The many dimensions of poverty in Albania: income, wealth and perceptions

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THE MANY DIMENSIONS OF POVERTY IN ALBANIA: INCOME, WEALTH AND ASSET OWNERSHIP

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This paper aims at assessing poverty in Albania through the use of an asset index whose effectiveness is compared with consumption in explaining differences in results of health and educational outcomes.
Firstly, an asset index is constructed by the use of factor analysis and principal component techniques; then, two probit models are estimated assessing enrolment rate for secondary education and chronic disability in Albania using the asset index as an independent variable to compare its effectiveness with expenditures.
The World Bank LSMS Survey of 2002 is used in the analysis.

1- INTRODUCTION

"By necessaries I understand not only the commodities which are indispensably necessary for the support of life, but what ever the customs of the country renders it indecent for creditable people, even the lowest order, to be without. A linen shirt, for example, is, strictly speaking, not a necessary of life. The Greeks and Romans lived, I suppose, very comfortably, though they had no linen. But in the present times, through the greater part of Europe, a creditable day-labourer would be ashamed to appear in public without a linen shirt, the want of which would be supposed to denote that disgraceful degree of poverty which, it is presumed, nobody can well fall into, without extreme bad conduct. Custom, in the same manner, has rendered leather shoes a necessary of life in England".

This is a quite famous excerpt from 'The wealth of nations' by Adam Smith (1776), which I decided to quote at the beginning of this work because it enlightens the necessity, even for the classical economic theory, of considering the concept of human well being in a multidimensional way.

The relevance of material aspects of life is certainly important in affecting happiness and satisfaction, but evaluation of wealth is such a complex issue that it requires more than a simplistic attitude towards any kind of analysis.

It is worth mentioning the relevance, within economic history of thought, of the debate about the assessment of human utility, with the contraposition between utilitarianism, which defines the problem in terms of maximization of a social welfare function, and other approaches which concentrate, instead, on different paradigms.

The capability approach of Amartya Sen (1997), but also the works of Kahneman and Tversky (1979) constitute a different attempt to describe concepts such as instrumental freedom, empowerment and human security. These theories represent an original elaboration of contents which can be found in the history of philosophy in the books of Aristotle (*oikonomìa* means, etymologically, organization and wealth of the household), Karl Marx or, surely, Adam Smith.

Evaluation of both well being and quality of life is then surely correlated with that of poverty, so that the definition of such a broad concept becomes a very difficult issue.

In this work, I will concentrate my attention on the possibility of measuring poverty by the use of a multidimensional indicator, able to provide more information than simple measures based only on money. I will then compare its effectiveness with that of more traditional indicators, such as consumption at the household level.

It is not a banal attempt, because all the twentieth century, with the prevalence of welfarist approach, has been characterised by the use, in poverty assessments, especially of indicators of monetary wealth: this is not surprising and it is important to stress the fact that indicators based on earnings or expenditures are easy to construct

and that they offer an immediate answer to the question 'How much is necessary to eradicate poverty from a specific community?'
The object of my paper is not, however, relevant only with respect to different possibilities of defining a concept from a philosophical point of view, but it has a strategic role in terms of policy making.
To use or not to use a multidimensional indicator can actually provide very different pictures of the same society and, therefore, it can suggest completely different interventions aiming at solving a specific problem.
My conviction is not that of a total opposition between univariate and multivariate definitions of wealth: I am absolutely sure of the importance of both in favouring the choice of the most effective way of addressing a targeted solution.
I will simply try to demonstrate, with relevance to Albania, that different indicators can contain different information.
The choice of the country on which I am performing my analysis is due to the availability of Living Standard Measurement Survey (2002) conducted by World Bank, which comprehends an entire section dedicated to Subjective Poverty.
Besides, Albania is a small transition economy in which the introduction of an open market system is determining profound transformations since the beginning of the 90_s; in such a context, it can be particularly interesting to test the effectiveness of a multidimensional indicator in representing wealth.
Basically, the structure of this work is articulated in four parts: in the first I will present the socio-economic context of Albania presenting descriptive statistics about the level of the most important indicators of poverty and inequality; in the second I will build up an asset index which I use as a regressor in my models for the relevant case of Albania, following the relevant literature on the matter; in the third I will describe the dataset used in the econometric analysis.
The last chapter, finally, is dedicated to the estimation of two models: in particular, I will investigate the determinants of enrolment rate for secondary education and the possible impact of consumption and of the asset index on the probability of being affected by a chronic disability. Conclusions follow at the end with a summary of the basic findings.

2-THE ECONOMIC CONTEXT IN ALBANIA

Albania is a small country with a population of approximately 3,100,000 people, situated in a peculiar region such the Balkans and classified as a transition economy.
After the collapse of the communist regime, it has experienced a decade of major reforms involving both the economic and the social structure, due to the introduction of a fully market system. The strong performance in terms of productivity is emphasized by the level of GDP growth in the last 5 years, with an average of 5,6% between 2001 and 2004.
Inflation is really low and it is assessed at 3%, offering an image of a very stable context also with regards to price volatility.
Literacy rate is extremely high (with approximately all the population able to write and read), so that primary education is not a problem for this country. This is a particular feature extremely relevant for my estimates: as a matter of fact, I will focus on the analysis of the determinants of secondary education enrolment rate.
During the '90s a lot of structural reforms were implemented: the privatisation of enterprises, the reorganisation of the bank system and land reforms.
In the next table, the most relevant macroeconomic indicators are presented for years between 2001 and 2004:

Table 1: Macroeconomic indicators for Albania (2001-2004)

	2001	2002	2003	2004
Current account balance (% of GDP)	-5.30	-9.05	-7.12	..
Deposit interest rate (%)	7.73	8.54	8.38	6.61
Final consumption expenditure, etc. (% of GDP)	91.17	98.29	99.59	98.01
Final consumption expenditure, etc. (annual % growth)	11.54	8.94	10.30	6.76
Foreign direct investment, net inflows (% of GDP)	5.05	3.00	3.11	5.61
GDP (constant 2000 US$) in milions	396.00	409.00	434.00	460.00
GDP (constant LCU)	404.00	417.00	442.00	468.00
GDP growth (annual %)	7.20	3.40	6.00	5.90
GDP per capita (constant 2000 US$)	1291.54	1330.55	1403.10	1477.28
GDP per capita (constant LCU)	131613.50	135588.80	142982.30	150541.30
Gross domestic savings (% of GDP)	8.83	1.71	0.41	1.99
Labor force, total	1339774	1336777	1349537	1351893
Lending interest rate (%)	19.65	15.30	14.27	11.76
Life expectancy at birth, female (years)	..	76.68	76.82	76.95
Literacy rate, adult total (% of people ages 15 and above)	..	..	..	98.71
Trade (% of GDP)	56.91	63.19	65.08	64.47
Unemployment, total (% of total labor force)	22.70	..	15.17	..

