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THE DIRECT MEASUREMENT OF WELFARE LEVELS IN SLOVENE HOUSEHOLDS

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INTRODUCTION

The purpose of this paper is to present some results of the direct measurement of welfare levels for Slovene households. This is achieved by posing questions which attempt to provide answers to the following question: what money income does a given household associate with a prespecified welfare level? This direct approach is thus based on the subjective evaluation of welfare, and there is now a rather extensive body of empirical work which supports the validity of such an approach.[1]

For Slovene households, the following questions on income evaluation of welfare levels were posed:

1. With what monthly household income could your family not make ends meet? (considering your present family conditions and employment)

2. If your monthly household income is not satisfactory, write down the necessary increase. If your monthly household income is satisfactory, leave the space blank.

3. What would be the monthly household income for your desired standard of living?

Of course, the greatest interest is in the evaluation of question 1, which provides a direct measurement of the "subjective" poverty line. The poverty line thus determined can be compared with various "unofficial" poverty lines that are set in a normative way. Namely, official poverty lines in Yugoslavia do not exist, though various non-governmental institutions do set them. Since no financial or other obligations stem from these unofficially determined poverty lines, such a normative exercise is to a large degree irrelevant.

The answer to question 2 would correspond to "satisfactory" income, whereas the answer to question 3 would correspond to the line of "desired" income.

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[1] We refer to van Praag and Kapteyn (1973), van Praag, Goedhart and Kapteyn (1980), van Praag, Hagennars and van Weeren (1982)

Of course, the greatest interest lies in the analysis of the subjective perception of the poverty line; we thus provide a rather detailed analysis of the answer to question 1.

Before proceeding to the analysis, we note that these questions were appended to the General Household Survey questionnaire. This survey is carried out every five years by the Federal Statistical Office, for each Yugoslav republic. Our analysis pertains to the year 1983. Unfortunately, these questions were appended only in the questionnaire for Slovenia, and we are thus deprived of a comparative analysis of the "subjective" welfare levels for various Yugoslav republics.

THE POVERTY LINE

Let us denote

Y_{min} = ("annualized") answer to question 1
Y = annual disposable household income
NH = number of persons in household
ED = education level of main breadwinner (an ordinal variable, with 1 denoting completed university education and 8 denoting an unqualified labourer)

For household i we specify the following equation:

$$Y_{min,\,i} = \alpha_o + \alpha_1 Y_i + \alpha_2 Y_i^2 + \alpha_3 NH_i + \alpha_4 ED_i + u_i \qquad (1)$$

where u_i is the error term with the usual statistical properties (the u_i are mutually independent and identically distributed, i. e. $u_i \sim N(o, \sigma_2)$).

Of course, model (1) did not come out of the blue. The linear and log-linear models were first specified, and the linear model provided a better fit[2]. Furthermore, a preliminary analysis also demonstrated the need for the inclusion of a quadratic term in income.

Model (1) was estimated separately for four different types of households: worker households, pensioner (urban) households, semi-urban households and rural households. Worker households are urban households in which the breadwinner(s) are wage earners. Pensioner households (urban) derive their income exclusively from pensions. Semi-urban households derive part of their income from agriculture, whereas rural households derive their income exclusively from agriculture.

The results of the estimation of model (1) for the four types of households are presented in table 1.

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[2] The statistical test for comparing these two specifications is based on the Box-Cox transformation and is described in Rao, Miller (1971, p. 108)

Table 1:

Estimation of equation (1)
(Ordinary least squares — OLS)

	households			
	worker	pensioner (urban)	semi-urban	rural
const	56.65*	16.21[a]	23.35	—25.14
	(22.12)	(9.03)	(25.43)	(17.85)
Y	0.633***	0.655***	0.0603***	1.037***
	(0.060)	(0.036)	(0.110)	(0.174)
Y^2	$-0.275\ 10^{-3}$***	$-0.218\ 10^{-3}$***	$-0.254\ 10^{-3}$**	$-0.109\ 10^{-2}$***
	$(0.404\ 10^{-4})$	$(0.135\ 10^{-4})$	$(0.910\ 10^{-4})$	$(0.230\ 10^{-3})$
NH	17.63***	8.99[a]	10.95*	8.35
	(3.91)	(5.27)	(5.38)	(6.64)
ED	—8.68***	—	—	—
	(1.93)			
$\bar{R}^2$	0.35	0.59	0.34	0.72

