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CHER

Uncertainty of Households Income in the European Union Countries and in Poland

by Barbara Liberda, Brunon Górecki & Marek Pęczkowski

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ABSTRACT

The paper examines the uncertainty of household income in the European Union countries and in one of accession countries - Poland. Data used in the paper are from the Household Budget Surveys for a panel of twelve European Union countries in years 1995-1998 and a Polish households' panel for 1997-2000. The uncertainty of household income was decomposed into a variance of shocks to permanent income and a variance of shocks to transitory income. For particular countries, we assess these two measures of income uncertainty using different criteria: age, gender, main economic activity, education and a professional status of the household head.

Our results indicate that for most EU countries the uncertainty of transitory income is higher than the uncertainty of permanent income. However, in Spain, Belgium, Italy and Greece the uncertainty of households' transitory income is exceptionally high. Cross tests of households' uncertainties of permanent and transitory income by different criteria show mixed picture for particular countries, nevertheless some regularities are visible. The income uncertainty of Polish households is in the range of a medium value for the EU countries.

We regressed the estimated variances of permanent and transitory income on the macroeconomic variables for all countries. The household permanent income variance is affected negatively by the level of GDP and the inflation rate and positively by the unemployment rate. The transitory changes of the households' income are not sensitive to the macroeconomic variables.

This is a companion paper to the one presented at the CHER (Consortium of the Household Panels for European Socio-economic Research) conference held on Majorca, Spain, in September 2002, under the title: "Saving from permanent and transitory income: the case of Polish households", co-authored by Barbara Liberda, Brunon Górecki and Marek Pęczkowski. In preparing both papers we also benefited from the grant by the Polish National Committee for Scientific Research (KBN) for years 2001-2003.

Keywords: Households, Income, Uncertainty, Households structure

JEL classification: D31, D91, C23

1. Introduction

The paper examines the uncertainty of household income in the European Union countries and in one of accession countries - Poland. Using the data from the Household Budget Surveys for a panel of twelve European Union countries in years 1995-1998 and the Household Budget Survey for Polish households' panel for 1997-2000 we have estimated the uncertainty of household income by decomposing it into a variance of shocks to permanent income and a variance of shocks to transitory income. For particular countries we have assessed these two measures of income uncertainty using different criteria, namely: age, gender, main economic activity, education and a professional status of the household head.

Our empirical results indicate that for most EU countries the average variance of shocks to transitory income for all households is higher than the average variance of shocks to permanent income. This is in line with the life cycle/permanent income hypothesis of consumption under uncertainty. However in Spain, Belgium, Italy and Greece the uncertainty of households' transitory income is exceptionally high. The picture of cross tests of households' income uncertainties by different criteria (age, gender, profession, occupation, education) is more mixed for particular countries. We can find some regularity in the otherwise diverging trends of income uncertainty for particular groups of households. The income uncertainty of Polish households is in the range of a medium value for the EU countries. We then conclude that the income uncertainty of households gaining from the growth of the economy and from higher human capital (the self-employed, the young, persons with tertiary education) may remain high while their incomes are growing.

The paper is organized as follows. In the next section we briefly refer to the method used to construct the measures of uncertainty in permanent and in transitory income. We also describe the data and techniques for estimating the variance of shocks to permanent income and the variance of shocks to transitory income. In the third part we give the estimates of these two variances for particular countries by age, gender, profession, occupation and education of the household head. In the fourth part we regress the income uncertainty on macroeconomic variables: GDP level, inflation rate, unemployment rate and a share of economically active population in agriculture. The last section concludes our research.

2. Method and data of estimating income uncertainty

To smooth consumption over the life cycle (to maximize consumption utility) consumers should consume less from the transitory change of income than from the permanent alteration to income (Modigliani, Brumberg 1954; Friedman 1957). If income follows a random walk the propensity to consume out of current income does not differ much from the propensity to consume out of permanent income (Hall 1978; Flavin 1981).

In the extended standard life cycle/permanent income (LC/PI) model under uncertainty consumption depends on consumers' perception of the permanence of income (Skinner 1988, Deaton 1991, Carroll 1994, Blundell, Preston, 1998). Predicting the impact of an income change on consumption requires knowledge of the degree of uncertainty in future income. The uncertainty in future income can be decomposed into two stochastic components: a shock to permanent income and a shock to transitory income. For this purpose we follow the method used by Hall, Mishkin, (1982) and Carroll, Samwick (1997). The method is described in detail in Liberda, Górecki, Pęczkowski (2002), where it was used in the first part of the paper (after some simplifications mainly due to the insufficient data sources).