Source: World Development Indicators, 2006

However, even in a context of such good economic performances, poverty remains a central issue in the policy debate and available data show the existence of a difficult situation in Albania, which has the lowest per capita income of the area (1330 $ in 2002). Evidence can also be provided about the radical contradiction between rural and urban areas, to which I will dedicate my investigation in the chapters containing models of health and educational outcomes.
The relevance of international aid is then witnessed by the dynamic of an indicator, such as 'Aid per capita', which grew from 88 $ in 2001 to 116$ in 2004, with an increase of 32%. The increasing role of institutions such as World Bank and IMF in providing financial resources constitutes a key point in comprehending Albanian development strategies.
An assessment of poverty is evidently necessary in order to provide and implement the most effective policy instruments and the definition of such a complex concept as poverty itself claims for extreme carefulness in deciding and applying the proper tools for evaluation.

2.1 Poverty and inequality in Albania
2.1.1Poverty level in Albania
In order to define a poverty profile, it is necessary at first to decide which indicator to use for the purpose; being Albania a country where large sectors of economy are informal and where rural areas account for 55% of the entire territory, it is better to use measures that are consumption-based (rather than income-based).
Then it is possible to set poverty lines both in absolute and in relative terms: the first ones define a specific threshold in terms of nutritional outcomes and they are useful for comparisons across countries and time; the second ones represent, instead, the degree of poverty of a household (or the relevant unit of analysis) in comparison with that of the other members of a specific population.
In this analysis I will refer to an absolute poverty line, which is taken from World Bank's poverty assessment, and it is fixed at 4,891 Leks (local money; the exchange rate in 2002 fixed the value of 1$ at 145.6 Leks). The method used for its construction is the Cost of Basic Needs approach (Ravallion and Bidani, 1994), which I described in the literature review. FAO Suggestions in terms of calories intake are also considered.
Using Stata, it is possible to perform an analysis of the data providing the values of the most relevant indicators of poverty[1], which are shown in the following table referring to monthly average per capita consumption:

Table 2: Poverty measures of per capita consumption

Mean	Estimate	Std.Err.	[95% Conf.	Interval]	Deff
P0	**0.205**	**0.007**	**0.191**	**0.217**	**1**
P1	**0.044**	**0.001**	**0.040**	**0.048**	**1**
P2	**0.014**	**0.0008**	**0.013**	**0.016**	**1**

Elaborations from Stata

[1] Methodology presented in details in Appendix A

The headcount is defined as the percentage of people living below the set poverty line (p0 in table 4).
In my case, it is quite high indicating that almost one fifth of the population lives under the poverty threshold; the problem with HR is that it does not take into consideration intensity and depth of deprivation, which is accounted for, instead, in the poverty gap index (p1 in table 4): this indicator represents the mean distance below the $1 (1993 PPP US$) a day poverty line, expressed as a percentage of the poverty line.
The third measure, finally, describes the average income shortfall (expressed in proportion to the poverty line) of those below the threshold (p2 in table 4).
Another interesting aspect to consider is the distribution of personal consumption in deciles:

Table 3: Distribution of deciles of personal consumption in Albania

Distributional summary statistics, 10 quantile groups					
Quantile group	Quantile	% of median	Share, %	L(p), %	GL(p)
1	3631.82	53.48	3.66	3.66	290.41
2	4450.13	65.53	5.13	8.79	696.77
3	5226.83	76.97	6.08	14.87	1178.85
4	6045.63	89.03	7.12	22.00	1743.46
5	6790.69	100.00	8.09	30.08	2384.30
6	7802.36	114.90	9.18	39.26	3111.84
7	9083.19	133.76	10.58	49.84	3950.08
8	10689.58	157.42	12.39	62.23	4932.35
9	13456.45	198.16	15.06	77.29	6125.68
10			22.71	100.00	7926.00

Elaborations from Stata

At the bottom of the distribution, individual consumption is fixed at 54% of the median, which is not a dramatic value if compared to those of other developing countries. The ratio of income share between the richest decile and the poorest one is equal to six and the last three deciles of the population account for more than 50% of the entire consumption.
I will discuss later the situation in terms of inequality, when presenting the values of indicators such as Gini Index.
Now I will instead concentrate on the profile of different subgroups: the difference in the values between urban and rural areas is, for example, quite relevant (the estimates will confirm this particularly interesting feature). Here the levels assumed by indicators are summarized in the tables below:

Table 4: Poverty measures for urban sub-sample

Mean	Estimate	Std.Err.	[95% Conf.	Interval]	Deff
P0	**0.146**	**0.007**	**0.130**	**0.161**	**1**
P1	**0.031**	**0.002**	**0.027**	**0.035**	**1**
P2	**0.010**	**0.001**	**0.008**	**0.012**	**1**

Elaborations from Stata

Table 5: Poverty measures for the rural sub-sample

Mean	Estimate	Std.Err.	[95% Conf.	Interval]	Deff
P0	**0.275**	**0.011**	**0.253**	**0.296**	**1**
P1	**0.060**	**0.003**	**0.0545**	**0.067**	**1**
P2	**0.020**	**0.001**	**0.017**	**0.023**	**1**

Elaborations from Stata

As it is possible to see immediately, there is a big difference in terms of headcount ratio: the number of people living under the poverty line is greater in rural areas by more than 10%, probably due also to a different pattern of consumption including self-production, which can contribute to explain part of the distance. However, also the World Bank's poverty assessment focuses its attention on the more difficult socio-economic condition of rural areas, also in terms of quality of infrastructure and availability of services (WB, 2003).
The standard errors reported in the tables confirm besides the statistical significance of the estimates.
Going deeper into the differences between different districts, I report here (Table 8) also the estimates for the sub-sample of people living in Tirana:

Table 6: Poverty measures for Tirana's sub-sample

Mean	Estimate	Std.Err.	[95% Conf.	Interval]	Deff
P0	**0.123**	**0.013**	**0.097**	**0.149**	**1**
P1	**0.024**	**0.003**	**0.017**	**0.031**	**1**
P2	**0.007**	**0.001**	**0.004**	**0.010**	**1**

Elaborations from Stata

2.1.2 Inequality level in Albania[2]

In this section I will discuss some measures of inequality for Albania.
Looking at the data for Albania in 2002, we can easily find out that inequality is surely a relevant issue, but the values of indicators are not extremely severe if we compare them with countries characterised by an high degree of inequality (like, for example, the South American ones): Gini coefficient is fixed at 0.28 and it is very similar to that registered for the other countries of the Balkans, while it is sensibly lower than the values for other transition countries such as Russian Federation or Poland, where it is higher than 0.35.
Perhaps this can be because the process of privatization has occurred and is occurring in Albania with a smoother pattern, but another important feature, recalling, for instance, the macroindicators presented just at the beginning of this work, is that Albania is attracting a lower flow of FDI from the rest of the world.

