Asset Based Poverty and Wealth Accumulation in Low Income Households in Bangladesh

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Using HIES 2000 data, the paper presents asset based poverty information so that it is possible to provide incentives in the form of social benefit and fiscal support to the group of people who needs it most. While income based measurements and other methods are available to characterise households under poverty, asset based measurements provide a new insight into poverty and related welfare studies. By applying fractional polynomial regression, it is found that there is a significant relationship between total asset and income. We also find significant results for asset income, profit from enterprises, other assets (including financial asset, jewelry), house value and other income (rent, dividend, interest) in total asset. Meanwhile, variables such as religion, gender of the household head and agricultural income do not significantly affect total asset. People accumulate asset starting from the age of around 20 years which continues until the age of 80 years. The education level of head of the household ranges between class V and class X, when such households move on to higher assets. Except for a few outliers, both asset and income are invested and managed effectively by households to derive return from such investment.

Keywords: Asset Based Poverty, Fractional Polynomial Regression, Social Welfare, Taxation Policy
JEL Classification: D3, H5, O12

I. INTRODUCTION

Wealthy are those who have bank balance, house, business or cars; but wealth is something that provides protection against tough times, tuition to get

private education, support to arrange sumptuous marriage ceremony, savings to go for solvent retirement life, and a facilitator of poor to achieve non-poor status. Wealthy people not always accumulate wealth over time. The poor can accumulate wealth too and that wealth can accrue over time. Poor people can use their existing assets as collateral for borrowing, giving families a way to move up and out of poverty. Possession of assets may help to escape from the poverty trap (Carter and Barrett 2006). First, assets can play an important role in reducing exposure to distress. Assets help provide ability to face accidents, repay debt and supplement sudden fall in income. Second, households with more assets are often able to improve their income levels by producing goods, speculating[1] or by lending. Third, accumulation of assets may help people move out of poverty and improve their standard of living. Policymakers concentrate on income before making policy regarding social benefits and overlook wealth. The government spends hundreds of billions of funds each year to support long term poverty reduction programmes. Reforming policies helping families enroll in automatic savings vehicles will ensure saving opportunities for all. Hence, by understanding wealth disparities, we can identify groups of people who need social protection and ultimately get themselves out of poverty.

In the next sections, we discuss the poverty and its relationship with assets.In addition , we will explore relationship between asset and income as levels of asset holdings are strongly associated with level of income. Also, we discuss the concept of wealth, asset based methods to measure poverty, comparing asset based measures with income based measure. We discuss the results derived on the basis of applying fractional polynomial regression model on household level data in Bangladesh. Finally, some concluding observations are made.

II. LITERATURE REVIEW: METHODOLOGICAL ISSUES

An economic approach measures poverty in terms of per capita consumption, income levels or calorie intakes. Minimum Income threshold has been accepted indicator for measuring poverty as income insufficiency can measure a person's inability to maintain a standard livelihood. Other measures such as wealth-ranking are practiced in sociology. But, according to Deaton and Grosh (2000), consumption is the best measure of the economic component of living standard. See appendix Table A.1 for definitions of poverty by think tanks in Bangladesh for understanding poverty criteria in Bangladesh.

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[1]*S*peculation is the practice of engaging in risky financial transactions in an attempt to profit from short or medium term fluctuations in the market value of a financial instrument or property.

A key research issue is that large numbers of individuals and households are unable to accumulate key assets. The factors which affect how individuals use their assets are very important, for example education, experience etc. The inability to use assets effectively may lead a person to stay in chronic poverty; while the ability to earn a handsome risk adjusted return on assets may be an important factor to escape from poverty. Besides, having more assets also plays an important role in measuring social status, and potentially identifying those people who need more attention from public policy interventions. However, poverty reduction policy should focus on what poor people have (assets) as much as what they lack (Moser 1998), and help them to accumulate assets and manage them effectively.