A variance of shocks to permanent income and a variance of shocks to transitory income are estimated from the d -year difference in logarithms of observed incomes.

We define the d -year difference in logarithms of observed incomes as: $r_d = y_{t+d} - y_t$,

where

y_t - logarithm of current income in period t .

A variance of r_d can be expressed as: $Var(r_d) = d\sigma_\eta^2 + 2\sigma_\varepsilon^2$,

where

σ_η^2 - variance of permanent shock to income

σ_ε^2 - variance of transitory shock to income.

The unbiased estimator of $Var(r_d)$ for each household i is $v_{id} = r_{id}^2$.

We use v_{id} of different lengths to solve for σ_η^2 and σ_ε^2 for each household.

To estimate variances of shocks to permanent and to transitory income we used data from the Household Budget Surveys for a panel of twelve European Union countries in years 1995-1998 and for the Polish households' panel for 1997-2000 (Central Statistical Office, Warsaw,

1997-2000), refined and adjusted to international structure by Warsaw Group of CHER. The data was compiled and made coherent under the CHER project (Consortium of the Household Panels for European Socio-economic Research, Luxembourg).

The household income is a yearly disposable income of household, consisting of the labour income, social security and other transfer payments, as well as the income from ownership of capital by households. Household incomes enter the calculations in real terms. The income data for Poland, which are registered by the Central Statistical Office as monthly data, are adjusted by monthly CPI indices to remove the seasonal changes of income in each year of observation.

The incomes of farmers' households are not always correctly measured in the Household Budget Surveys. Farmer households' income is not wholly separated from the costs of their farm production and it is sometimes reported as negative income. In this paper we have omitted the households reporting negative incomes.¹ For the twelve European Union countries and for Poland, farmers' households are included in the category of self-employed.

Incomes reported by households in the Household Budget Surveys are generally lower than average macro data on income due to the insufficient coverage of the wealthiest households in the Surveys as well as under-reporting of some incomes by the households. On the other hand, the unreported (grey) incomes are often absorbed by the financial sector and thus registered at the macro scale. Also the scale and the trend of changes of the reported incomes in the Household Budget Surveys are sometimes different than in the macro data (as was the case in Poland in 1998 and in 2000). Because of these differences of micro and macro data on the households' income, we have decided not to adjust our households' budget data for the economy-wide growth of income in particular countries.

The period of observation is relatively short (four years) because we had a comparable panel of households (CHER data) for all countries only for this period. Panels for some countries were of longer duration but the Polish panel was only four years long. Polish data cover the

¹ In our companion paper for Poland (Liberda, Górecki, Pęczkowski, 2002) we have omitted the farmers' households altogether. In order to measure savings accurately, we have also omitted in that paper the households whose saving rates exceeded minus 50%. Therefore the estimations of the income uncertainty for Polish households differ in the two papers in a magnitude, but not in the direction.

years 1997-2000 while the data for twelve European countries are for a period of 1995-1998. Due to the short period of observation we assume that real incomes of our homogenous panels of households show no trend due to life cycle aging and overall growth of productivity.

3. Estimations of the uncertainty in permanent and in transitory income of households in the European Union countries and in Poland

First we have estimated the average uncertainty of permanent and transitory income for all households in thirteen countries. Table 1 shows the overall variances of permanent and transitory income for full samples of households in particular countries.

Table 1. Income uncertainty of households in the EU countries and in Poland

CHER country code	Country	Estimated variance of income		Number of households
		permanent	transitory	
1	Belgium	0.065	0.267	2198
3	Germany	0.040	0.081	5436
5	Italy	0.031	0.194	5414
6	Luxembourg	0.039	0.022	1933
7	The Netherlands	0.071	0.100	3913
12	Austria	0.069	0.081	2456
13	Denmark	0.037	0.068	2004
15	France	0.059	0.087	5036
16	Greece	0.032	0.157	3738
17	Ireland	0.064	0.049	2461
18	Portugal	0.092	0.092	4027
19	Spain	0.000	0.311	4521
22	Poland	0.057	0.086	3032

Variance 0.000 indicates a result not statistically different from zero.