[2] Methodology presented in details in AppendixA

In order to judge correctly this indicator, however, it is necessary to keep in mind the complexity of countries which were part of the Soviet Union: on one side, this has for sure determined, after 1989, a revolution in the structure of post-communist societies determining an increase in inequality; on the other side, the situation inherited can partly explain the low level still assumed by GINI index because of a sort of inertial process.
In the next table, the values of indicators are summarized:

Table 7: Inequality indicators for Albania

Variable	Reps	Observed	Bias	Std. Err.	[95% Conf.	Interval]	
Gini	50	.2864664	-.0005112	.0057677	.2748757	.2980571	(N)
					.2774518	.2995954	(P)
					.2777616	.3005569	(BC)
Theil	50	.1374162	-.0005006	.0057251	.1259111	.1489213	(N)
					.1280028	.1507278	(P)
					.1285147	.1517731	(BC)
Varlogs	50	.2598029	-.0002556	.0121103	.2354663	.2841394	(N)
					.2420938	.2899103	(P)
					.2429642	.2899684	(BC)

N = normal, P = percentile, BC = bias-corrected

Elaborations from Stata

3- THE ASSET INDEX IN ALBANIA

3.1 The use of Asset Index in the development economics literature

Literature is full of studies about the definition and application of techniques aimed at constructing multidimensional indicators of poverty but I will focus my attention on the utilization of asset indices.
A review about the different possibilities in the measurement of living standards (using dataset such household surveys, as I do) is contained in Montgomery (2000). The author describes the use of statistical techniques, such as principal component or factor analysis, useful for the purpose of reducing the dimension of a dataset; he then addresses his analysis to the definition and construction of consumption aggregates discussing the reasons for which it is better to use one measure instead of its alternative, dependently on the context.
Deaton (2002) also dedicates a chapter to the question of smoothing behavior of consumption versus the volatility of income sources, especially for least developed countries.
To go deeper into the literature about the use of asset indices, it is interesting to notice its wide use in many applications: for example, an analysis can be performed in order to compare the econometric reliability of such an indicator in contrast with expenditure measures (Montgomery et al., 2000); but the asset index is often used also as a covariate performing better than monetary values when poverty dynamics is taken into consideration (Sahn and Stifel, 2000) and providing more information in explaining determinants of nutritional outcomes (Sahn and Stifel, 2003) in the absence of data about consumption.
Looking at this specific issue, there is a point to make which will be relevant considering the purpose of this work: a lot of empirical studies, as a matter of fact, focus on countries such the Sub-Saharan ones, where the availability of data on consumption is limited by the absence or inefficiency of statistical offices (Lloyd and al., 1994; Brockerhoff, 1990; Njogu, 1991) or in Asian countries characterized by an extreme degree of price instability (Jensen, 1991 for Indonesia; Muhuri, 1996 and Foster, 1993; Knodel and Wongsith, 1991 for Thailand).

This is a relevant issue because it can easily explain why, in contexts where the quality of data about consumption is good (as in the case of Albania with LSMS Survey of 2002), the performance of asset index and expenditure measures can be really comparable.
With regards to the topics analyzed in studies using this particular technique, most of them concentrate on the determinants of fertility and nutritional outcomes (Adair and al., 1993; Stewart and al., 1991; DeGraff, 1991) or on education (Knodel and al., 1987, Lloyd and al., 1994) as I actually do.

3.2 The asset index in Albania
Before performing any kind of statistical analysis it is necessary to decide which variables to include in the asset index. Following the relevant literature on the use of multidimensional indicators, and adapting it to the specific context of Albania (looking at the World Bank Poverty Assessment of 2003), I chose 3 relevant areas:

1) characteristics of the housing
2) utilities (source of energy, availability of drinking water, phone)
3) durables ownership

The entire list of variables included in the asset index is the following[3]:

1) number of rooms in the house
2) availability of a separate kitchen
3) drinking water from well
4) drinking water from river
5) drinking water from water truck
6) drinking water from a tip inside the house
7) drinking water from a tip outside the house
8) availability of a mobile phone
9) availability of a wc facility inside the house
10) availability of a double wc facility inside the house
11) wc outside the house with pipe
12) wc outside the house without pipe
13) availability of central heating
14) heating through wood
15) heating through gas
16) heating through electricity
17) heating through petrol
18) no heating
19) ownership of a colour tv
20) ownership of a black tv
21) ownership of a tape
22) ownership of a camera
23) ownership of a refrigerator

[3] In a first instance, I had included hectares of owned land for each individual as a variable to consider in the asset index: the results of pca, however, suggested us to use it as a specific independent variable in the set of regressions

24) ownership of a freezer
25) ownership of a washing machine
26) ownership of an electric stove

All the variables, with the exception of 'number of rooms', are constructed as dummies assuming the value of 1 in case of availability of a facility or of ownership of a specific good and 0 otherwise.
With regards to the distribution of assets across population, the following table shows the percentages relative to each item (for 'number of rooms' the average number of rooms considered):

Table 8: Distribution of assets in Albania

Variable	Obs	Mean
sepkitchen	16521	0.87
nr_rooms	16521	2.50
mobileph	16521	0.43
watinside	16521	0.03
watoutside	16521	0.01
watertruck	16521	0.01
publictap	16521	0.04
well	16521	0.03
river	16521	0.00
wc_inside	16521	0.62
wc_double	16521	0.03
wc_outs~epip	16521	0.09
wc_outs~opip	16521	0.26
centheat	16521	0.00
wood_en	16521	0.63
gas_en	16521	0.23
petrol_en	16521	0.00
electr_en	16521	0.12
noheat_en	16521	0.02
colourtv	16418	0.88
blw_tv	16418	0.11
tape	16418	0.51
camera	16418	0.02
refrigerator	16418	0.83
freezer	16418	0.01
washmachine	16418	0.51

There are a lot of items for which distribution is quite widespread within the entire population, such as 'colour tv'. The great majority of people, besides, dispose of a separate kitchen in the house where they live.
This particular features make Albania a country rather different from the traditional developing ones and more similar in this sense to the highly developed nations.
After considering the descriptive statistics I showed above, the procedure is then to score the factors and to consider the first score as the latent common factor, which I assume to be an indicator for household 'wealth'.
The table with the scoring coefficients is now reported:

Table 9: Scoring coefficients of factor analysis

separate kitchen	0,018
nr_rooms	0,036
mobile phone	0,055
water inside	0
water outside	-0,007
water by truck	-0,005
public tap	0,002
well	0
river	-0,02
wc inside	0,39
wc outside	0,11
wc outside with pipe	0,041
wc outside without pipe	-0,07
central heat	0,003
wood engine	-0,398
gas engine	0,013
petrol engine	-0,007
electrical engine	-0,005
no heat	-0,038
tv colour	0,16
tv b/w	-0,07
tape	0,051
camera	0,02
refrigerator	0,08
freezer	0,012
washing machine	0,08
computer	0,023
electric stove	0,079

The interpretation of the coefficients is quite straightforward: each of them can be thought as the specific contribution of the relative variable in determining household wealth.
The sign on all of the items makes sense (where it is negative, it means that the specific characteristic contributes negatively to the level of wealth).
The robustness of the procedure is confirmed then by constructing the index through principal component.
By computing the Spearman's rank correlation[4] for the two indices (computed by applying the techniques of factor analysis and of principal component), the result is that

[4] In statistics, *Spearman's rank correlation coefficient* is a non-parametric measure of correlation – that is, it assesses how well an arbitrary monotonic function could describe the relationship between two variables, without making any assumptions about the frequency distribution of the variables. Unlike the Pearson product-moment correlation coefficient, it does not require the assumption that the relationship between the variables is linear, nor does it require the variables to be measured on interval scales; it can be used for variables measured at the ordinal level.
In principle, ρ is simply a special case of the Pearson product-moment coefficient in which the data are converted to ranks before calculating the coefficient. In practice, however, a simpler procedure is normally used to calculate ρ. The raw scores are converted to ranks, and the differences *D* between the ranks of each observation on the two variables are calculated. ρ is then given by:

$$\rho = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$$

where:

between the two indicators the correlation is fixed at 0.9849, which reassures us on the consistency of the estimates.
Another important test to perform is the calculation of correlation between the asset index and the consumption measure: in this sense, I would expect a high value of Spearman's indicator because of the fact that most of the assets included in the multidimensional index are presumably highly correlated with the availability of monetary resources.
The result is however 0.3277, which is not extremely high but which is acceptable looking at the results in the relevant literature (Sahn and Stifel, 2003). Besides, after calculating the Spearman rank's correlation between the asset index and a specific consumption measure including only expenditures on durables, the result is quite comforting and the value of the coefficient is 0.5918.