In a study of rural areas in four African countries, Ellis and Freeman (2004) found that land productivity increased with income level and asset accumulation. Meanwhile, Rigg (2006) argues that land is not enough for poor rural households to escape from poverty. He argued that rural livelihoods have become separated from agricultural production because the importance of non-agricultural activities has been increasing. Rigg strongly challenges the idea that solution to rural poverty lies within rural areas and within agriculture (the 'yeoman farmer fallacy[2]').In addition, owning a house has been very important for asset based poverty. Low income people having a house can accumulate wealth and repay debt. But assets themselves are not sufficient; institutions and technology are also important (Barrett 2001).

What is Wealth?

Wealth is measured as total assets minus total liabilities. Assets are the sum of financial assets (such as bank accounts, stocks, bonds) and non-financial tangible assets (such as homes and real estate, businesses, jewelry and vehicles). Liabilities include both unsecured debt (such as credit card balances) and secured debt (such as mortgages and vehicle loans). Households save both in the form of conventional buffer assets (e.g. grain stocks and other safe savings instruments) and in the form of productive assets. Buffer assets accrue at the opportunity cost of productive assets, as well as at the cost of foregone consumption.

In this paper, we used ideas such as net worth, asset and savings to characterise households under poverty, which are follows:

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[2]In the late 14th to 18th centuries, yeomen were farmers who owned land (freehold, leasehold or copyhold). Their wealth and the size of their landholding varied. Often it was hard to distinguish minor landed gentry from the wealthier yeomen, and wealthier husbandmen from the poorer yeomen.

$$\text{Wealth/ Net worth }_t = \left(\sum_{i=1}^{t} \text{asset i} + \sum_{i=2}^{t} \text{asset return i}\right) - \left(\sum_{i=1}^{t} \text{debt i} + \right.$$
$$\left. \sum_{i=2}^{t} \text{cost of debt i}\right) + (\text{retained earnings }_t) \qquad (1)$$

$$\text{Assett }_t = \sum_{i=1}^{t} \text{Investment i} - \sum_{i=1}^{t} \text{sale of asset i} \qquad\qquad (2)$$

$$\text{Savings}_t = \text{income }_t + \text{net worth }_{(t-1)} - \text{consumption}_t - \text{investment t} \qquad (3)$$

Where t= terminal time

Income vs. Wealth

Income inequality and wealth inequality change over time. If neither improves, in such cases income gap remains the same. A common misconception is that poor or even low-income families cannot save.

Low income households accumulate wealth in several patterns. Oliver and Shapiro (1990), using the data from 1984, found that one-third of households had zero or negative net financial assets, whereas median net financial assets were about $2,600. The average American household can sustain three months without earning with their available net financial assets. Wolff (2000) used survey of consumer finances of 1995 and found that families in the middle quintile have financial wealth sufficient to replace current income for 1.2 months, those in the second quintile for 1.1 months, and those in the bottom quintile could not replace current income.

Wolff (2000) also showed net worth among low-income families declined for a significant period in the 1980s and 1990s, whereas mean wealth among the bottom 40 per cent of the population fell sharply, from $4,400 in 1983 to $900 in 1995. This was accompanied by a decline in wealth and home ownership rates for households between the ages of 25 and 44. There is great heterogeneity in wealth holdings. Wolff showed that in 1995, the top 1 per cent of households held over 38 per cent of all net worth (other than social security and pensions), and the top 5 per cent held 60 per cent of net worth, while the bottom 60 per cent of households held less than 5 per cent of net worth.

What is an Asset-based Approach?

An asset based approach involves how asset enables households to overcome shortfall in income and to continue sustainable consumption level. Households are observed to make transition from poor to non-poor status (and vice versa) over time.

