta_1 v_{il} + \beta_t t_{it} + u_i$$

$$c_{ij} = \beta + \sum_{j=1}^{6} \beta_j h_{ij} + \sum_{l=1}^{2} \beta_l v_{il} + \beta_b b_{ib} + \lambda_m m_{im} + \varepsilon_i$$

b_i is the BRAC membership variable

c_{ij} is the log of total consumption per adult equivalent

t_{it} is the identification variable

h_{ij} is a vector of household level variables

v_{il} is a vector of village level variables

m_{im} is the Mills ratio term

Detailed definitions of the variables used are given in table 1.6.

[13] I am greatfull to Professor Mark Pitt of Brown University for making this suggestion.

[14] A BRAC VO's size ranges from 25-40 members. Whilst larger villages have more than one VO there is still a large portion of eligible households who do not join or are not selected. The percentage of TG households covered in the Matlab villages where RDP is present is 51%

Table 1.6: Definitions of variables used in equations 1.0 – 1.2

Variable	Definition
Dependent	
LGCOAD	Log of total consumption per adult equivalent
Household level	
LGLAND	quantity of land owned (log)
AGHHH	age of the household head in years
AGHSQ	age of the household head squared
AG1560M	number of adult males in the household (aged 15-60)
AG1560F	number of adult females in the household (aged 15-60)
OTHNGO	1 if household member of other NGO, 0 if not
HHHLBR	1 if household head is a manual labourer, 0 if not
ADEQPR	ratio of the number of adult equivalents to household size
DEPEND	number aged under ten plus those over 60 divided by total members
EARNER	ratio of earners to household size
HHHLBR	1 if household head is a manual labourer, zero if not
HLTHHH	1 if household head is in good health, zero if not
PRIMHHH	1 if household head attended primary school, zero if not
SECHHH	1 if household head attended secondary school, zero if not
SXHHH	1 if household head is male, zero if female
BRAC specific	
BRVO	1 if household is BRAC member, 0 if not
BRBOR	1 if household borrows from BRAC, 0 if not
SECDUM	1 if household has borrowed and received training, 0 if not
LOADUM1	1 if household has borrowed less than 5000 taka, 0 if not
LOADUM2	1 if household has borrowed between 5000-10,000 taka, 0 if not
LOADUM3	1 if household has borrowed more than 10,000 taka, 0 if not
MEMLEN1	1 if membership length between 1-10 months, 0 if not
MEMLEN2	1 if membership length between 11-20 months, 0 if not
MEMLEN3	1 if membership length between 21-30 months, 0 if not
MEMLEN4	1 if membership length between 31-40 months, 0 if not
Village specific	
IEMBNK	1 if village is inside embankmemt, o if not
MARDIS	Distance from market in kms.
TGHH92	Number of eligible households in village in 1992

Equation 1.1 adds BRBOR and SECDUM to the second part of the above equation in order to test the effect of taking only loans and the effect of taking loans plus training on welfare.

Equation 1.2 ADDS LOADUM1, LOADUM2, LOADUM3. MEMLEN 1, MEMLEN2, MEMLEN3, MEMLEN4 to equation 1.0 in order to test for the effect of loan size and membership length.

Preliminary regressions eliminated certain variables whose significance levels were very small or if they were highly collinear with other variables.

The demographic variables are included to reflect the earning potential of the household as well as the nutritional need for food. For instance if the ratio of adult equivalents to total members is close to one the food consumption requirement will be higher (Rogers 1986). Moreover a lower dependency ratio, higher earners ratio and more adults are likely to contribute positively to household welfare. The household head's characteristics are included as better educated individuals with good health are more likely to have higher consumption levels; manual labour as the main occupation is likely to have a detrimental effect on welfare. Land is also hypothesized to be positively correlated with consumption. Membership in other NGO's is hypothesized to have positive effects on consumption.

1.8 Results from the multivariate analysis

Prior to applying the two step Heckman procedure the validity of the identification variable was tested in an OLS regression. Appendix table 3.0 shows, the 'BREL92' variable is a highly significant explanatory factor behind participation in BRAC (at the1 % level) giving the expected negative sign but is not a significant determinant of our outcome variable (at the 10% level). As such this variable satisfies the properties of a valid instrument.

With regards to the selectivity bias issue all three equations, 1.0-1.2, did not reject the null hypothesis of no selectivity bias. The lambda coefficient was not significant at the 10% level in any of the equations. In other words it appears that BRAC members do not have any inherent unobservable characteristics that favour or disfavour them compared to a group of eligible households in this sample in Matlab. The same result of no selectivity bias was found in a sample of 'less than ten decimal' (a proxy indicator for the 'ultra-poor) households as well.

As such table 1.8 gives heteroscedasticity corrected OLS estimates of the coefficients of the 'BRAC input variables' given the fact that selectivity corrected estimates are not necessary for the two above mentioned samples.