4- DATA: LSMS SURVEY

The regressions estimated later in the work use data from Living Standards Measurement Survey (LSMS) for Albania of 2002, which was on the field from April and September. The work was undertaken by the Albanian Statistical Office, INSTAT, with the supervision of World Bank.
The Survey has a standard framework that refers to literature on the issue (Grosh and Gleewe, 2000) and contains a household questionnaire, a community questionnaire, a price and a food questionnaire (these sections were not used in my analysis).
The household questionnaire is made up of different sections: information on the household members, ownership of durables, migration, health, education, employment, subjective poverty and agriculture.
The community questionnaire contains information about variables at the community level, in terms of education, health, quality and availability of services.
With regards to the sample size and the implementation of the survey, the final sample is comprised of 450 primary sample units (PSU_s), with 8 households in each unit. The total number of households is therefore of 3,600[5], with 16,521 individual observations. Due to the availability of data (especially for the ones relative to subjective poverty) my unit of analysis will be the household: the models in the last chapter are then evaluated at the household level.
So we can say that the magnitude of the dataset is really limited, due also to the dimension of Albania: in general, however, the problem of availability of data is huge for this country. Sources of information lack and also instruments to conduct surveys are inadequate. This is for sure an issue to take into consideration in the discussion of my results.
The sampling frame was divided into 4 regions: coastal area, mountain area, central area and Tirana. I will conduct my estimates by simply controlling for the distinction between urban and rural regions, after creating a specific dummy variable.
For each of the estimated models, I will present the modifications of the dataset that I added and the information used, in addition to the presentation of variables created.

D = the difference between the ranks of corresponding values of X and Y, and N = the number of pairs of values.

[5] During implementation of the survey, a household initially accepted and then refused to answer the questionnaires, so that the final number of households included is 3,599

As I have already said in the preceding section, my basic aim is to compare the results of specific models aimed at explaining different outcomes in education and health.
With regards to the expenditure measure, I will use the variable *totcons3*, which is monthly average household aggregate consumption (excluding expenditures in health and rent); I will use, then, as the asset index the one obtained through factor analysis[6], which I labeled *f1*.
In the following table I will report the summary statistics for each of the two variables:

Table 10: Summary statistics for totcons3 and f1

Variable	Obs	Mean	Std. Dev.	Min	Max
totcons3	16521	35527.98	18988.58	2242.836	277177.4
f1	16418	7.27e-10	.975122	-2.167053	1.866822

Elaborations from Stata

I then generated a variable, labeled *lncons*, which is the natural logarithm of *totcons3*.
Finally, because the asset index is expressed in terms of standard deviation, I created the variable *stdcons*, which I obtained by standardizing the natural logarithm of consumption.
For both variables, I will present summary statistics below:

Table 11: Summary statistics for lncons and stdcons

Variable	Obs	Mean	Std. Dev.	Min	Max
lncons	16521	10.36643	.4670522	7.715497	12.53241
stdcons	16521	-5.92e-10	1	-5.675883	4.637561

Elaborations from Stata

5- MULTIDIMENSIONAL VERSUS MONETARY INDICATORS OF WEALTH: THE IMPACT ON EDUCATIONAL AND HEALTH OUTCOMES

The basic aim of this section is to compare the effectiveness of consumption indicator and the asset index in explaining the variation in outcomes related to both education and health.
The structure is as follows: I will first present the methodology used in the estimation, then the dataset and the outcomes tested and I will end up with the presentation of results.

5.1 Methodology

With regards to the econometric analysis of probability outcomes, the model I am going to use provides one framework within which thinking about a binary dependent variable model may be situated. This approach is based on a latent (i.e., unobservable) continuous dependent variable (y_i^*) where: y_i^*

$$y_i^* = \mathbf{x}_i'\boldsymbol{\beta} + ui \qquad i = 1,.....,n \qquad (1)$$

and where $ui \sim N(0, \sigma^2)$ and $y_i^* \sim N(\mathbf{x}_i'\boldsymbol{\beta}, \sigma^2)$

[6] The construction of the index is explained in details in the next chapter

If $y_i^* \geq 0$ then yi = 1, and if $y_i^* < 0$ then yi = 0.

Thus, if the latent dependent variable equals or exceeds zero, the event is supposed to have occurred. If not, the event will not occur.
One of the most important characteristics of the model is that a discrete observable dependent variable is substituted by a continuous unobservable dependent variable.

Prob[yi = 1] = prob[$y_i^* \geq 0$]

(if we subtract from each side of the latter inequality the mean of y_i^*)

= prob[$y_i^* - \mathbf{x}_i'\boldsymbol{\beta} \geq -\mathbf{x}_i'\boldsymbol{\beta}$]

and, by dividing through the standard error σ in order to generate a standardized random variable, we get:

$$= \text{prob}\left[\frac{y_i^* - \mathbf{x}_i'\boldsymbol{\beta}}{\sigma} \geq -\frac{\mathbf{x}_i'\boldsymbol{\beta}}{\sigma}\right] = \text{prob}\left[\frac{u_i}{\sigma} \geq -\frac{\mathbf{x}_i'\boldsymbol{\beta}}{\sigma}\right] = \text{prob}\left[\frac{u_i}{\sigma} \leq \frac{\mathbf{x}_i'\boldsymbol{\beta}}{\sigma}\right] \qquad (2)$$

where $\frac{y_i^* - \mathbf{x}_i'\boldsymbol{\beta}}{\sigma} = \frac{u_i}{\sigma}$ is interpreted as the standardized random variable in this case.

Formula (2) gives us the probability that the standardized random variable $\frac{u_i}{\sigma}$ is less than the threshold value $\frac{\mathbf{x}_i'\boldsymbol{\beta}}{\sigma}$, which can be thought as the cumulative probability from $-\infty$ to the point indicated by $\frac{\mathbf{x}_i'\boldsymbol{\beta}}{\sigma}$ (prob[$\frac{u_i}{\sigma} \leq \frac{\mathbf{x}_i'\boldsymbol{\beta}}{\sigma}$] = F[$\frac{(\alpha + \beta X_i)}{\sigma}$]).