Diagram 1: Income-Asset Interaction Grid
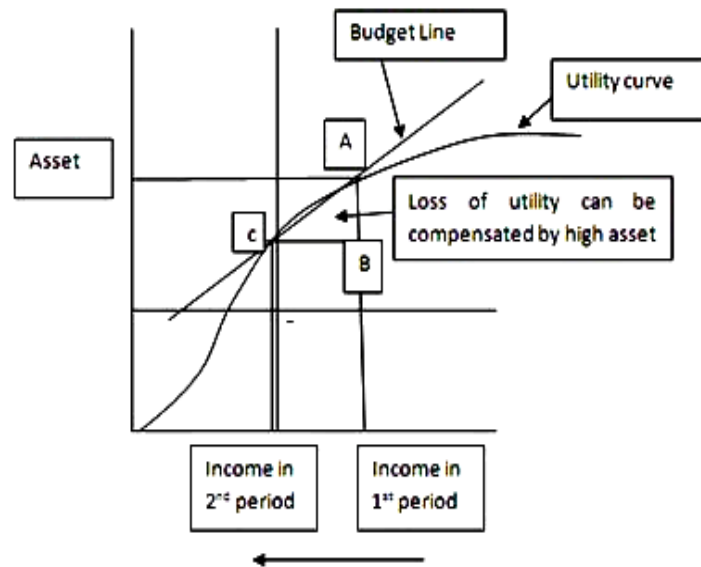
Source: Author.

In the above diagram, we can see that due to a fall in income from first period to second period utility level may fall from A to C. But sale of asset may help to return to the same utility level as in the 1st period.

Hypotheses

Our null hypothesis is that asset cannot be explained by flows such as income and its subgroups such as wage income, agricultural income, asset income, and profit from business, gender, religion and education of household heads. In addition to that we want to examine which components of asset itself are significantly affecting total asset such as land value, financial assets and jewelry, equity contributed to firms, livestock, forestry, house value and agricultural asset.

Model Specification

Linearity is assumed for continuous predictors, for example, the weight and height of a person. In most cases, linear functional relationship or a step function is assumed for such continuous predictors. However, the assumption of linearity may be incorrect; this may lead to a mis-specification of fitted model. Models assuming non-linearity may lead to good fit of the data. Fractional polynomial

method looks for best fit functional forms for continuous covariates as well as it eliminates insignificant covariates.

Royston and Altman (1994) explained regression models based on fractional polynomial functions of a continuous covariate (see also Sauerbrei and Royston (1999). Fractional polynomials are used in regression models to fit non-linear functions because linear and quadratic functions are limited in fitting curve shapes.

A polynomial of degree m may be written as

$$\beta 0 + \beta 1 x + \beta_2 x^2 + \cdots + \beta_m x^m \tag{4}$$

whereas fractional polynomial of degree m has m integer and or fractional powers p1 < ……< pm

$$\beta 0 + \beta 1 x^{(p1)} + \beta_2 x^{(p2)} + \cdots + \beta_m x^{(pm)} \tag{5}$$

where ,

$$x^{(p)} = \begin{Bmatrix} xp & \mid if \ p \neq 0 \\ logx & \mid if p = 0 \end{Bmatrix}$$

x must be positive. A Fractional Polynomial of first degree (m = 1) involves one power or log transformation of x. Fractional Polynomial functions may be extended to include repeated powers. A fractional polynomial of degree m with exactly m repeated powers of p is defined as

$$\beta 0 + \beta 1 x^p + \beta_2 x^p \log x + \cdots + \beta_m x^{(p)} (\log x)^{m-1} \tag{6}$$

For example, a fractional polynomial of second degree (m = 2) with repeated powers of 0.5 is

$$\beta 0 + \beta 1 x^{(.5)} + \beta_2 x^{(.5)} \log x \tag{7}$$

The linear predictor for a fractional polynomial of order M for covariates is as follows:

$$\beta o + \sum_{m=1}^{M} \beta m X^{pm} \tag{8}$$

Power pm is chosen usually with restricted set of powers: {-2,-1,-.5,0,.5,1,2,3}. Estimation involves a systematic search for best power that fit the data best because values of the power are not known. If the values of the power were known, fractional polynomials would become a multiple regression model with coefficients $\beta 0 \ \beta 1 \ldots \ldots \beta m$. For each combination of power, deviance is measured and lowest deviance is considered as best fit.