Table 1.8 Estimated coefficients of the 'BRAC variables' on log of total consumption per adult equivalent

	Equation 1.0		Equation 1.1		Equation 1.2	
	1.0a	**1.0b**	**1.1a**	**1.1b**	**1.1a**	**1.1b**
BRAC member dummy	0.06	0.02	0.06	0.08	0.02	0.01
	(p = 0.01)	(p = 0.59)	(p = 0.27)	(p = 0.20)	(p = 0.60)	(p = 0.81)
BRAC borrower dummy			-0.01	-0.07		
			(p = 0.92)	(p = 0.26)		
BRAC borrower with training dummy			0.04	-0.03		
			(p = 0.43)	(p = 0.69)		
Cumulative loan						
Upto 5000 taka					0.02	-0.07
					(p = 0.78)	(p = 0.35)
5000 - 10,000 taka					0.01	-0.11
					(p = 0.94)	(p = 0.13)
Abobe 10,000 taka					0.11	0.03
					(p = 0.04)	(p = 0.71)
Membership length						
1-10 months					0.08	0.15
					(p = 0.22)	(p = 0.13)
11-20 months					0.04	-0.02
					(p = 0.50)	(p = 0.86)
21-30 months					-0.04	0.04
					(p = 0.43)	(p = 0.56)
31-40 months					0.40	0.10
					(p = 0.52)	(p = 0.21)

Note: 1.0a, 1.1a, 1.2a consists of all BRAC members and eligible non members in BRAC villages (n = 1072)
1.0b, 1.1b, 1.2b consists of BRAC members and non-members with less than ten decimals of land (n = 547)

Table 1.8 shows the heteroscedasticity corrected estimates of the ' BRAC input variables' from equations 1.0-1.2 for a sample of BRAC members and TG non members and for a sample of less than ten decimal households. 1.0a. suggests that controlling for other explanatory variables BRAC membership raises a household's daily total consumption per adult equivalent by 6.2% [15]. However the BRAC membership dummy is not significant for the sample of ultra-poor households in 1.0b.

Moreover one can infer from equation 1. l a. that a household which borrows from BRAC and has received some training in Matlab has a higher welfare level compared to an identical member who has

[15] exp(0.06)-1=0.062

borrowed but not taken any training. However this coefficient is not statistically significant which raises doubts on the suggestion derived from the bivariate analysis that the 'credit plus training' package is associated with lower poverty. This result is also reflected in the 'less than ten decimal' sample where none of the 'BRAC variables' in equation 1.lb. are significant. Recent work specifically on training provided by BRAC's RDP in Matlab (Mahbub *et al.* 1996) mentions several shortcomings, which revolve around the lack of refresher courses leading to a lack of knowledge retention and a degree of mismatch between the training received and the purpose *for* which a loan is taken. However another crucial factor behind the apparant lack of significant 'training impact' is the data used in this paper; for most 'sectoral' programmes for which the bulk of training is provided the training period is the starting point of the launch of the particular programme and the loan relevant to that specific activity for which the training has been provided is disbursed later. Hence whilst training on poultry rearing was in full swing by 1995 in Matlab the amount of loans disbursed for poultry activities was only 0.8% of the total loans disbursed from 1992 to 1995 (Husain and Moore 1996). This picture is mirrored for other sectoral programmes except for the livestock programme as discussed earlier. Hence the effect of the training on the productivity of the enterprise for which the training was designed for and its consequent knock on impact on the household socioeconomic status can only be verified using longer term data.

Equation 1.2a. includes both membership duration and loan size; the category that clearly emerges as the most significant determinant of poverty status are those who have borrowed more than 10,000 taka. Borrowing more than 10,000 taka (the mean loan size for the '10,000 plus' category is 13,090 taka) raises a household's consumption per adult equivalent by 11.6% relative to an identical non borrowing BRAC member. This improvement can be seen in the context of the average shortfall in consumption from the food poverty line of non-borrowing members (14.7%), TG BRAC members (19%), NTG BRAC members (9%) and TG non members (16%). The results also show that membership duration in itself does not appear to significantly affect poverty status once loan size is included in the model. However the equivalent equation for the ultra-poor indicates that credit does not contribute to significant poverty reduction for this group. In fact the negative coefficient on the '5,000-10,000' loan category, whilst only significant at the 13% level, suggests that borrowing could even have an adverse effect on the welfare of the poorest of the poor. However even if one does not take such an extreme position it would be safe to say that these findings reinforce the view that the poorest of the poor may not benefit as much as the moderate poor from membership in credit programmes (Hulme *et al.* 1996, Wood *et al.* 1997).

The full regression results are reported in appendix 3. The non BRAC variables that emerge as significant determinants of poverty arc fairly intuitive. Appendix table 3.1 reports the results of the equation used to test the identification variable, which can be used as an illustrative case. Poverty is significantly determined by the age, education and occupation of the household head, the ratio of earners to household size, the wealth endowment of the household (as proxied by land value) and whether the household is a member of another NGO or not. Moreover there are significant village effects as well. Households living in villages, which are closer to the market and are outside the embankment, have higher levels of welfare controlling for other factors.