If we define $\theta = \frac{u_i}{\sigma}$, the expression in brackets can be expressed as follows:

$$F\left(\frac{\mathbf{x}_i'\boldsymbol{\beta}}{\sigma}\right) = \int_{-\infty}^{\mathbf{x}'\beta \div \sigma} f(\theta)\, d\theta \qquad (3)$$

Assuming that the random variable has a normal distribution, and setting the parameter σ=1, we obtain:

$$F(\mathbf{x}_i'\boldsymbol{\beta}) = \int_{-\infty}^{x'\beta \div \sigma} \frac{1}{\sqrt{2\pi\sigma^2}} \exp\frac{-\theta_i^2}{2} d\theta = \Phi(\mathbf{x}_i'\boldsymbol{\beta}) \quad (4)$$

That is to say:

$$\text{prob}(y_i = 1) = \Phi\left(\frac{\mathbf{x}_i'\boldsymbol{\beta}}{\sigma}\right) = \Phi(\mathbf{x}_i'\boldsymbol{\beta}) \text{ given } \sigma = 1$$

where $\Phi(\cdot)$ is the notation defining the cumulative distribution function for a standard normal random variable.
The general likelihood function for the probit model may be expressed as:

$$\vartheta = \prod_{i=1}^{n} [\Phi(\mathbf{x}_i'\boldsymbol{\beta})]^{yi} [1 - \Phi(\mathbf{x}_i'\boldsymbol{\beta})]^{(1-yi)} \quad (5)$$

Taking natural logarithms yields the log likelihood function:

$$L = \sum_{i=1}^{n} y_i \times \log_e[\Phi(\mathbf{x}_i'\boldsymbol{\beta})] + \sum_{i=1}^{n} (1 - y_i) \times \log_e[1 - \Phi(\mathbf{x}_i'\boldsymbol{\beta})] \quad (6)$$

The maximum likelihood estimates for these are α and β. These are obtained by choosing the values that maximize the above likelihood function. This is done by partially differentiating L with respect to α and β respectively.

$$\frac{\partial L}{\partial \alpha} = \sum_{i=1}^{n} \frac{[y_i - \Phi(\mathbf{x}_i'\boldsymbol{\beta})] \times \phi(\mathbf{x}_i'\boldsymbol{\beta})]}{\Phi(\mathbf{x}_i'\boldsymbol{\beta}) \times [1 - \Phi(\mathbf{x}_i'\boldsymbol{\beta})]} = 0 \quad (7)$$

$$\frac{\partial L}{\partial \beta} = \sum_{i=1}^{n} \frac{[y_i - \Phi(\mathbf{x}_i'\boldsymbol{\beta})] \times \phi(\mathbf{x}_i'\boldsymbol{\beta}) \times x_i}{\Phi(\mathbf{x}_i'\boldsymbol{\beta}) \times [1 - \Phi(\mathbf{x}_i'\boldsymbol{\beta})]} = 0 \quad (8)$$

where $\phi(\cdot)$ is the standard normal pdf. Both equations are highly non-linear in their parameters and require solving by iterative methods, which STATA reports in its results section.
Another problem with probit model is the nature of the coefficients: in this sense, the model estimates the impact of each covariate on the standardized probability index, whose interpretation is not straightforward.
If we define the probit model as follows:

$$\text{Prob}[y_i = 1] = P_i = \Phi(\alpha + \beta X_i) \quad (9)$$

With X as a continuous variable, we can define the marginal effect of X on P as $\frac{\partial P_i}{\partial X_i}$.

Then, Let $Z = \alpha + \beta X_i$, so $P_i = \Phi(Z_i)$.

Deriving through the chain rule we have: $\frac{\partial P_i}{\partial X_i} = \frac{\partial P_i}{\partial Z_i} \frac{\partial Z_i}{\partial X_i}$

Since $\frac{\partial P_i}{\partial Z_i} = \frac{\partial \Phi_i}{\partial Z_i} = \phi(Z_i)$ [where $\phi(\cdot)$ denotes the standard normal probability density function],

and $\frac{\partial Z_i}{\partial X_i} = \beta$

The marginal effect is then given by

$$\frac{\partial P_i}{\partial X_i} = \phi(\alpha + \beta X_i) \times \beta \quad (10)$$

An average value of the marginal effect may be calculated using the expression below:

$$\frac{\partial P_i}{\partial X_i} = \frac{1}{n} \sum_{i=1}^{n} \phi(\alpha + \beta X_i) \times \beta \quad (11)$$

An infinitesimal change in X is then supposed to determine a change in the outcome P_i in terms of percentages of probability points.
As concerns with the binary variables, instead, in the probit model impact effects are estimated.
Define the model as:

$$\text{Prob}[y_i = 1] = P_i = \Phi(\alpha + \beta X_i + \delta D_i)$$

Where D is a binary variable assuming, for example, the value of 1 is the individual lives in urban areas and 0 otherwise.
In order to compute the effect of living in different regions, it is not appropriate to compute a derivative.
If $D_i = 1$ then:

$$\text{Prob}[y_i = 1] = P_i = \Phi(\alpha + \beta X_i + \delta)$$

If $D_i = 0$ then:

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[7] This marginal effect is calculated using the average of probabilities. However, the value of the density function can be computed also through the mean characteristics of the covariates, which we define $\overline{X}$. The expression is then: $\frac{\partial P_i}{\partial X_i} = \phi(\alpha + \beta \overline{X}) \times \beta$

$$\text{Prob}[Y_i = 1] = P_i = \Phi(\alpha + \beta X_i)$$

The impact effect is given by:

$$\Delta = \Phi(\alpha + \beta X_i + \delta) - \Phi(\alpha + \beta X_i)$$

The average value is still given by:

$$\Delta^* = \frac{1}{n}\sum_{i=1}^{n} \Phi(\alpha + \beta X_i + \delta) - \frac{1}{n}\sum_{i=1}^{n} \Phi(\alpha + \beta X_i)$$[8]

5.2 Enrolment rate for secondary education

5.2.1Data

My aim is to estimate and compare the impact of consumption measure and of the asset index on the probability of being enrolled in secondary education. The dependent variable is the answer to the question reported in the section 'Education' of LSMS:

Did you enroll in school this academic year?

I decided to consider only the probability of being enrolled in secondary education because, as I have already had the opportunity to mention before, the percentage of pupils going to primary education schools is extremely high, greater than 99%.

Because of the absence of any variation in the outcome, the probit model is not able to perform any interesting result.

In Albania, secondary education level includes different grades and enrolls pupils between 14 and 19 years old; so, I estimated the model considering this cohort, running two specifications: one considering pupils between 14 and 16 years old (which is the International Standard Definition period of general secondary education, according to World Development Indicators)[9] ; the second one, performing the analysis for the entire cohort.

The whole sample comprises 1,960 individuals between 14 and 19 years old; due to the presence of missing values both in the dependent variable and in the asset index, I decided to drop them: in the former case because it is not possible to impute a missing value for a binary variable and in the latter because missing values for the asset index are really insignificant as a percentage of the total. So, I used 1,512 observations, which constitute the 77% of the sample.

The number of people between 14 and 16 years old, instead, is 1,034. Again, due to missing values, I used for the estimates 848 observations, which account for 82% of the sample.