Empirical specification of our model is as follows:

$$Asset = \beta 0 + \beta 1 income\,(i)^{p1} + \beta 2 income(i)^{p2} + \beta 3\ other\ income^{p3} +$$
$$\beta 4 total\ profit^{p4} + \beta 5\ asset\ income^{p5} + \beta 6 agricultural\ income^{p6} +$$
$$\beta 7 religion^{p7} + \beta 8 gender^{p8} + \beta 9 house\ value^{p9} + \beta 10 other\ asset^{p10} + \epsilon it \qquad (9)$$

Sources of Data

We used data from the HIES (Household Income and Expenditure Survey) 2000 of Bangladesh. Using Stata, we performed necessary data management function to get our desired data set. There are 7,440 households in the data set.

The following components of household wealth have been used for estimating the value of total asset:

(1) Main home: The value of home

(2) Firm and business: The equity contributed by gift, own source and savings

(3) Financial assets: value of stock and bond of public limited companies traded in exchanges

(4) Current and saving account: amounts deposited in current and saving accounts

(5) Land asset

(6) Livestock

(7) Forestry

The following components have been used for calculating income flows:

(1) Wage and salary income

(2) Other income (income from rent, other income from property, dividend and profit from stock and partnership, interest from bank and other sources)

(3) Non-agricultural income (profit from enterprise)

(4) Agricultural income: It includes:

    a)   Income from crop
    b)   Income from fishery
    c)   Income from forestry
    d)   Income from livestock product
    e)   Rental from agricultural asset
    f)   Expenses related to agricultural activities

Agricultural income = a+b+c+d+e-f

The summary of our dataset is as follows:

TABLE I

SUMMARY OF DATA SET

(Amounts are in Taka)

	No. of Observations (households)	Mean	Minimum	Maximum
Total asset	7,440	88,045	-595,500	14,000,000
Income	7,440	58,325	-24,405	923,2000
Net agricultural income	3,917	9,390	-126,171	12,82,850
Expenses on agricultural inputs	3,917	4,904	0	545,300
Total agricultural income	4,157	13,637.9	-18,690	15,95,800
Asset income	3,893	847.47	-40,000	120,000
Fish farming income for 12 months period	4,799	1,769.07	0	150,000
Income from crop	3,387	10,141	0	13,20,000
Total profit from business	2,442	49,331	-18,000	34,95,000
Other income	7,440	17,960	0	91,30,000
Salary income	2,666	37,432	0	14,65,000

Source: Author's Calculations.

We used data from HIES for the period 2000. Meanwhile, data from the HIES for the years 2005 and 2010 are available. Our purpose is to examine relationship between asset and income flows and gender, religion, house value and other asset; thus the scope of the paper does not cover time varying relationship between asset and income.

III. RESULTS OF EMPIRICAL EXERCISE

The regression result shows that total asset (house value, enterprise equity share, other asset, land and property asset) has significant relationship with income (wages and salary, profit from enterprise, other income, agricultural income), other asset (jewelry, financial assets, etc), house value, and profit from business, at 5% significance level. Income is very significant in building asset. House value is illiquid asset, thus when any shortfall of income is faced by

consumers, they can immediately sell their house at once for maintaining livelihood. However, if one has more than one house, he or she can lease the asset and enjoy some revenue. Ornaments, financial assets and bank deposit may work as liquid asset in vulnerable time or in times of financial need. If the house is mortgaged, then the scenario is difficult for maintaining a certain standard of living. Non-payment of such debt may lead to leave the house. Often poor people lose their house as they cannot pay back their loans. Agricultural income is not significant to total asset. Policymakers should take care of people involved in agriculture, since without proper development of farming, it would be difficult for the economy to thrive. As agricultural income is very low, it would be difficult for the people in agriculture profession to accumulate wealth.

TABLE II
REGRESSION RESULTS OF FRACTIONAL POLYNOMIAL

R^2(adjusted)=.8774 R^2=.8786 F=735.34 P(F)=0.0000 Number of observations= 1027

	Coefficient	P value*
Constant		0.000
Income 1	1238028	0.000
Income 2	-908527	0.000
Asset income	-2.268138	0.000
Total profit	-.3017069	.030
Total other income	-.0091097	.962
Total agricultural income	.1193245	.448
Religion	-312.2564	.979
Gender	-8952.719	.716
House value	1.061701	0.000
Other asset	2.420582	0.000

Note:* We considered 5% significance level.