Turning to the specific estimates appendix table 4.1 suggests that having a manual labourer as household head reduces total consumption per adult equivalent by 9.7% in this pooled sample of BRAC members and TG non members. Households whose heads have attended secondary school have a 17.0% greater total consumption per adult equivalent than the base case of 'no schooling households' and those with primary education have welfare levels 5.7% greater than an identical household whose head did not go to school. Membership of another NGO raises total consumption per adult equivalent by 8.8%. A doubling in landholding size raises total consumption per adult equivalent by 4.9% on average. Moreover a l% increase in the ratio of earners to household members raises welfare by 0.2% and a 1% rise in the dependency ratio lowers total consumption per adult equivalent by 0.05%. The two village effects are significant as well; a household residing inside the embankment is worse off by almost 20% compared to an identical household residing in a village outside the embankment. Moreover a doubling of the distance to the market is associated with 19% lower household welfare [16].

1.9 Concluding discussion

The paper has presented some evidence of BRAC contributing to poverty reduction amongst its member households in Matlab though the benefits are unlikely to be evenly distributed across socioeconomic groups. The bivariate analysis shed some initial light in this regard; it was found that the oldest cohort of BRAC members (31-40 months), the group who had received credit and training and those households that borrowed more than 10000 taka appeared less poor than other groups; given the fact that their initial endowment levels were broadly similar to the comparison groups this could be tentatively attributed to BRAC's membership. The data also suggested that after comparing 'initial endowment' factors such as dependency ratios and education newer members were less poor to start off with than older members. However there were other puzzling features as well: for instance those

[16] A village fixed effects model with dummy variables representing each village was also estimated. However there was little to choose between the main model in this paper and the fixed effect one in terms of goodness of fit indicators, hence the results are not reported.

households who were in the 'intermediate categories' of both membership length and loan size appeared worse off than those who had been members for a shorter time or had borrowed smaller amounts.

The multivariate analysis proved useful in resolving some of the queries raised earlier as controlling for both observable characteristics and taking into account unobservable factors helped in disentangling the effects of the various factors that contribute to poverty. One of the clearest messages that emerged from the literature review was the importance of catering for selectivity bias before arriving at conclusions about programme impact. However interestingly the empirical analysis in this paper suggested that in sample of BRAC members and eligible non members and in a sample of households that owned less than ten decimals of land the problem of selectivity bias did not arise. This suggests that households who decide to join BRAC, or are selected by BRAC, do not have underlying unobservable characteristics that give them 'an edge' compared to the typical eligible non member. This finding somewhat contradicts the notion in the literature that it is women who are more confident or more entrepreneurial who join micro credit programmes (Mckerman 1996, Morduch 1997).

The findings from the selectivity corrected estimates suggested that BRAC membership is a significantly positive determinant of the welfare variable used in this paper for the 'average' BRAC member. The membership variable was 'unpacked' into cumulative loan sizes and membership duration. The results suggested that borrowing more than 10,000 taka made a significant contribution to poverty reduction amongst BRAC members but that membership length did not appear important after loan size had been controlled for. The bivariate results indicated that those households who had crossed the 10,000 taka threshold were BRAC members for significantly longer than those in the smaller loan bands and as such had access to more loans; the typical member in this group had borrowed just over 13,000 taka from RDP. This group also had a significantly a lower proportion of household heads who were manual labourers or female headed compared to the lower loan categories and had invested significantly more in non land productive assets compared to households who had borrowed less. Moreover the loss of significance of the BRAC membership dummy in equation 1.2 along with the significance of the greater than 10,000 taka variable suggests that aside from this loan threshold there is not much more in the way of explaining poverty reduction from RDP's perspective. The fact that RDP's role in poverty alleviation in Matlab centres around loan size is not surprising given that almost 90% of credit disbursed went for activities that are not complemented by BRAC's training, extension or marketing services.

The ultra poor, proxied by those with less than ten decimals of land, do not appear to have benefitted substantially from borrowing even for those few who had taken more than 10,000 taka in credit. This could be due to the nature of the data or due to a more fundamental 'structural problem'. Given the fact that the ultra-poor are more risk averse than the 'moderate poor' they are more likely to have borrowed for traditional low productivity activities with a view to switching into riskier higher return activities over time. The data set with its short average membership length may have failed to capture this progression. However the lack of any significant impact on the ultra poor may also be due to the fact that the current package of inputs provided by RDP with the emphasis on micro credit may not be the answer to the needs of the poorest as has been argued elsewhere. Alternative anti-poverty schemes like BRAC's Income Generation for Vulnerable Groups Development (IGVGD), which combines credit with food relief, may be more effective. Moreover the provision of more flexible and wide ranging financial services such as multiple savings facilities[17] (Zaman *et al.* 1994, Wright *et al.* 1997) and insurance schemes may be more appropriate to the needs of the most vulnerable in society.

The idea of a threshold level of cumulative loan size at which significant improvements in welfare take place is not new; Mustafa *et al.* (1995) suggested that this threshold was crossed when membership length was over two and a half years and cumulative borrowing was over seven and a half thousand taka. As such it can be argued that providing capital to poor households in the form of micro credit has the capacity to improve their socio economic conditions but that this improvement only occurs when loans are of a large enough size so that investments in both on and off farm enterprises can earn significant returns. Smaller loans may not generate sufficient returns to make borrowing worthwhile as the figures for the 'less than 10,000 taka' loans suggested. However if this idea of a threshold cumulative loan size is taken aboard by credit programme managers a key issue is whether the amount necessary to reach this threshold should be provided in a lump sum in order to improve a poor households welfare in as short a time as possible or whether to stagger loan sizes, disbursing small amounts over time. This decision will vary according to the type of prospective client as credit delivering organizations trade off the potential of rapid gains in borrower welfare with the risk of default from large loan sizes.