The control variables, leaving aside expenditures and the asset index, are: gender, area of provenience (rural/urban), hectares of owned land, age of the household head, the

[8] As for marginal effects, the effect can be computed using the mean characteristics of the covariates, obtaining: $\Delta^* = \Phi(\alpha + \beta \overline{X} + \delta) - \Phi(\alpha + \beta \overline{X})$ (STATA uses a similar expression)

[9] We also estimated a model for pupils between 16 and 19 years old, but we do not report results because they are very similar to the ones obtained for pupils between 14 and 16 years old

employment status of both the household head and the household partner (which is defined in terms of being employed, unemployed or inactive), educational level of both the household head and the household partner, measured by the highest diploma attained (primary education, secondary education, vocational education, university education), religion (muslim, orthodox, catholic and no religion) and the availability of primary schools at the community level.
Finally, I ran the regression considering also the splines of the distribution, dividing into quintiles both consumption and the asset index, in order to test the sensitivity of the dependent variable to different parts of the distribution.

5.2.2 Results: 14-16 years

At first I will present the results for the cohort between 14-16 years old. Here, after performing a likelihood ratio test, I decided to split the sample between rural and urban regions, so that two different models are considered.
The results for the urban model are the following:

Enrolment rate: 14-16 years old in urban areas		
	(1)	(2)
	Enrolled in this academic year	Enrolled in this academic year
Sex	-0.51 (0.00)**	-0.51 (0.00)**
Land	-0.03 (0.32)	-0.03 (0.26)
Standardized values of (lncons)	0.05 (0.62)	
f1		0.23 (0.09)
inact_h	0.23 (0.47)	0.24 (0.45)
employed_h	0.31 (0.26)	0.30 (0.28)
inact_sp	0.56 (0.04)*	0.60 (0.02)*
employed_sp	0.75 (0.01)**	0.76 (0.01)**
Sufficient primary schools	0.26 (0.29)	0.32 (0.21)
Age	0.01 (0.24)	0.01 (0.40)
second_h	0.65 (0.01)*	0.62 (0.01)*
vocat_h	0.04 (0.84)	0.02 (0.91)
univ_h	1.08 (0.00)**	1.06 (0.00)**
second_sp	0.85 (0.00)**	0.83 (0.00)**
vocat_sp	0.89 (0.00)**	0.86 (0.00)**
univ_sp	0.33 (0.43)	0.29 (0.48)
Musl	1.22 (0.04)*	1.27 (0.03)*
Orthodox	1.47 (0.03)*	1.47 (0.03)*
Catholic	0.93 (0.16)	1.08 (0.10)
Constant	-2.20 (0.03)*	-2.25 (0.02)*
Observations	396	396

P-values in parenthesis
*significant at 5% level
**significant at 1% level

Looking at the estimates related to the urban sub-sample, the most important result is that the variable containing information about expenditure (*stdcons*) is not significant: it is not easy to provide an explanation for that. Probably because of the fact that almost all people in urban areas attend secondary education (the enrolment rate is above 90%), it can be said that money does not matter in explaining differences in the outcomes.

The asset index, instead (*f1*) is significant at the 10% level: probably the ownership of durables reflects more a sort of 'history of consumption' and it is a good indicator for 'financial stability' of a household. In terms of marginal effects[10],the effect of a 1% increase in the standard deviation of the asset index determines an increase in the probability of being enrolled by 3,5 percentage points.
Both the variables, however, have the expected positive sign, which reassures us on the correctness of the derivation of the asset index.
With regards to the other covariates, an interesting result is given by the variable referring to gender, which is significant but with a negative sign: being male, in the urban sub-sample, seems to reduce the probability of being enrolled in secondary education. Remember, however, that gender discrimination does not seem to be a huge problem in Albania.
Ownership of land is not significant and this is a feature that we will find out in all the other models: there are many factors helping to explain this fact. First of all, I have considered the owned land while it should be more interesting to investigate the impact of cultivated land; secondly, the results may be affected by the nature of distribution of land, which is highly concentrated in rural areas (a value of 0 is assigned to people who do not own land); last but not least, Albania is a post-communist country where land was distributed in small plots of absolutely equal magnitude: probably, even if a land reform has been approved in these years, the process is far from being completed and this explains the insignificance of land in determining the enrolment rate.
Employment status seems to be an important factor only if we consider it for the household's head partner: it makes sense, however, that being employed increases the probability of enrolling more than being unemployed does.
Education variables are clearly significant and with the expected sign: the more educational level increases for the household head and his/her partner, the higher the effect on the probability of being enrolled.
Another interesting result is given by the religion dummy: the fact of being muslim (the majority of Albanian population is) seems to have a greater impact than the other religions.
Now I will concentrate on the results of the model for the rural sub-sample, which I present here:

[10] Appendix C

Enrolment rate: 14-16 years old in rural areas		
	(1)	(2)
	Enrolled in this academic year	Enrolled in this academic year
Sex	0.26 (0.04)*	0.26 (0.04)*
Land	-0.02 (0.27)	-0.01 (0.64)
Standardized values of (lncons)	0.28 (0.00)**	
f1		0.14 (0.07)
inact_h	-0.83 (0.13)	-0.55 (0.29)
employed_h	-0.31 (0.54)	-0.06 (0.90)
employed_sp	-0.10 (0.53)	-0.13 (0.39)
Sufficient primary schools	-0.01 (0.61)	-0.02 (0.40)
Age	-0.00 (0.62)	-0.00 (0.93)
second_h	0.57 (0.03)*	0.60 (0.02)*
vocat_h	0.47 (0.01)*	0.53 (0.00)**
univ_h	0.34 (0.40)	0.48 (0.24)
second_sp	0.64 (0.09)	0.73 (0.06)
vocat_sp	0.62 (0.03)*	0.57 (0.05)*
Musl	-0.08 (0.82)	0.15 (0.69)
orthodox	-0.27 (0.60)	0.14 (0.79)
catholic	-0.12 (0.78)	0.06 (0.89)
Constant	0.39 (0.59)	-0.16 (0.82)
Observations	447	447

P-values in parenthesis
*significant at 5% level
**significant at 1% level

In the rural sub-sample, the consumption indicator is clearly significant and performs better than the standard asset index, which is however strongly determined. Both coefficients are positive and, in terms of marginal effects[11], a 1% increase in the standard deviation of consumption produces an increase in the probability of being enrolled by 10,7 percentage point, while for the asset index the effect is lower (5,7%).

[11] Appendix C

The results for the model with splines of both consumption and the asset index are reported in the Appendix A: however, the different splines are not significant so that nothing can be inferred about the impact of being in a specific quintile of the distribution on the probability of being enrolled.

5.2.3 Results: 14 – 19 years old

I will concentrate now on the entire sample of students between 14 and 19 years old. After conducing a likelihood ratio test to verify if to split the sample in two sub-regions (urban versus rural), the results suggest to consider two different models for the expenditure measure, while for the asset index it is better to consider the whole sample. We can probably interpret this first result as an evidence of a greater stability and consistence of the multidimensional indicator across observations.