Gender and religion of household heads are not significant to total asset at 5% significance level. It means that the asset building in a household does not depend on whether household head is male or female. This is because more and more women are participating in the income generation process and accumulation of wealth process as well. As a result, women are doing well in running families

along with men. Religion does not affect total asset, which implies that religious background does not really matter in having jobs, or in doing well in businesses.

TABLE III
PER CENTILES OF INCOME AND ASSET DATA
**PER CAPITA (AMOUNT IN TAKA)**

Variable	Observation	Per centile	Centile
Total asset	7,440	10	0
		20	5,000
		30	12,000
		40	20,000
		50	30,000
		60	45,000
		70	65,000
		80	100,212
		90	195,000
Income	7,440	10	2,704
		20	10,451
		30	19,000
		40	27,504
		50	36,000
		60	46,528
		70	60,000
		80	80,683
		90	120,000

If we look at percentile or distribution of both income and asset data, it can be observed that the bottom 10 per cent of people hold total asset amounting Taka 0, whereas income for that group is just around Taka 2,704. If we see the top 10 per cent of the people holding total asset of about Taka 195,000 and income for the top 10 per cent people is Taka 1,20,000. As per distribution of asset and income, wealth accumulates faster as income rises; as MPC (marginal propensity to consume) falls with increase in income. At the same time, MPS

(marginal propensity to save) rises with increase in income. In addition, due to diminishing marginal utility, people reduce consumption once they are satisfied. For example, a solvent person will buy a car, but buying the fifth car will not appeal him much unless buying car is a hobby to such person.
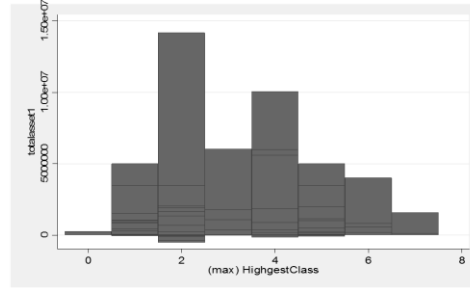
Figure 1: Asset Accumulation and Management Pattern
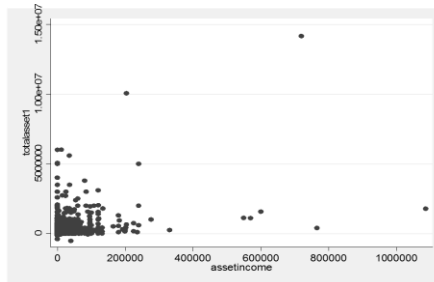
1A) Total Asset Vs. Age of the Household Head
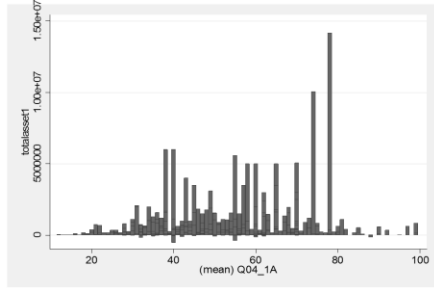
1B)Total Asset Vs. Highest Class Attended by the Household Head
The Codes are 1 = Class 1-5, 2=Class 6-10, 3= Class11, 4=Graduate, 5=Postgraduate, 6=Medical/ Engineering,7=Others, vocational, diploma.