[17] This paper has not included RDP's savings facilities a poverty reduction intervention. Whilst savings are collected weekly from members as a pre requisition to obtaining credit, these savings are held in long-term deposit accounts. The policy in Matlab for the period this data was collected was the savings could only be withdrawn once a member left RDP or after five years of membership. However more flexible 'current account' type facilities are now being introduced in RDP branches.

However whether the improvement in welfare associated with borrowing more than ten thousand taka will lift a household out of poverty obviously depends on far the household is below the poverty line to start with. Whilst the two measures of welfare used in this paper, total consumption per adult equivalent and food consumption per capita are not directly comparable, these figures suggest that a typical poor BRAC member will be close to crossing the poverty line after borrowing more than this sum. However this paper also highlighted other factors associated with poverty, lending weight to BRAC's multidimensional anti - poverty strategy. The importance of the education variables in raising welfare supports BRAC's emphasis on primary education (34,000 schools) and in adult education. The organization's efforts in its family planning facilitation services reaching 5.3 million people are designed to have long run effects on reducing dependency ratios and raising earners ratios both of which emerged as important determinants of poverty status in this paper. Moreover BRAC's other health interventions are designed to reduce poverty through improvements in health status, another crucial dimension in the poverty process (Sen 1995,. UNDP 1997). Glewwe's point on the limitations of reduced form analysis discussed earlier are also reflected in this paper: changes in the overall socio-political power structure which crucially affect a household's poverty status (Rahman 1995) are difficult to capture in such equations. However BRAC's attempts at 'social mobilization' by encouraging participation in local elections, lobbying for the poor's access to common property resources and making the poor aware of their legal and political rights are crucial if the major 'structural' obstacles to poverty reduction are to be addressed.

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Appendix 1

Consumption based poverty measures: some methodological points

It is important to clarify a few methodological issues in this area namely that of 'multiple poverty lines', the 'income' versus 'consumption' issue, the 'calorie availability' versus 'calorie intake' debate, the 'Food Energy Method' (FEM) versus the 'Cost of Basic Needs' (CBN) approaches to setting the poverty line, and the different poverty measures that are used.

It is considered good practice to have at least two poverty lines in order to be able to differentiate between the poor and the ultra poor (Lipton 1983). For instance whilst the commonly used minimum calorific threshold for moderate poverty is 2112 calories per person per day in Bangladesh, the threshold for absolute (ultra) poverty is 1805 calories per person per day. Studies have shown that if an individual attains the minimum calorie threshold his daily requirement of proteins is generally satisfied although micronutrient deficiencies can occur even without energy deficiency (Lipton and Ravallion 1995). Measures of poverty are generally based on consumption in preference to income data. One reason that this is so is that whilst income fluctuates sharply, even from day to day, consumption is comparatively smoother due to periods of saving and dissaving and hence consumption at any one time period is more closely related to 'permanent income' than is 'current income'. Measurement difficulties also plague income figures. The diversity of income sources in rural Bangladesh, problems with accurately recording the costs and returns of both farm and non farm activities, irregular remittances and a tendancy to under-report income flows all contribute to the problem (see Lipton and Ravallion 1995).

Calorie availability is generally derived from expenditure data and is inclusive of 'leakages' in the form of *'plate waste, loss in cooking and other preparation, feeding of animals and feeding non household members such as guests, hired farm labourers and servants' (Bouis and Haddad 1992 pp 338).* Calorie intake on the other hand is measured from a 24-hour recall survey and is considered to be the actual cooked food intake of the household members (i.e. calorie availability minus leakages). Whilst 'calorie intake' is in ideal terms the 'first-best' indicator, in practice 'calorie availability' is used more widely as in this paper. The main reason is survey cost and span; expenditure data is relatively easier and less expensive to collect on a large scale.

The Food Energy Method (FEM) of setting the poverty line is based on an econometric relationship between calorie availability (or intake) and food expenditure in order to determine the minimum expenditure required on food (total expenditure can also be used). Greer and Thorbecke (1986) estimate the poverty line in Kenya, separately for different regions, using region specific food (and non food) bundles and prices.

The log of food expenditure is used as the dependent variable with calorie availability as the regressor in order to derive the poverty line. The Cost of Basic Needs (CBN) method on the other hand is based on the cost of a fixed food bundle whose calorie content adds up to 2112 calorie per person per day.