Notes: standard errors in parenthesis
*** significant at the 0.0001 level
** significant at the 0.05 level
a significant at the 0.1 level

The results of the estimation of model (1) can be termed highly satisfactory. Besides, since

$$\frac{\partial Y_{min}}{\partial Y} = \alpha_1 + 2\,\alpha_2\,Y$$

one would expect $\alpha_1 >$ and $\alpha_2 < 0$; this means, the perceived poverty line for a given household composition increases with household disposable income, though at a diminishing rate, i. e. $\frac{\partial^2 Y_{min}}{\partial Y^2}$ is negative.

We thus note that the estimated coefficients for the Y and Y^2 term are all of the expected sign and highly significant. The estimated coefficients for NH and ED are also of the expected sign and fully validate the inclusion of these variables in the model. To summarize the results, we can say that the perceived poverty line

1. increases with household income, though at a decreasing rate
2. increases with the number of persons in the household
3. increases with the increasing education level of the main breadwinner.

For certain analytical purposes it is important to calculate the income elasticity of the poverty line. Thus

$$\eta = \frac{\partial Y_{min}}{\partial Y} \cdot \frac{Y}{Y_{min}} = (\alpha_1 + \alpha_2 Y) \frac{Y}{Y_{min}} \tag{2}$$

and evaluate this elasticity at the average values in the sample, i. e.

$$\overline{\eta} = (\alpha_1 + 2\,\alpha_2 \overline{Y}) \frac{\overline{Y}}{\overline{Y}_{min}}$$

These values are presented in table 2.

Table 2

THE INCOME ELASTICITY OF THE POVERTY LINE

Household	income elasticity of the poverty line
worker	0.572 (0.043)
pensioner (urban)	0.803 (0.070)
semi-urban	0.630 (0.070)
rural	0.979 (0.154)

Note: standard errors given in parentheses. These are computed by treating the Y and Y_{min} as constants and not as random variables evaluated on the sample. Therefore:

$$V(\overline{\eta}) = [V(\hat{\alpha}_1) + 4\,\overline{Y}^2\,V(\hat{\alpha}_2) + 4\,\overline{Y}\,COV(\hat{\alpha}_1, \hat{\alpha}_2)] \frac{\overline{Y^2}}{\overline{Y^2}_{min}}$$

The values of the income elasticity, evaluated at the sample means, are not only significantly greater than 0 (at the 0.001 level), but also significantly less than 1 (at the 0.001 level). This later conclusion though does not hold for rural households.

The poverty line is therefore obviously *not* perceived as an absolute category, since it depends on the actual household income. On the other hand, it is also *not* perceived as a purely relative ("proportional")

category; a 1% increase in household income induces a less than 1% increase of the perceived poverty line.[3]
Furthermore, by inserting the expression for Y_{min} in equation (2) we get

$$\eta = (\alpha_1 + 2\alpha_2 Y)\frac{Y}{\beta + \alpha_1 Y + \alpha_2 Y^2}$$

$$= 1 - \frac{\beta - \alpha_2 Y^2}{\beta + \alpha_1 Y + \alpha_2 Y^2}$$

where

$$\beta = \alpha_o + \alpha_3 \overline{NH} + \alpha_4 \overline{ED}$$

A straightforward analysis of this expression shows, that for all four types of households, the income elasticity of the poverty line is a decreasing function of income in practically the whole relevant range of income. Thus, for the worker household, whose average income is 502.7 thousand dinars, the income elasticity of the poverty line decreases from 339.0 thousand dinars onward.

THE LINE OF SATISFACTORY INCOME

In this section we analyse answers to the question: "If your monthly household income is not satisfactory, write down the necessary increase in income. If your monthly household income is satisfactory, leave the space blank".

We denote the answer to the above-quoted question by "S". Our model is therefore (suppressing household subscripts):

$$S = \begin{cases} \alpha_o + \alpha_1 Y + \alpha_2 Y^2 + \alpha_3 NH + \alpha_4 ED + u & \text{if } S > O \\ 0 \text{ otherwise} \end{cases} \qquad (3)$$

u is the error term with the usual properties [$u \sim N(o, \sigma^2)$]. Model (3) is the well-known Tobit model, originally formulated by J. Tobin (1958). The model was estimated through the maximization of the loglikelihood function, by the Newton-Raphson iterative method.[4]

The results of the estimation of model 3 are presented in table 3. As can be seen, almost all the estimated coefficients are of the expected

[3] This result is in close agreement with the results obtained by R.W. Kilpatrick (1973) and Danziger, van der Gaag, Taussig and Smolensky (1984) for the U.S.A.