UE countries 1995-1998, Poland 1997-2000

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Source: Polish Household Budget Surveys, CSO, Warsaw, 1997-2000 for original data for Poland and the CHER database.June.2003 for a final version of the panel data used.

The permanent income variances are generally lower than the variances of transitory income. This is in accord with the life cycle/permanent income model of consumption under uncertainty. However, there are a few exceptions: Luxembourg, Spain, Ireland and Portugal. In Luxembourg the estimated variance of a permanent income is almost twice as high as the variance of transitory income. The data for Spain show some noise as a variance of permanent income gives a result not statistically different from zero. In Ireland, the uncertainty of a households' permanent income is higher than the variance of transitory income, but the difference is not as great as in Luxembourg. In Portugal, both variances are equal, which may indicate that the income of Portuguese households follows a random walk.

The uncertainty of households' transitory income for Spain, Belgium, Italy and Greece is exceptionally high. In Greece, the high transitory income uncertainty may be explained by the highest – among the EU countries – share of the self-employed, including farmers. In Italy, the regional income disparities could also play a role. Some anomalies in results for particular countries or sometimes only marginal differences in results for different groups of households may be influenced by the fact that a period of observation of the households' panels is short (four years).

The breakdown of income uncertainty by age of the household head is given in Table 2. The estimated variance of the permanent component of income for the youngest households is expected to be high, according to the life cycle theory. Then it should fall as the life income becomes steady and more secured by approaching the retirement age.

In most countries of the observed panels of households, the estimated variance of the permanent income of households headed by young persons (up to 34 years) is indeed higher than it is for older households. It is above 0.100 in the Netherlands, Spain, France, Belgium, Denmark, Portugal and Greece. In all those countries, except Portugal, the permanent income variance falls to the level much below 0.100 in the age 55-64. In almost all countries (except for Spain and for France at a very small margin) the permanent income uncertainty is the lowest after retirement (in the age above 65) in full accord with the life cycle theory.

Table 2. Income uncertainty by age of the household head

CHER country code	Country	Age									
		Up to 34		35-44		45-54		55-64		65+	
		Estimated variance of income									
		permanent	transitory	permanent	transitory	permanent	transitory	permanent	transitory	permanent	transitory
1	Belgium	0.163	0.236	0.106	0.266	0.038	0.271	0.000	0.396	0.012	0.221
3	Germany	0.083	0.069	0.022	0.046	0.063	0.044	0.042	0.062	0.000	0.146
5	Italy	0.006	0.259	0.114	0.120	0.017	0.209	0.000	0.311	0.017	0.151
6	Luxembourg	0.075	0.005	0.064	0.000	0.027	0.029	0.056	0.007	0.001	0.049
7	The Netherlands	0.297	0.008	0.000	0.199	0.080	0.041	0.053	0.095	0.023	0.081
12	Austria	0.083	0.089	0.050	0.042	0.177	-0.010	0.073	0.073	0.000	0.135
13	Denmark	0.124	0.033	0.026	0.046	0.062	0.026	0.000	0.218	0.047	0.030
15	France	0.168	0.002	0.000	0.125	0.007	0.107	0.053	0.079	0.061	0.097
16	Greece	0.100	0.074	0.000	0.201	0.016	0.172	0.015	0.212	0.044	0.141
17	Ireland	0.062	0.044	0.052	0.049	0.068	0.041	0.055	0.041	0.043	0.061
18	Portugal	0.120	0.070	0.114	0.026	0.085	0.143	0.147	0.077	0.065	0.088
19	Spain	0.188	0.042	0.000	0.432	0.000	0.453	0.000	0.039	0.043	0.128
22	Poland	0.081	0.125	0.111	0.061	0.014	0.138	0.043	0.037	0.022	0.053

Variance 0.000 indicates a result not statistically different from zero.

UE countries 1995-1998, Poland 1997-2000

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Accordingly, the uncertainty of transitory income is lower for the youngest households (in the age up to 34 years) than for the older heads of households, except for Italy, Poland and Belgium. It goes up and down in the older age groups in particular countries in relation to the behaviour of the permanent income of the household. For example, the transitory income becomes less certain in the age 35-44 in the Netherlands, which was characterised by a more certain permanent income in this age group. The age group of 45-54 is generally characterised by a growing certainty of permanent income and often also more certain transitory income. This is a moment when the life income reaches its peak and it settles the permanent life income at its steady state level.