Ravallion and Sen (1996) provide an excellent overview of the debate between the use of these two methods of setting the poverty line. Given that the FEM approach is based on the calorie - expenditure function, differences in tastes, relative prices and activity levels may lead one group to attain the calorie threshold at higher expenditure levels than another which could lead to inconsistent welfare judgements. For instance better off households in urban areas may have a preference for a more expensive diet consuming food with a costlier per calorie content; urban poverty lines may then be higher than the rural one and certain households may be deemed 'poor' in the urban context even if their command over commodities is greater than some non-poor households in rural areas. Moreover this problem is also applicable in time series comparisons of the same group; tastes and preferences may have changed which will affect the poverty line expenditure level but may not have changed the '*command over basic consumption needs* ' (Ravallion and Sen pp768)[18]. However in addition to the aforementioned problems a related concern centres around the elasticity of calorie intake with respect to expenditure. This elasticity varies widely according to the model chosen, the econometric specification and the variables used and has repercussions on the level at which the poverty line is set. Strauss and Thomas (1995) comprehensive review of numerous estimates of income and expenditure elasticities of calorie demand indicates that this figure ranges from 0.01 to 1.18. This variation has serious implications for policy makers; the early 'high' estimates (Pitt 1983, Strauss 1984) imply that strategies promoting income growth will have strong positive effects on calorie consumption and nutritional status. The 'revisionists' view in contrast (Bouis and Haddad 1992, Behrman and Deolalikar 1987) suggests that this elasticity is close to zero and hence that 'increases in income will not result in substantial improvements in nutrient intakes' (Behrman and Deololoikar 1987). A more recent strand of literature appears to balance these two extremes; Subramanaian and Deaton (1996) calculate the elasticity of calorie consumption with respect to total expenditure to be between 0.3 and 0.5 using data from rural India. The higher figures appear to be estimated from food demand equations i.e. demand elasticities for different food categories are calculated and then converted into calorie elasticites. The lower estimates are generally calculated using the direct estimation of the calorie - expenditure/income relationship; however the choice of estimation technique and the nature of the variables used has also led to a wide range of estimates. Bouis and Haddad (1992) illustrate how the elasticity estimates can be biased upwards if '*random errors in measuring food purchases are transmitted (by construction) both to calorie availability and total expenditures and second because the residual difference between family calorie intake and household calorie availability will often increase with income'* . The authors also argue that the most accurate estimates of this elasticity is derived using instrumental variables or fixed effects on the calorie intake - total expenditure pair.

[18] For the purposes of this work these shortcomings may not be as acute since comparisons are being made for a relatively homogenous group (BRAC members versus eligible non-members) in one region of the country and at one point in time.

Two problems with the CBN method is that the *'utility compensated substitution effects in consumption are ignored'*[19] and there are *'difficulties in setting nonfood 'basic needs ' and valuing their cost at local prices '*(Ravallion and Sen pp 768). However Ravallion and Sen argue that the *'most compelling argument in favour of the CBN method for making poverty comparisons is that it explicitly aims to control for differences in purchasing power over basic consumption needs, while the FEI*[20] *method does not'* (pp 769).

Determining a poverty line(s) is the first step; households have to be classified around this line according to the extent, depth and severity of poverty. The Foster Greer Thorbeck (1984) class of poverty indicators (FGT) is the most commonly used measures of poverty in current literature.[21] Algebraically they can be represented as follows:

$$P_\alpha = 1/n \sum_{i=10}^{j} (z - x)^\alpha / z$$

where i...j are the number below the poverty line

z is the poverty line

x is the actual expenditure per head

n is the entire population

α is 0, 1, 2

The PO measure tells us about the 'incidence of poverty' or the popular 'headcount ratio' which is the number of people below the poverty line as a proportion of the total population.

[19] Osmani (1990) discusses the demerits of using the fixed bundle approach (CBN) due to that it ignores the substitution from dearer to cheaper goods, which occurs when relative prices change over time. He criticizes the Rahman and Haque (19880 study on changes in rural poverty for this reason. However, Osmani also shows how using the calorie-income relationship (FEM) can be problematic by citing the World Bank (1987) and BBS (1988) estimates of rural poverty in Bangladesh which he shows were based on downwardly biased income data.

[20] FEI stand for food energy Intake.

[21] see Appleton (1995), Coulcombe *et al.* (1996), Glewwe (1991) as a few examples of recent work using FGT measure and Ravallion (1995) for the advantages and disadvantages of the measures.

The P1 measure tells us the 'depth of poverty' or the average shortfall in expenditure per head of a poor person from the poverty line. P 1 is also useful in that it can be used to calculate the minimum cost, per head of population, of eliminating poverty via perfect targeting. If an anti poverty scheme 'filled' each household's poverty gap exactly to the point where all poor households reach the poverty line then this would constitute the minimum cost of eradicating poverty (Ravallion 1995). However P1 does not capture income inequalities amongst the poor which the P2 measure does.

The P2 measure allows for an expenditure improvement of a person far below the poverty line to be valued more than the same gain for a person just short of the poverty line. Hence P2 is an indication of the 'severity' of poverty and allows one to capture income inequalities.

Appendix 2

Poverty measurement in Bangladesh: a brief review

Research on rural poverty in Bangladesh depicts considerable differences in the estimates of poverty at any one time period as well as the changes over time. These anomalies are discussed in Ravallion (1990), Osmani (1990), Sen (1995a) and Sen (1997). Ravallion raises doubts over the comparability of BBS Household Expenditure Survey (HES) statistics over time and in particular questions the supposed substantial decrease in poverty incidence from 74% in 1981/82 to 5% in 1985/86 suggested by BBS data. Changes in sample size and alterations to the expenditure questionnaires fuel these doubts; Ravallion compares the HES to the Bangladesh National Accounts data and finds that the latter only shows a 0.5% per annum growth rate of per capita real consumption as opposed to the 9.9% per annum that would be inferred if the HES data were correct. Ravallion's own calculations suggests the growth in real per capita consumption is much closer to the National Accounts rate than the HES figure.