I am firstly presenting the results taking into consideration the urban areas:

Enrolment rate: 14-19 years old in urban areas		
	(1)	(2)
	Enrolled in this academic year	Enrolled in this academic year
Sex	-0.30 (0.01)**	0.02 (0.76)
land	-0.02 (0.16)	-0.01 (0.27)
Standardized values of (lncons)	0.09 (0.15)	
f1		0.14 (0.00)**
inact_h	0.03 (0.89)	-0.06 (0.76)
employed_h	0.11 (0.57)	0.09 (0.58)
inact_sp	0.38 (0.04)*	0.41 (0.02)*
employed_sp	0.48 (0.01)**	0.44 (0.01)**
Sufficient primary schools	0.01 (0.92)	0.01 (0.74)
Age	0.00 (0.64)	-0.00 (0.34)
second_h	0.56 (0.00)**	0.55 (0.00)**
vocat_h	0.37 (0.01)**	0.40 (0.00)**
univ_h	0.82 (0.00)**	0.82 (0.00)**
second_sp	0.43 (0.00)**	0.42 (0.00)**
vocat_sp	0.46 (0.00)**	0.52 (0.00)**
univ_sp	0.69 (0.04)*	0.80 (0.01)**
musl	0.79 (0.05)*	0.36 (0.09)
orthodox	0.79 (0.06)	0.32 (0.19)
catholic	0.54 (0.22)	0.29 (0.26)
(mean) urbrur		0.56 (0.00)**
Constant	-1.16 (0.08)	-1.15 (0.00)**
Observations	712	1512

P-values in parenthesis
*significant at 5% level
**significant at 1% level

Basically, the conclusions of the previous model are confirmed, with consumption that seems to be not relevant in determining enrolment rate in the urban area, while the asset index is decisively significant with the expected positive sign.
Gender is a decisive variable in the first model, while it is not significant in the pooled sample for the asset index.
Here again employment status of the household head's partner affects positively the dependent variable, as the educational level of both head and partner does.
In terms of marginal effects, which are shown in the Appendix C, a 1% increase in the standard deviation of the asset index increases the probability of being enrolled by 6 percentage points:
Looking at the data for the rural sub-sample, instead, exactly as for the cohort of pupils between 14 and 16 years old, consumption becomes significant and positively determined, with a greater effect than the asset index in influencing the probability of being enrolled:

Enrolment rate: 14-19 years old in rural areas		
	(1)	(2)
	Enrolled in this academic year	Enrolled in this academic year
Sex	0.29 (0.00)**	0.02 (0.76)
land	-0.01 (0.41)	-0.01 (0.27)
Standardized values of (lncons)	0.25 (0.00)**	
f1		0.14 (0.00)**
inact_h	-0.63 (0.14)	-0.06 (0.76)
employed_h	-0.28 (0.47)	0.09 (0.58)
inact_sp	0.31 (0.59)	0.41 (0.02)*
employed_sp	0.29 (0.61)	0.44 (0.01)**
Sufficient primary schools	0.01 (0.66)	0.01 (0.74)
Age	-0.01 (0.08)	-0.00 (0.34)
second_h	0.58 (0.00)**	0.55 (0.00)**
vocat_h	0.42 (0.00)**	0.40 (0.00)**
univ_h	0.69 (0.02)*	0.82 (0.00)**
second_sp	0.36 (0.13)	0.42 (0.00)**
vocat_sp	0.65 (0.00)**	0.52 (0.00)**
musl	0.10 (0.66)	0.36 (0.09)
orthodox	-0.15 (0.64)	0.32 (0.19)
catholic	0.13 (0.69)	0.29 (0.26)
(mean) urbrur		0.56 (0.00)**
univ_sp		0.80 (0.01)**
Constant	-0.24 (0.70)	-1.15 (0.00)**
Observations	797	1512

P-values in parenthesis
*significant at 5% level
**significant at 1% level

The better performance of consumption in this case is confirmed by the marginal effects: a 1% increase in the standard deviation of expenditure measure increases the probability

of enrolling in secondary education by 9 percentage points, against the usual value of 6 percentage points for the asset index.
What emerges from the estimates I just presented is that consumption and the asset index can be considered as perfect substitutes in explaining the determinants of enrolment rate for secondary education; perhaps the asset index is a more stable indicator, but evidence shows the substantial equivalence of the two.
An important aspect to take into consideration is the fact that I did not include in my estimates the repetition rate: however, from World Development Indicators, its value is estimated at approximately 4% so that my basic conclusions in comparing univariate and multivariate indicators of poverty should not be significantly altered.
A final point to add is related to the use of splines of both consumption and the asset index in the regression as alternative covariates: in this case, it is interesting that for expenditures measures the more significant quintiles are not the extreme, but the ones in the middle of the distribution; if we look, instead, at the asset index, the bottom part of the distribution seems to strongly determine the probability of enrolment rate.
Details of these estimates are reported in the Appendix C.

5.3 Evaluating health outcomes for Albania
Literature on poverty evaluation is full of studies dedicated to the investigation of health outcomes: quite often, for example, the methodology of the asset index has been used in order to assess the greater reliability of a multidimensional indicator in explaining, say, the different nutritional levels across young population (Sahn and Stifel, 2003). Here I will concentrate, instead, on the probability of being affected by a chronic disability estimating a probit model.

5.3.1 Chronic disability
5.3.1.1Data
I will estimate a probit model using data for the household head, so that the total number of observations is 3,599. As in the previous case, however, due to the presence of missing values both in the dependent variable and in the covariates, I decided to drop them.
As a matter of fact, the *y* in our model is a binary variable corresponding to the answer to the question in the Health section of the questionnaire:

Did [NAME] suffer from a chronic illness or disability that has lasted more than 3 months (including severe depression)?

and it is impossible to impute predicted values for such kind of variables.
So, I ran our probit model using 3,053 observations, which constitute the 85% of the entire sample.
The basic aim is the same described with regards to education: the comparison between different effectiveness of multidimensional indicators and consumption measure in explaining the variation in the dependent variable.
The set of regressors used as control variables includes: gender of the household head, age of the household head, household size, a dummy variable for regional provenience (urban / rural), the employment status of the household head (in terms of being inactive, employed or unemployed), the educational level of the household head (primary, secondary education, vocational level, university level).

I then add three community variables to control for the presence of new hospital in the community where the survey was conducted, for the existence of equipment of good quality in the hospital and for the presence of sufficient staff.
As in the model specified earlier for education, I am testing for the sensitivity of different parts of the distribution of both consumption and the asset index by creating splines of the two variables, considering quintiles.

5.3.1.2 Results
The conduction of a likelihood ratio test suggests to split the sample both for the consumption indicator and for the asset index, so that I will estimate two different models for the urban and for the rural areas.
Here the table with the results of the regression for the urban sub-sample is shown:

Chronic illness: urban subsample		
	(1)	(2)
	Suffers from chronic illness or disabilility	Suffers from chronic illness or disabilility
Sex	-0.02 (0.85)	-0.01 (0.93)
Standardized values of (lncons)		-0.14 (0.00)**
f1	-0.26 (0.00)**	
(mean) hhsize	-0.17 (0.00)**	-0.13 (0.00)**
Age	0.03 (0.00)**	0.03 (0.00)**
Hospitals built in past five years	-0.04 (0.63)	-0.04 (0.65)
hosp_equipm	0.08 (0.34)	0.05 (0.59)
hosp_staff	0.04 (0.78)	0.06 (0.67)
second_h	0.02 (0.84)	-0.02 (0.88)
vocat_h	0.09 (0.38)	0.06 (0.53)
univ_h	-0.10 (0.41)	-0.11 (0.33)
employed_h	-0.00 (1.00)	0.03 (0.82)
inact_h	0.18 (0.26)	0.20 (0.20)
Constant	-1.78 (0.00)**	-2.03 (0.00)**
Observations	1764	1764

P-values in parenthesis
*significant at 5% level
**significant at 1% level

Both the asset index and the expenditure measure are significant at the 1% level and with the expected negative sign: that is to say, an increase in the asset index or in consumption determines a reduction in the standardized probability index. The marginal effects (whose results are presented in the Appendix C) show a greater capability of the asset index in explaining the variation of the dependent variable: a 1% increase in the standard deviation of the multidimensional indicator decreases the probability of being affected by a chronic disability by 6 percentage points, against the value for consumption, which is fixed at 3% .