There might also be a situation when the life income is quite certain during the long life spans. In our panel it is the case of Ireland, where the transitory income component is almost stable during the life cycle and similarly the permanent income, which varies only slightly. Such trend is caused by a high rate of growth of households incomes in all the age groups of households, what happened in Ireland. Similar but less visible trend was observed in Luxembourg.

Only in Italy, Poland and Belgium the youngest households face a lower variance of the permanent than of the transitory income. Their permanent income becomes less stable in the age 35-44, except for Belgium, where the variance of the permanent income falls continuously till retirement and only later in the life cycle it stabilises again.

The reason for such developments is that the young generations often out-pass the older generations in income growth mainly due to their higher level of education and employment or production activity in the most modern sectors of economy (high-technology, financial sector, foreign trade). It was visible in Poland in 1994-2000.

Accordingly, the transitory income component in Italy and Poland is more uncertain for the youngest households and it becomes more stable in the age 35-44. Later, the variance of transitory income increases in the age 44-55 and falls in the age 56-64. In Belgium, the transitory income uncertainty grows all the time till retirement.

Table 3. Income uncertainty by gender of the household head

CHER country code	Country	Gender			
		Male		Female	
		Estimated variance of income			
		permanent	transitory	permanent	transitory
1	Belgium	0.072	0.252	0.029	0.286
3	Germany	0.038	0.052	0.041	0.131
5	Italy	0.020	0.211	0.058	0.131
6	Luxembourg	0.024	0.031	0.085	0.000
7	The Netherlands	0.052	0.084	0.122	0.125
12	Austria	0.092	0.045	0.041	0.127
13	Denmark	0.000	0.100	0.091	0.021
15	France	0.032	0.107	0.137	0.019
16	Greece	0.011	0.182	0.116	0.055
17	Ireland	0.053	0.050	0.084	0.050
18	Portugal	0.082	0.100	0.115	0.071
19	Spain	0.000	0.358	0.080	0.162
22	Poland	0.025	0.118	0.126	0.016

Variance 0.000 indicates a result not statistically different from zero.

UE countries 1995-1998, Poland 1997-2000

The breakdown of income uncertainty by gender of the household head is given in Table 3. The incomes of households headed by women are lower on average by one fourth to one third than incomes of households headed by men. The uncertainty of households headed by men in our panel is generally higher for transitory income than for a permanent component of income (except for Austria and Ireland at the margin).

In seven countries (Luxembourg, Denmark, France, Greece, Ireland, Portugal and Poland) out of thirteen in our panel, households headed by women face higher uncertainty of a permanent component of income. It means that women receive less transitory (extra) incomes and the stability of their long-term income is lower than the permanence of income of households headed by men. Ireland is again a special case: households headed by men face almost the same uncertainty of both permanent and transitory income while women cope with more uncertain life permanent incomes.

In the remaining six countries (Belgium, Germany, Italy, the Netherlands, Austria and Spain) households headed by women are characterised by higher variance of their transitory income, similarly to the households headed by men, though in the Netherlands both variances are almost equal. Thus, the division of households by gender shows that differences in the certainty of income between households headed by men and those headed by women may depend on the level of welfare of the society. In countries at the lower level of income the stability of long term life income of women is lower (in our panel Luxembourg, Denmark and France are rather exceptions to this rule).

However one should notice that the majority of households are headed by men in all countries in our panel (from 55% of a total sample in Austria to 80% in Italy) and their incomes are generally much higher than that of women (by 10 % in Denmark or Austria to 50% in France and Belgium). The economic situation of women as a head of the household is determined also by the occupational structure of the labour force as well as by the professional status and the level of education of both genders.

Table 4. Income uncertainty by professional status of the household head

CHER country code	Country	Professional status			
		Self-employed		Employees	
		Estimated variance of income			
		permanent	transitory	permanent	transitory
1	Belgium	0.177	0.000	0.041	0.010
3	Germany	0.188	0.170	0.076	0.054
5	Italy	0.268	0.000	0.039	0.045
6	Luxembourg	0.000	0.664	0.045	0.036
7	The Netherlands	0.000	0.208	0.013	0.090
12	Austria	0.011	0.266	0.023	0.086
13	Denmark	0.123	0.049	0.037	0.029
15	France	0.159	0.210	0.083	0.011
16	Greece	0.000	1.211	0.000	0.131
17	Ireland	0.208	0.390	0.025	0.292
18	Portugal	0.024	0.141	0.023	0.047
19	Spain	0.000	0.614	0.021	0.081
22	Poland	0.127	0.032	0.071	0.053

Variance 0.000 indicates a result not statistically different from zero.