Another source of discrepancy between the various studies is in the choice of prices by which food consumption bundles are converted into poverty lines. Most studies use urban prices which are then deflated to generate rural equivalents; Ahmed and Hossain (1984) assume the cost of living in rural areas is 20% lower than urban areas whereas Rahman and Haque (1988) deflate urban prices by 10%; Muqtada (1986) did not mention how his rural prices were derived. [22] Binayek Sen in his calculation of rural poverty uses survey expenditure [23] data to derive prices for the different items as he feels this captures the actual prices faced by the poor more accurately particularly where certain cheaper varieties are consumed. Sen (1997) provides further evidence of conflicting results regarding the trends in rural poverty in the 1990's. Preliminary results from the 1995-96 Nutrition Survey of Bangladesh (Jahan 1996 cited in Sen opcit.) and the agricultural wage data collected by the Bangladesh Bureau of Statistics (BBS) suggests that rural poverty has worsened in the 1990's whilst the Analysis of Poverty Trends Project (APT) of BIDS (see Rahman *et al.* 1996) and nutrition data collected by the Nutrition Surveillance Project (NSP) carried out by HKI suggest that there has been an improvement in rural poverty (Loganathan 1996 cited in Sen opcit). This could be because these four pieces of evidence on rural poverty are based on four types of indicators: per capita food expenditure (BIDS), per capita food intake (Jahan opcit), anthropometric indicators (HKI) and agricultural wages (BIDS).

[22] This comparison is drawn from B. Sen (1995)

[23] Household surveys of either income or expenditure are needed to estimate poverty; predictions using aggregate national data are prone to serious error (Ravallion 1995).

Appendix Table 2.1: The cost of basic needs food bundle used to derive a poverty line in Matlab

Items in minimum consumption bundle	Per capita normative daily requirement		Price
	Calories	Grams	Taka/kg
Rice	1,386	397	13
Wheat	139	40	11
Pulses (khesari)	153	40	19
Milk (cow)	39	58	15
Oil (mustard)	180	20	56
Meat (beef)	14	12	57.5
Fish (fresh water)	51	48	40
Potato	26	27	6.5
Other vegetables (leafy and non leafy)	36	150	10.6
Sugar (guur)	82	20	18.5
Fruits (banana)	6	20	20
Total	2,112	832	
Poverty line expenditure on food (Tk/person/day)	13.51		

Appendix Table 2.2: A comparative assessment of rural poverty in Bangladesh[24]

	1995 Matlab	1994 Rural	1993 Rural	1991/92 Rural	1989-90 Rural
Moderate poverty line total expenditure per head per year in taka	6410	6287	5270	5136	4790
Below moderate poverty line (%)	47.7	52	61	50	55.4
Below ultra-poverty line (%)	30	22.5	12	25.7	27.5
P1 index (%)	12	19	14.7	-	9
P2 index (%)	5	9.6	3.4	-	3.2

Sources: 1995: present study
1994: Rahman and Hossain (1996)
1993: Khandker *et al.* (1996)
1991/92: BBS (1995) 'graph-fitting method' estimate
1989-90: Rahman and Hossain (1995)

Appendix table 2.3 shows the degree to which the ten 'fully sampled' villages are representative of the rural average in Bangladesh in terms of land ownership status. Whilst the Matlab villages have a higher proportion of household's below 0.5 acres of land (64.7% versus a rural average of 53%) this disparity is bridged in terms of the proportion of each land ownership category who are below the two poverty lines. For instance 62.3% of the landless group in Matlab are below the poverty line compared to a 65.1% average in rural areas. Poverty incidence appears to decline steadily with increases in land holdings once again confirming the appropriateness of land as an instrument to target the poor. Ravallion (1995) believes that '*... the most promising single additional indicator is probably landholding class, given the strong negative correlation observed between landholding and poverty in rural areas of much of South Asia* ' However, land based targeting is not free from controversy. Ravallion and Sen (1994) show that an untargeted transfer of resources to all social classes in rural areas in Bangladesh also reduces poverty significantly and that the gain in targeting by landholding class is small. The reduction in rural poverty when larger landholding groups are taxed and the revenue redistributed to the landless or functionally landless is even smaller than one achieved through an external aid inflow, which does not involve taxation. This is because '*...landholding, while providing a good proxy for the living standards of rural households (as can be seen in all our simulations, the target groups should be the land poor) remains an imperfect indicator. Poor households in larger land holding classes would be adversely affected by such programmes, and there will be leakage to non poor households among land-poor groups'* (Ravallion and Sen opcit pp 836).

In BRAC's case Ravallion's 'external-aid inflow' scenario is more appropriate than the taxation case. This is because RDP's resources are a combination of donor grants, branch revenues and income from BRAC's commercial enterprises and hence do not involve taxing and redistributing from one group to another. Appendix table 2.4 suggests that poverty and the lack of any formal education are more correlated in the ten sampled villages than on average in rural Bangladesh. However the percent of poor households with more than primary education are very similar (12.2% for Matlab and 13.4% on average in rural areas).

[24] The 1995 Matlab figure is computed as the number of people below the food poverty line.