[4] see G. Maddala (1983), p. 156

sign, though many of them are not statistically significant (at the — say — 0.05 level). The results of the estimation can be summarized:

1. The negative sign of the estimated coefficients of Y imply that the required increment to achieve "satisfactory" income decreases with increasing income.

Table 3

ESTIMATION OF MODEL (3)

(MLE)

	households			
	worker	pensioner (urban)	semi-urban	rural
const	—126.67	42.20	—56.66	—31.81
	(16.07)	(19.98)	(47.09)	(31.24)
Y	—0.201	—0.435	—0.138	—0.194
	(0.136)	(0.090)	(0.209)	(0.294)
Y^2	$0.680\ 10^{-4}$	$0.147\ 10^{-3}$	$-0.106\ 10^{-3}$	$0.623\ 10^{-4}$
	$(0.912\ 10^{-4})$	$(0.033\ 10^{-3}$	$(0.174\ 10^{-3})$	$(0.418\ 10^{-3})$
NH	41.36	51.70	51.35	30.91
	(8.47)	(11.76)	(10.15)	(11.15)
ED	20.50			
	(4.16)	—	—	—

MLE — Maximum Likelihood Estimates

Asymptotic standard errors in parentheses

The rate of this decrease is diminishing (the positive sign of the estimated coefficents of Y^2). The coefficient of Y^2 is, though, statistically significant only for pensioner households.

2. The required increment to achieve "satisfactory" income increases with the number of persons in household.

We note, however, that the estimated coeficient for Y^2 (semi-urban households) and for ED (worker households) are not of the expected sign. Only in the latter case is the estimated coefficient also statistically significant (at the 0.01 level).

The results presented in table 4 also permit certain computations. Namely, for a given number of persons in household and given educational level of main breadwinner, the functional dependence of the required increment (to reach satisfactory income) is presented in figure 1.

Y_o is the lowest income deemed "satisfactory" by the household. At income Y_1 the household perceives that it requires an additional income (increment) S_1 to reach "satisfactory" income. The lowest satisfactory income (i.e. Y_o) for the average worker household is given as a solution to the equation

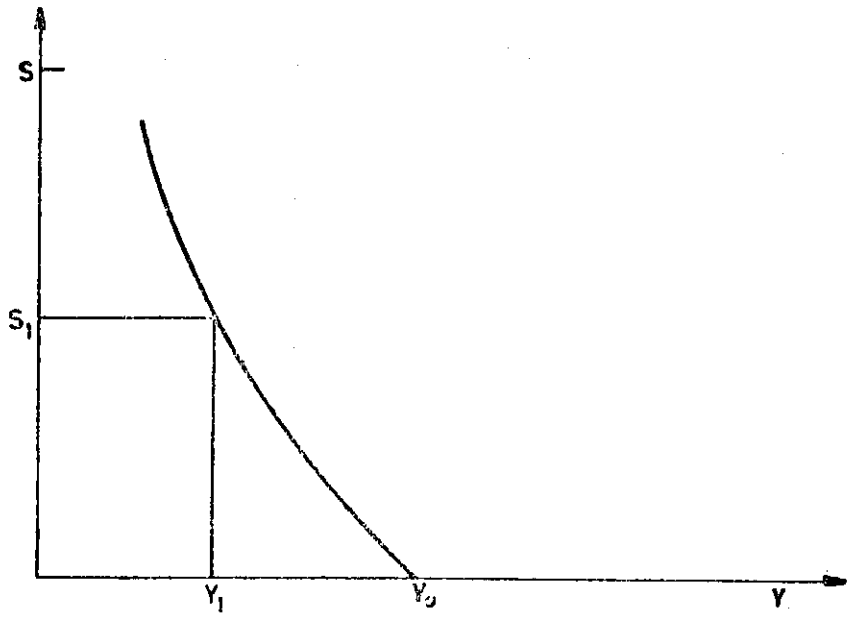

Fig. 1 *The dependence of the required increment S (to reach satisfactory income) on the actual household income Y*

$$-126.67 - 0.201\,Y + 0.680 \cdot 10^{-4}\,Y^2 + 41.36\,\overline{NH} + 20.50\,\overline{ED} = 0$$

The (first) root is $Y_o = 705.1$. This value represents 140% of the average worker household income. Rather high values of the minimal average satisfactory income were also obtained for the other three household groups (pensioner, semi-urban, rural).