With regards to the other covariates, gender does not seem to affect the outcome of the model, while age of the household head is significant and positively determined as expected. An increase in the age of the household head increases the probability of being affected by chronic illness. A quite surprising result is that an increase in the household

size seems to decrease the value of the dependent variable: it should be interesting to investigate the nature of the social transfers in Albania. Perhaps household with more members receive some help in terms, say, of participating to the health system. The community variables, and also the ones regarding employment status and educational level, are not significant.
The models with splines of the variables (results in Appendix C) show that the variation in the dependent variable is explained basically by the bottom quintile of the distribution, where the magnitude and significance of the coefficients is greater.
Looking at the data, instead, for the rural sub-sample, the results are quite interesting: the total number of observation is 1,250 because I dropped 36 observations due to perfect determination. Both the consumption indicator and the asset index do not seem to affect the dependent variable significantly, but while the sign of the asset index is negative as expected, the consumption measure has a positive coefficient.
In this case the use of splines of the variables (results in Appendix C) is really useful in that shows for the asset index that the middle quintile of the distribution is significant and negatively determined as expected.
The community variable referring to the availability of hospital equipment now is significant: the presence of hospital equipment of good quality reduces the probability of being affected by chronic illness by 5 percentage points.
Finally, being inactive rather than unemployed seems to reduce the value of the predicted value of y either.
In the next pages, the results of the regression (marginal effects in Appendix C) are shown.

Chronic illness: rural subsample		
	(1)	(2)
	Suffers from chronic illness or disabilility	Suffers from chronic illness or disabilility
Sex	-0.11 (0.49)	-0.12 (0.44)
Standardized values of (lncons)		0.05 (0.25)
f1	-0.02 (0.70)	
(mean) hhsize	-0.15 (0.00)**	-0.16 (0.00)**
Age	0.02 (0.00)**	0.02 (0.00)**
Hospitals built in past five years	0.03 (0.76)	0.03 (0.75)
hosp_equipm	-0.22 (0.05)*	-0.24 (0.03)*
hosp_staff	0.10 (0.31)	0.10 (0.30)
second_h	0.11 (0.49)	0.08 (0.64)
vocat_h	-0.03 (0.82)	-0.06 (0.62)
univ_h	-0.03 (0.90)	-0.09 (0.72)
inact_h	0.30 (0.01)**	0.31 (0.01)**
Constant	-1.16 (0.00)**	-1.05 (0.00)**
Observations	1250	1250

P-values in parenthesis
*significant at 5% level
**significant at 1% level

6- CONCLUSIONS

In this paper, I have argued that a multidimensional approach to the definition of poverty can help to find more effective policy tools, able to eradicate the phenomenon of deprivation from a community, concentrating my analysis on Albania through the use of LSMS Survey of 2002.

Looking at the general situation in Albania, literacy rate is really high in terms of primary education and gender issues, which generally constitute a relevant feature in affecting poverty profile of a developing country, do not seem to be significant (this result being confirmed by World Bank Poverty Assessment of 2003).

These elements contribute to draw a rather peculiar context in this country, where inequality is assessed at quite low levels but poverty still represents a huge problem as the indicators presented in the first section demonstrate. It is particularly remarkable the contradiction between urban and rural areas, which is then confirmed by the results of the

estimates. Albania is a country where agriculture still plays a decisive role in the economic system but, as in the other transition economies, a profound transformation is happening involving all the relevant sectors. These changes are affecting differently the Albanian regions: as I had the opportunity to emphasize, Tirana and urban areas present a context where educational attainment is extremely high and industries and services are highly developed if compared with the rural provinces.
These differences come up obviously with different needs expressed by the population and a very different profile in terms of poverty, with rural areas affected more by the problem. My basic aim was to compare the effectiveness of an asset index, which I built up following the relevant literature on the matter, with that of expenditure measures in contributing to explain the variation in different outcomes regarding health levels and educational attainment.
I was actually expecting, at the beginning of my research, that results of a multidimensional indicator would be able to provide more information than consumption, but the estimated models showed that these kinds of measures can be considered as perfect substitutes in the empirical evidence for Albania. After performing the analysis, the implication is not so surprising for two reasons:

1) I decided to include in the asset index only variables, such as ownership of durables, which are strongly correlated with availability of financial resources. It is not strange, thus, that the two indicators perform quite similarly in the regressions;
2) the relevant literature using the asset index uses this indicator especially in contexts where data about consumption (such daily diaries) are not available and price volatility induces to the choice of a more stable measure. Albania, actually, has a very different situation, in which quality of data about consumption is good and inflation is assessed at low and stable levels

However, although these aspects are surely relevant in explaining the substantial equivalence of the two measures, also for Albania I can conclude that asset index is a more stable indicator than consumption (for example, it is definitely more reliable when used for the rural areas) in representing household wealth, and that it performs better in health models, which is not surprising also considering the fact already mentioned of the particular condition of educational attainment for this country.
Perhaps, it should be interesting to construct a multidimensional indicator trying to include in it not only ownership of assets, but dimensions of wealth which actually incorporate different information, following the example of human development indicator (Sen and Anandt, 1997) which comprises income, life expectancy at birth and educational attainment. In this case, probably, the two models, the first using consumption and the second making use of the multidimensional index, should produce different results. However, this could be subject for further investigation.
The implications in terms of policy making are not easy to draw, but in this work I tried to put in evidence how not only traditional assessments of poverty can be used to address public interventions, but also less conventional approaches.
This is not to say that multivariate measures of poverty must be substituted to univariate ones.

On the contrary, both multivariate and univariate indicators should be combined in an attempt to produce a powerful policy tool able to design a targeted intervention and to address different goals: on one side, the objective is to reduce in absolute terms the number of people living below the poverty line (whatever approach is chosen to define it); on the other, using the results obtained by the means of multidimensional techniques, the aim is at promoting structural changes which, in the long run, can contribute to transform the socio-economics conditions in which people live.

What is important to stress is the impossibility of considering poverty almost as a meaningless word represented by a unique number, focusing instead on the opportunity of enlarging our perspectives with the broadness and richness of such a relevant concept.

Empowerment, human security, instrumental freedom: all of these words can help to define well being in a different way from that based conventionally on the simple consideration of material aspects of life.

To conclude in the same way in which I began, Adam Smith would say 'In ease of body and peace of mind, all the different ranks of life are nearly upon a level, and the beggar, who suns himself by the side of the highway, possesses that security which kings are fighting for'.

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