Appendix table 2.3: Household's classified by poverty status and land ownership

Land owned in acres	Matlab sample: number and percent	Rural average: number (millions) and percent	Matlab sample: % below moderate poverty line	Rural average: % below moderate poverty line	Matlab sample: % below ultra poverty line	Rural average: % below ultra poverty line
0 (landless)	199 (6.9%)	0.94 (5.4%)	62.3	65.1	43.2	48.5
0.1-0.49 (functionally landless)	1665 (57.8%)	8.37 (47.6%)	52.7	55.4	34.4	34.2
0.5-1.49 (marginal farmer)	647 (22.5%)	3.65 (20.8%)	41.6	40.9	21.9	21.9
1.5-2.49 (small farmer)	206 (7.2%)	1.83 (10.4%)	35.0	35.3	17.5	18.8
2.5-7.49 (medium farmer)	153 (5.3%)	2.23 (12.7%)	22.2	29.4	13.1	14.8
Above 7.5 (large farm)	10 (0.3%)	0.55 (3.1%)	-	19.2	-	7.5
All groups	2880 (100%)	17.57 (100%)	47.7%	46.4%	29.7%	27.5

Sources: The 'Matlab sample' statistics were collected in the ten 'fully sampled' villages by the BRAC-ICDDR,B research project and use food poverty estimates
The 'rural average' figures are from BBS (1995) pp 39. Note that BBS's 'hard core poor' is equivalent to this author's 'ultra-poor'.

Appendix Table 2.4 Households classified by poverty status and household head's education

	Matlab: below moderate poverty line	Rural average: below moderate poverty line	Matlab: below ultra poverty line	Rural average: below ultra poverty line
No schooling	67.7%	56.7%	70.7%	58.6%
Attended primary	20%	29.9%	18.2%	29.0%
More than primary	12.2%	13.4%	11.1%	12.4%
Total	100%	100%	100%	100%

Appendix 3: detailed regression results

Table 3.0 Means and standard deviations of variables used in regression analysis

Variable	All BRAC members (n = 547)	TG non members in RDP villages (n = 544)	BRAC members with less than ten decimals of land (n = 242)	Non members with less than ten decimals of land (n = 305)
LGTOCEQ	2.85 (0.41)	2.82 (0.36)	2.77 (0.35)	2.81 (0.36)
HLTHHH	0.85 (0.36)	0.81 (0.40)	0.84 (0.37)	0.81 (0.39)
AG1560F	1.48 (0.77)	1.29 (0.69)	1.35 (0.68)	1.22 (0.68)
AG1560M	1.33 (0.86)	1.26 (0.85)	1.20 (0.74)	1.14 (0.79)
SXHHH	0.87 (0.34)	0.83 (0.38)	0.88 (0.33)	0.81 (0.39)
HHHLBR	0.26 (0.44)	0.32 (0.47)	0.33 (0.47)	0.32 (0.47)
DEPEND	0.33 (0.20)	0.34 (0.23)	0.34 (0.20)	0.35 (0.22)
EARNER	0.22 (0.11)	0.27 (0.18)	0.23 (0.10)	0.28 (0.20)
ADEQPR	0.81 (0.75)	0.82 (0.76)	0.80 (0.80)	0.81 (0.74)
PRIMHHH	0.23 (0.42)	0.22 (0.41)	0.17 (0.38)	0.17 (0.38)
OTHNGO	0.11 (0.31)	0.22 (0.41)	0.96 (0.29)	0.23 (0.42)
SECHHH	0.15 (0.36)	0.12 (0.33)	0.10 (0.30)	0.13 (0.33)
AGHHH	44.10 (12.60)	43.8 (13.4)	42.19 (11.48)	41.99 (12.96)
AGHSQ	2102.8 (1229.2)	2100.6 (1248.8)	1910.9 (1100.2)	1930.6 (1235.9)
LGLAND	2.55 (1.52)	2.09 (1.31)	1.15 (0.73)	1.11 (0.79)
IEMBNK	0.41 (0.49)	0.62 (0.49)	.43 (0.50)	0.57 (0.50)
MARKET	249.24 (124.70)	202.6 (114.92.)	242.77 (127.37)	209.51 (116.80)
LODUM1	0.25 (0.43)		0.24 (0.43)	
LODUM2	0.33 (0.47)		0.30 (0.46)	
LODUM3	0.23 (0.42)		0.27 (0.45)	
MEMLEN1	0.10 (0.30)		0.87 (0.28)	
MEMLEN2	0.18 (0.38)		0.14 (0.34)	
MEMLEN3	0.37 (0.48)		0.42 (0.49)	
MEMLEN4	0.16 (0.37)		0.15 (0.36)	