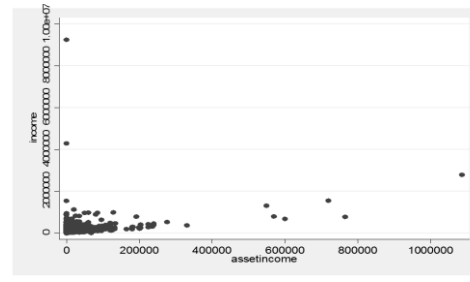1C) Total asset VS Asset Income

1D) Income Vs Asset Income

Figure 1(A) shows that people accumulate asset starting from the age of 20 which continues until the age of 80. Figure 1(B) shows that the education level of head of the household ranges between class V and class X, when such households possess higher assets. Meanwhile, Figures 1(C) and 1(D) show that except for few outliers, both asset and income are invested and managed effectively to derive return on such investment.

III. POLICY IMPLICATIONS

Apart from education, public policies are mostly concentrated on social programmes to meet basic consumption need .Such policies prioritize income

distribution of population. An asset-based approach is recommended to balance this traditional approach, which may lead to long-term development of low-income households.

We believe that social benefit programme and tax policy should be aligned to derive optimum benefit from any fiscal policy and ultimately to reduce gap between the rich and poor. Table IV divides people into two categories based on income and asset; here we avoid middle class.

TABLE IV
POOR-RICH CLASSIFICATION BASED ON INCOME AND ASSET

	Poor	Rich
Income	Low	High
Asset	Low	High

Source: Author.

Diagram 2: Asset–Income Poverty Grid
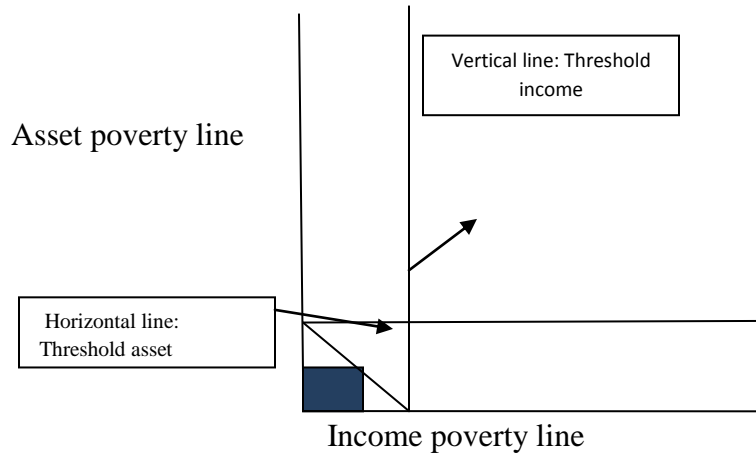
Source: Author.

In the above diagram people staying in blue shaded area are worse off, as they neither have much asset nor much income to sustain their life. We assumed equality in income and asset poverty measures. We believe that a poor person is not capable of paying his/her debt. A person with low debt, when fall in distress, can borrow and lead existing lifestyle for some time. Meanwhile, a person having asset, with low debt can sell liquid asset immediately and illiquid asset in the long run to maintain existing living standard.

We recommend the following tax for four groups identified above:

Savings tax: Government should impose tax on savings in bank fixed deposits (above set amount) in order to discourage savings, as more savings will go to banks and banks will lend at higher interest rate, thus eventually savers need to bear the burden when they purchase goods from a producer who borrowed fund from a bank at high cost. Besides, savings will reduce consumption and often investment. If savings is invested in income generating asset by the savers, then it can be welcomed. Also, savings is done through buying government securities and prize bonds; savings certificate is welcomed as government will reinvest or spend for public welfare. Savings income tax may be reduced for low amounts of savings.

Asset subsidy: If anyone invests in assets, he or she can be given a certain rebate in tax liability. As assets generates cash or used in production, creating employment.

Debt tax: Debt is discouraged, thus if anyone has substantial amount of debt, tax should be imposed. High debt comparing asset may make an entity bankrupt. Since business firms often prefer debt due to tax deductibility, business should provide very low rate tax on debt along with tax on earnings.

TABLE V
HYPOTHETICAL DEBT TAX CALCULATION

	Scenario without debt tax	Scenario with debt tax	
Earnings before Interest and Tax	12	12	
Tax on debt		0.1	Debt 20, interest rate 10%
Interest	2	2	Debt tax rate 0.50%
Earnings before Tax	10	9.9	
Tax 5%	0.5	0.45	
Net income	9.5	9.45	

Source: Author.