As our subsequent analysis of the answer to question 3 shows, this question was unfortunately perceived rather similarly to question 2. Thus, "satisfactory" household income was percieved rather like "desired" household income. This will force a reformulation of these two questions in the coming household survey.

THE LINE OF DESIRED INCOME

The answers to the question:

"What would be the monthly household income for your desired standard of living?" are analysed in the same way as for the poverty line. We write (suppressing household subscripts)

$$Y_{des} = \alpha_o + \alpha_1 Y + \alpha_2 Y^2 + \alpha_3 NH + \alpha_4 ED + u \qquad (4)$$

where Y_{des} is the "annualized' answer to the above question. The error term u has the same statistical properties as the error term in equation (1). The results of the estimation are presented in table 4.

Table 4

ESTIMATION OF EQUATION (4)
(OLS)

	households			
	worker	pensioner (urban)	semi-urban	rural
const	200.40***	55.08**	109.78*	1.99
	(38.08)	(15.96)	(40.05)	(51.36)
Y	1.317***	1.087***	1.628***	1.773**
	(0.122)	(0.069)	(0.184)	(0.499)
Y^2	$-0.790\ 10^{-3}$***	$-0.349\ 10^{-3}$***	$-0.109\ 10^{-2}$***	$-0.176\ 10^{-2}$a
	$(0.914\ 10^{-4})$	$(0.254\ 10^{-4})$	$0.153\ 10^{-3})$	$(0.922\ 10^{-3})$
NH	13.00**	38.94**	—1.45	35.66a
	(6.55)	(9.51)	(9.05)	(19.25)
ED	—10.26**			
	(3.17)	—	—	—
$\overline{R^2}$	0.27	0.56	0.30	0.65

Standard errors in parenthesis
*** significant at the 0.0001 level
** significant at the 0.001 level
* significant at the 0.05 level
a significant at the 0.1 level

From the statistical viewpoint, the results presented in table 4 are highly satisfactory. All the estimated coefficients (except the coefficient of NH for semi-urban households) are of the expected sign and — in the majority of cases — highly significant. Thus the line of "desired" income:

1. increases with household income, though at a decreasing rate
2. increases with the number of persons in the household
3. increases with the increasing educational level of the main breadwinner.

The income elasticity of the line of desired income is evaluated at the sample means, i. e.:

$$\overline{\eta} = (\alpha_1 + 2\,\alpha_2 \overline{Y}) \frac{\overline{Y}}{\overline{Y}_{des}} \tag{5}$$

These values are presented in table 5.

Table 5

THE INCOME ELASTICITY OF THE LINE OF DESIRED INCOME

Household	income elasticity of the line of desired income
worker	0.434 (0.037)
pensioner (urban)	0.633 (0.040)
semi-urban	0.570 (0.060)
rural	0.684 (0.149)

Note: standard errors given in parentheses. The formula is analogous to the formula used in the footnote of table 2

It is interesting to note, that for all the four subsamples this elasticity is lower than the income elasticity of the poverty line. True, the income elasticity of the desired income line is significantly lower (at the 0.01 level) than the income elasticity of the poverty line only for worker and pensioner (urban) households. A possible — though not necessarily the only — explanation could be that some sort of equalization of aspirations is present.

CONCLUDING REMARKS

Table 6 provides some summary characteristics of our subsamples.