Table 3.1: Testing the validity of the identification instrument

Variables	Dependent variable: BRAC membership dummy (n = 1072)		Dependent variable: log of total consumption per adult equivalent (n = 1072)	
	Coefficient	P value	Coefficient	P value
HLTHHH	0.03	0.46	0.04	0.16
AG1560F	0.03	0.23	0.03	1.42
AG1560M	-0.04	0.08	0.02	0.33
SXHHH	0.01	0.76	-0.03	0.44
HHHLBR	-0.07	0.03	-0.09	0.00
TGHH92	0.001	0.00	-0.00	0.15
DEPEND	-0.02	0.84	-0.15	0.06
EARNER	-0.62	0.00	0.81	0.00
ADEQPR	0.04	0.89	0.08	0.74
PRIMHHH	-0.03	0.45	0.06	0.04
OTHNGO	-0.23	0.00	0.08	0.00
SECHHH	-0.02	0.73	0.16	0.00
AGHHH	0.004	0.58	-0.02	0.00
AGHSQ	-0.00	0.60	0.00	0.03
LGLAND	0.05	0.00	0.05	0.00
IEMBNK	-0.03	0.81	-0.18	0.04
MARKET	0.00	0.14	-0.00	0.02
R squared			0.19	
initial log likelihood	-777.9			
Maximized log likelihood	-696.5			

Table 3.2: Results from OLS regressions of the log of total consumption per adult equivalent on a sample of all BRAC members and TG non members (n = 1072)

Variables	Equation 1.0a		Equation 1.0b		Equation 1.0c	
	Coefficient	P value	Coefficient	P value	Coefficient	P value
HLTHHH	0.04	0.16	0.04	0.16	0.04	0.17
AG1560F	0.03	0.18	0.03	0.18	0.02	0.27
AG1560M	0.02	0.28	0.02	0.28	0.02	0.38
SXHHH	-0.03	0.45	-0.03	0.45	-0.03	0.36
HHHLBR	-0.09	0.00	-0.09	0.00	-0.09	0.00
BRVO	0.06	0.01	0.06	0.27	0.02	0.51
DEPEND	-0.15	0.05	-0.16	0.05	-0.16	0.04
EARNER	0.85	0.00	0.85	0.00	0.84	0.00
ADEQPR	0.07	0.74	0.07	0.75	0.06	0.78
PRIMHHH	0.06	0.04	0.06	0.04	0.05	0.04
OTHNGO	0.01	0.00	0.01	0.00	0.09	0.00
SECHHH	0.16	0.00	0.16	0.00	0.15	0.00
AGHHH	-0.02	0.01	-0.02	0.01	-0.02	0.00
AGHSQ	0.00	0.03	0.00	0.03	0.00	0.02
LGLAND	0.04	0.00	0.04	0.00	0.04	0.00
IEMBNK	-0.24	0.00	-0.24	0.00	-0.22	0.00
MARKET	-0.00	0.00	-0.00	0.00	-0.00	0.00
BRBOR	-	-	-0.00	0.92	-	-
SECDUM	-	-	0.04	0.43	-	-
LODUM1	-	-	-	-	0.01	0.78
LODUM2	-	-	-	-	0.00	0.94
LODUM3	-	-	-	-	0.11	0.04
MEMLEN1	-		-	-	0.08	0.22
MEMLEN2	-	-	-	-	0.04	0.50
MEMLEN3	-	-	-	-	-0.04	0.42
MEMLEN4	-	-	-	-	0.04	0.52
R squared	0.19		0.19		0.20	

Table 3.3: Results from OLS regressions of the log of total consumption per adult equivalent on a sample of less than ten decimal BRAC members and non members (n = 547)

Variables	Equation 1.0b		Equation 1.1b		Equation 1.2c	
	Coefficient	P value	Coefficient	P value	Coefficient	P value
HLTHHH	0.05	0.24	0.04	0.26	0.04	0.27
AG1560F	0.00	0.72	0.01	0.69	0.00	0.77
AG1560M	0.03	0.21	0.03	0.28	0.03	0.32
SXHHH	0.02	0.75	0.01	0.77	0.00	0.89
HHHLBR	-0.08	0.00	-0.08	0.01	-0.07	0.02
BRVO	0.02	0.59	0.08	0.20	0.01	0.81
DEPEND	-0.14	0.18	-0.13	0.19	-0.15	0.14
EARNER	0.68	0.00	0.67	0.00	0.67	0.00
ADEQPR	-0.04	0.87	-0.01	0.96	-0.03	0.91
PRIMHHH	0.10	0.00	0.10	0.00	0.11	0.01
OTHNGO	0.01	0.01	0.10	0.01	0.09	0.03
SECHHH	0.01	0.03	0.01	0.04	0.10	0.03
AGHHH	-0.02	0.00	-0.02	0.00	-0.02	0.00
AGHSQ	0.00	0.00	0.00	0.01	0.00	0.01
LGLAND	-0.00	0.92	-0.00	0.84	-0.00	0.75
IEMBNK	-0.27	0.00	-0.26	0.00	-0.24	0.01
MARKET	-0.00	0.00	-0.00	0.00	-0.00	0.02
LODUM1	-	-	-	-	-0.07	0.35
LODUM2	-	-	-	-	-0.11	0.13
LODUM3	-	-	-	-	0.03	0.71
MELEN1	-	-	-	-	0.15	0.13
MELEN2	-	-	-	-	-0.02	0.86
MELEN3	-	-	-	-	0.04	0.56
MELEN4	-	-	-	-	0.10	0.21
BRBOR	-0.07	0.26	-0.07	0.26	-	-
SECDUM	-0.03	0.69	-0.03	0.69	-	-
R squared	0.19		0.19		0.20	

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