UE countries 1995-1998, Poland 1997-2000

The role of the professional status of the head of the household in income uncertainty is most visible in the case of the self-employed. Their incomes are generally less certain than incomes of the employees, but they are much higher on average than the employees' income (by 30-50%). Only in less affluent societies the self-employed (among them farmers) acquire lower incomes than employees (in our sample in Greece, Portugal and Spain).

The self-employed are characterised by a very high uncertainty of the transitory component of income, which is much higher than their permanent income uncertainty. That was expected. But in some countries we have encountered an opposite tendency, namely the self-employed permanent income was less certain than the transitory income. This was the case of Belgium, Denmark, Poland, Germany and Italy. In those countries, the relative incomes of the self-employed are the highest in relation to the employees (except for Denmark where the incomes of both groups are almost equal). It says that the higher average incomes of the self-employed are obtained at the cost of greater variations of their permanent component of income.

On the other hand, the employees' permanent income is expected to be more protected than their transitory income. It is so in a half of our sample (except for Greece due to strange results obtained). In the other half of the group (Belgium, Denmark, Poland, Germany, France and Luxembourg) the permanent income of employees is less stable than their transitory income.

In four countries of this last group (Belgium, Denmark, Poland and Germany), also the self-employed face a higher uncertainty of their permanent income, but of a greater magnitude than employees. It may be due to the radical changes of income of all groups of households, like in Germany after reunification and in Poland during transition or due to high unemployment that also affects the certainty of incomes of employees (Belgium, Denmark). The conclusion is that the stability of incomes of those who are gaining from the structural changes of the whole economy may remain low while their incomes are growing.

Table 5. Income uncertainty by main economic activity status of the household head

CHER country code	Country	Economic activity status					
		Working*		Unemployed		Other inactive	
		Estimated variance of income					
		permanent	transitory	permanent	transitory	permanent	transitory
1	Belgium	0.057	0.300	0.201	0.174	0.000	0.289
3	Germany	0.027	0.049	0.112	0.032	0.023	0.153
5	Italy	0.000	0.250	0.149	0.347	0.031	0.138
6	Luxembourg	0.050	0.009	0.142	0.000	0.015	0.043
7	The Netherlands	0.080	0.066	0.174	0.122	0.051	0.112
12	Austria	0.077	0.036	0.068	0.095	0.061	0.130
13	Denmark	0.026	0.077	0.033	0.121	0.051	0.047
15	France	0.015	0.102	0.119	0.022	0.118	0.069
16	Greece	0.019	0.174	0.013	0.189	0.045	0.130
17	Ireland	0.062	0.040	0.012	0.125	0.060	0.054
18	Portugal	0.105	0.083	0.000	0.331	0.086	0.088
19	Spain	0.000	0.382	0.032	0.212	0.000	0.204
22	Poland	0.054	0.109	0.519	0.000	0.048	0.047

Variance 0.000 indicates a result not statistically different from zero.

UE countries 1995-1998, Poland 1997-2000

* Normally working more than 15 hours per week

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Table 5 shows the household income variance structure by the main economic activity of the household head: working, unemployed and inactive, mainly pensioners. As one could expect, the uncertainty of income of the inactive persons is very low and their permanent component of income is even more stable or equal to their transitory income stability (with an exception of France). For households headed by the unemployed the opposite tendency is expected – they generally face a higher variation of the permanent income. It is so in a half of our sample while in the other half the unemployed meet greater uncertainty of the transitory income.

The households where the head is working compose the majority of all households (60% on average, but only 50% in Denmark and 67% in Luxembourg). They show a mixed picture concerning income uncertainty. In five countries (Ireland, Portugal, Austria, Luxembourg and

the Netherlands), the permanent income variance of those households is greater than their transitory income uncertainty. In other countries, households with working heads deal with greater instability of transitory income, which is exceptionally high in Belgium, Italy, Spain and a bit lower but still very high in Greece. The households with working heads affect the average transitory income variance in those economies the most.