Table 6

THE AVERAGE VALUE OF VARIABLES IN THE SUBSAMPLES

	worker	pensioner (urban)	semi-urban	rural
poverty line ($\overline{Y}_{min}$)	313.0	165.5	263.7	122.6
line of desired income ($\overline{Y}_{des}$)	617.2	333.0	528.0	291.5
income ($\overline{Y}$)	480.2	226.9	406.9	169.4
$\overline{Y}_{min}/\overline{Y}$	0.65	0.73	0.65	0.72
$\overline{Y}_{des}/\overline{Y}$	1.29	1.47	1.30	1.72
$\overline{NH}$	3.37	1.72	3.74	2.41
$\overline{ED}$	4.66			
sample size	823	332	315	39

From table 6 it is seen, that the average poverty line varies from 0.65 to 0.73 of the average income within the group. Furthermore, the following percentage of households stated that their disposable income is below their perceived poverty line: 4% (worker), 10% (semi-urban) and 10% (rural). Of course, the percentage of households which are not satisfied with their income is much larger: 56% (worker), 63% (pensioner), 60% (semi-urban) and 51% (rural).

Our analysis also enables us to compute (for given household profiles) national poverty lines. Namely, household i is poor if

$$Y_i \leq Y_{i,\,min}$$

Thus, ignoring the error term, we have

$$Y_i \leq \alpha_o + \alpha_1 Y_i + \alpha_2 Y^2{}_i + \alpha_3 NH_i + \alpha_4 ED_i$$

For a four-person worker household, whose main breadwinner is a qualified worker, the solution of the appropriate quadratic equation gives $Y_{i,1} = 198$ thousand dinars. Therefore, this household profile is poor if its annual income is less than 198 thousand dinars. It is worth noting, that this amount is only slightly less than the average annual workers' income in Slovenia in 1983.

In a similar vein, the poverty lines for other household profiles can be computed. Of course, the computation of these poverty lines is based on estimated coefficients and for a given household profile we ought to compute a "poverty interval". Nevertheless, in spite of this uncertainty regarding the precise value of the poverty line, we can firmly say that these poverty lines are lower that the poverty lines based on the absolute (normative) approach and set by various unofficial institutions.[5]

Finally, one must state that our analysis does leave something to be desired. Thus, one might wish a finer segmentation of household profiles with regard to other household characteristics (number of income earners, number of children etc.). This was not possible at the time of our analysis. We must, though, state that the variable "age of main breadwinner" did not prove to be a statistically significant variable.

In conclusion, our analysis provides one more proof of the fact that economic phenomena deserve an economic approach. The poverty line clearly deserves to be analysed with the methodology of economics — as a positive science.

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[5] For example, J. Šumi (1984, p. 28) sets the poverty line for a four-person worker household at 484 thousand dinars.

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DIREKTNO MERENJE NIVOA BLAGOSTANJA U DOMAĆINSTVIMA SR SLOVENIJE

Tine STANOVNIK

Rezime

Savezni zavod za statistiku obavlja svakih pet godina anketu o potrošnji domaćinstava. U 1983. godini anketni obrazac (samo za Sloveniju) sadržao je i sledeća pitanja:

1. Sa kakvim mesečnim dohocima vaša porodica ne bi mogla više normalno živeti (uzimajući u obzir vaše sadašnje porodično stanje i zaposlenje)?

2. Ako vaši mesečni porodični dohoci nisu zadovoljavajući, navedite iznos za koliko dinara bi bilo potrebno da se povećaju. Ukoliko su vaši mesečni dohoci zadovoljavajući, ostavite polje prazno.

3. Kakvi redovni mesečni porodični dohoci bi bili dovoljni za stan dard kakav želite?

Odgovori na ta tri pitanja daju subjektivne ocene o tri različita nivoa blagostanja.

U radu je obavljena ekonometrijska analiza tih triju odgovora, pri čemu je posebna pažnja posvećena analizi percepirane crte (granice) siromaštva — tj. odgovora na prvo pitanje. Pokazano je da percipirana granica siromaštva zavisi od aktuelnog dohotka domaćinstva i nekih drugih socioekonomskih karakteristika (kvalifikacija nosioca domaćinstva, broj članova domaćinstva). Ti osnovni zaključci važe i za analizu željenog dohotka (tj. odgovora na treće pitanje).

Odgovori na drugo pitanje su analizirani pomoću Tobit modela; i tu rezultati pokazuju da potrebni (percipirani) inkrement dohotka do dostizanja zadovoljavajućeg dohotka zavisi od aktuelnog dohotka domaćinstva i (u manjoj meri) od socioekonomskih karakteristika domaćinstva.

Analiza dohodovnih elastičnosti crte siromaštva i crte željenog dohotka daju izvesne indikacije o prisustvu egalitarnog sindroma odnosno suženim aspiracijama domaćinstava Slovenije.