There are four types of people in a society, as shown in Table VI.

TABLE VI
FINANCIAL STATUS CLASSIFICATION

High Income High Asset	High Income Low Asset
Low Income High Asset	Low Income Low Asset

Source: Author.

The tax rate applicable for both income and asset for above four groups is follows:

Low Income Low Asset: We suggest low income tax should be imposed on this group and social benefit be provided effectively so that this people can uphold their status over time.

High Income High Asset: We suggest high income tax bracket for this group; as this group has high asset, low asset subsidy can be applicable.

High Income Low Asset: We suggest high income tax for that group with high asset subsidy in order to encourage them to accumulate asset.

Low Income High Asset: We suggest low income tax and low asset subsidy for this people.

A dynamic status over time for a person from poor to non-poor or non-poor to poor is provided below.

TABLE VII
DYNAMIC POVERTY AND SOCIAL WELFARE

Time period		1st period	2nd period	3rd period	4th period No social welfare		5th period Social welfare	
Consumption (standard of living above poverty line)	0	8	8	8	0	8	?	8
Income (Above poverty line is 8)	0	10	12	8	0	0	0	4
Net worth	0	2.0	2.2	2.42	2.64	0	0	0
Investment	0	2.0	0	2	0	0	0	0
Asset@ 10% return	0	2.0	2.2	4.42	4.84	0	0	0
Debt@ 10% interest	0	0	0	2	2.2	.52	.57	.57
Savings @ 10% interest	0	0	4.0	4.4	4.84	0	0	0
Social welfare								4

Source: Author.

Low-income households are not targeted in asset based programmes. Such people do not own homes, investments, or retirement accounts. Besides, they do not have asset accumulation incentives for getting waiver in income tax liability. Asset-based policy would improve the welfare of low-income households in ways that traditional income-support policy cannot. Asset-based policy includes policies to promote the accumulation of financial wealth, tangible property, human capital, social capital, political participation and influence, cultural capital, and natural resources.

Few recommendations are made as follows to reduce asset gap between the rich and the poor. In addition, by accumulating wealth the poor are expected to sustain a decent standard of living.

1) Long term savings incentive such as tax benefit and low income tax should be offered to low income, low asset people.
2) Programmes need to be telecast in radio and TV regarding issues on asset management and asset building, savings, good health care, etc. in native language.
3) Co-operatives and banks should provide asset management lessons to low-income people in villages.
4) Implementation of no premium social insurance for low income, low asset households would better face physical and financial hazards.

IV. CONCLUDING REMAKRS

In this paper, an attempt has been made to provide meaningful insight into poverty via asset based information. Such asset based measurement constitutes new class of poverty measurement, along with conventional flow or income based poverty. The income distribution of the society and implementation of social benefit plans towards targeted poor people become more logical and viable through asset based information, since such information can provide an actual reflection of an economy and its agent's financial position. Finally, formulation of anti-poverty policy becomes ethical as every class of the society is given preference. To achieve success, the challenge is to identify the populations least able to accumulate assets over time, as people change their asset based financial position over time. It is possible to do further research with different data sets and regions. Results may vary over time and over geographical region.

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Appendix A.1

Organisation	Term used to define poverty	Definitions	Sources/References
BIDS	Extreme poor	Own less than 5 decimal of land and have no cultivated land Suffer chronic food deficit Fully dependant on manual labour Per capita income annually less than BDT 2800 No access to health facility Live in thatched roof	Rethinking Rural Poverty: Bangladesh as a Case Study by Hossain Zillur Rahman and Mahbub Hossain, 1995
BRAC		Own less than 10 decimal of land Fully dependant on seasonal wage labour Suffered from recurrent food insecurity Have no or very few productive assets. Female headed household with single income earner Have poor housing Woman with disabled husbands.	Challenging the Frontiers of Poverty Reduction:Targeting Ultra Poor,Targeting Social Constraints Published by BRAC Centre, March 2001