Table 6. Income uncertainty by education of the household head

CHER country code	Country	Education level					
		Primary and vocational		Secondary		Tertiary	
		Estimated variance of income					
		permanent	transitory	permanent	transitory	permanent	transitory
1	Belgium	0.050	0.283	0.037	0.296	0.038	0.284
3	Germany	0.030	0.079	0.046	0.089	0.015	0.077
5	Italy	0.036	0.206	0.003	0.203	0.084	0.105
6	Luxembourg	0.018	0.033	0.054	0.006	0.063	0.004
7	The Netherlands	0.055	0.092	0.000	0.131	0.184	0.000
12	Austria	0.062	0.064	0.048	0.070	0.212	0.000
13	Denmark	0.038	0.041	0.013	0.089	0.069	0.027
15	France	0.119	0.000	0.151	0.002	0.075	0.139
16	Greece	0.046	0.149	0.000	0.206	0.000	0.176
17	Ireland	0.062	0.038	0.071	0.048	0.066	0.039
18	Portugal	0.099	0.086	0.099	0.090	0.101	0.041
19	Spain	0.012	0.266	0.000	0.390	0.000	0.379
22	Poland	0.063	0.106	0.049	0.052	0.041	0.031

Variance 0.000 indicates a result not statistically different from zero.

UE countries 1995-1998, Poland 1997-2000

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In Table 6 we present the breakdown of the income uncertainty by the highest education level obtained by the head of the household. The level of education does not influence the income uncertainty in a way one would predict when it concerns persons with tertiary education. In the majority of this group, the uncertainty of permanent income is quite high and greater than the transitory income uncertainty². The households headed by persons with tertiary education

² In: Liberda, Górecki, Pęczkowski (2002) we observed a similar tendency in Poland for persons with tertiary education, but the self-employed (excluding farmers) had their transitory (not permanent) incomes less stable.

report highest incomes (about 50% higher than the average income in particular countries) and their behaviour resembles that of the self-employed group, to which they often belong. One would predict that the highly educated people could acquire higher and more stable permanent incomes than the whole self-employed group and persons with a primary and secondary education. In our panel it was true in relation to the self-employed but not always in comparison to persons with primary and secondary education.

A relatively low uncertainty of permanent income of persons with primary and basic vocational education as well as those with secondary education (except for France and Ireland) in our panel is rather surprising. In Portugal, the permanent and transitory income variances in those both groups of households are different only at the margin. In the remaining countries of our sample, the lower educated heads of households face a lower permanent than transitory income uncertainty. This is in line with the general LC/PI model, but in conflict with the human capital model (Becker, 1993).

4. Dependence of households' income uncertainty on macroeconomic variables

The estimated variances of shocks to permanent and to transitory income components for all households in each European country from our panel are regressed on the macroeconomic variables for all countries: GDP level, inflation rate, unemployment rate and a share of economically active population in agriculture.

The estimated equation of a function of variance of the permanent income is:

$$Var(\eta) = \beta_0 + \beta_1 Y + \beta_2 \pi + \beta_3 u + \beta_4 z . \quad (1)$$

The estimated equation of a function of variance of the transitory income is:

$$Var(\varepsilon) = \alpha_0 + \alpha_1 Y + \alpha_2 \pi + \alpha_3 u + \alpha_4 z . \quad (2)$$

Where:

- Y - GDP per capita in 1999, in euro,
- π - inflation rate in the examined period,
- u - unemployment rate,
- z - share of the economically active population in agriculture.

The results of the OLS regression are presented below.

For the function of variance of the permanent income:

$$Var(\eta) = 0.0631 - 0.0886Y - 0.0371\pi + 0.0231u - 0.0021z$$

$$(1.374) \quad (-2.550) \quad (-2.038) \quad (4.302) \quad (-0.431)$$

(t statistics in parenthesis)

$$R^2=0.736$$

For the function of variance of the transitory income:

$$Var(\varepsilon) = 0.0793 + 0.0019Y + 0.0036\pi - 0.0045u + 0.0005z$$

$$(4.016) \quad (0.130) \quad (0.460) \quad (-1.946) \quad (0.813)$$

(t statistics in parenthesis)

$$R^2=0.421$$

The coefficients of the regression for the function of the permanent income uncertainty (measured by a variance) have got expected signs, except for the share of the population economically active in agriculture which appeared statistically not significant.

The regression results for the function of the transitory income uncertainty on macroeconomic variables proved not statistically significant for most variables (except for unemployment rate) and came out with wrong signs (except for the share of the population in agriculture). It means that the transitory changes of the households' income are not sensitive to the macroeconomic variables. The level of GDP, the share of population in agriculture, the unemployment rate and even the inflation rate affect rather the absolute level of the households' income than its transitory changes.

The household permanent income variance is affected negatively by the level of GDP and the inflation rate. The strongest effect is influenced by the GDP level. The negative effect of the GDP level on the permanent income uncertainty indicates that households in the wealthier societies should experience more certainty of their permanent income. This certainty is often secured also by the state policy of income and taxes.

However, it does not mean that all households in richer countries have got higher certainty of the permanent income. Results of our estimation of average income uncertainties for particular countries do not show such a direct relation. The highest permanent income uncertainty for Portugal, which is poorer than other EU countries in our panel may indicate the negative relationship between the level of GDP and the permanent income uncertainty. But a very low variance of the permanent income in Greece, where the average GDP level is lower than in Portugal, goes against the obtained regression results. Poland with a medium level of the permanent income uncertainty and the lowest level of income in the group does not prove the obtained correlation either.

The variables specified in the function (1) explain 74% of the variance of the permanent income of households in the EU countries. The factors that were not included into the regression function (mainly due to measurement difficulties), but that may influence the income uncertainty in particular countries are: different systems of wages and taxation in EU countries and in Poland, differences in the structure of industries and thus the differences of the employment structure. These factors could only be included into regression with a use of many dummy variables.

The direct variable we used, e.g., the share of population economically active in agriculture proved not statistically significant. One could expect that the higher share of the self-employed, who in poorer countries are active mainly in agriculture and in related activities, may be an important reason of the high average households' income variance of those societies. The results of the regression estimation did not prove that, however. The reason probably is a relatively small number of observations (52) and the short period of analysis (4 years).

The positive effect of unemployment rate on the permanent income uncertainty was expected and is self-evident. A high unemployment rate affects the life permanent income negatively, even if incomes of the unemployed are secured partially by unemployment benefits.

The negative effect of the inflation rate on the permanent income uncertainty may be explained as a proxy for growth of nominal incomes. If the whole economy is growing in real terms, then a higher inflation is correlated with a lower uncertainty of the households' permanent income.

5. Conclusions

1. This paper shows that in most European Union countries as well as in Poland the uncertainty of permanent income is lower than the uncertainty of transitory income.
2. The variance of households' average transitory income in Spain, Belgium, Italy and Greece is very high.
3. According to the life cycle theory, a variance of the permanent component of income for the youngest households is expected to be high and it should fall as the life income becomes steady by approaching the retirement age.
4. In most countries of the observed panel of households, the estimated variance of the permanent income of households headed by young persons (up to 34 years) is higher than it is for older households.
5. Only in Italy, Poland and Belgium the youngest households face a lower permanent than the transitory income variance.
6. The uncertainty of households headed by men in our panel is generally lower for their permanent income than for a transitory component of income.
7. In seven out of thirteen countries (Denmark, France, Greece, Ireland, Luxembourg, Portugal and Poland), households headed by women face higher uncertainty of a permanent component of income.
8. It means that women receive less transitory (extra) incomes and the stability of their long-term income is lower than is the permanence of income of households headed by men.
9. The transitory incomes of the self-employed are generally very uncertain, much more than their permanent incomes.
10. In some countries (Belgium, Denmark, Poland, Germany and Italy), the opposite was revealed: the self employed permanent income was less certain than their transitory income.
11. In a half of the sample, the employees' permanent income is more protected than their transitory income.
12. The uncertainty of income of the inactive persons is very low and their permanent component of income is even more stable or equal to their transitory income stability.
13. In more than a half of the sample, households with working heads deal with a greater instability of transitory income.

14. The very high variance of transitory income of households with working heads in Belgium, Italy, Spain and Greece is responsible for the high average transitory income variance in those economies.
15. In the majority of the group of persons with tertiary education, the uncertainty of permanent income is quite high and greater than the transitory income uncertainty.
16. A relatively low variance of a permanent income of persons with primary and basic vocational education is surprising.
17. The household permanent income variance is affected negatively by the level of GDP and the inflation rate and positively by the unemployment rate. The transitory changes of the households' income are not sensitive to the macroeconomic variables.
18. The general conclusion is that the uncertainty of incomes of households gaining from the structural changes of the economy and from higher human capital (the self-employed, the young, persons with tertiary education) may remain high while their incomes are growing.

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