

THE DETERMINANTS OF
POVERTY IN UKRAINE

by

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A thesis submitted in partial fulfillment of
the requirements for the degree of

Master of Arts in Economics

National University "Kyiv-Mohyla Academy"
Economics Education and Research Consortium
Master's Program in Economics

2004

Approved by _____
Ms.Svitlana Budagovska (Head of the State Examination Committee)

Program Authorized
to Offer Degree _____
Master's Program in Economics, NaUKMA

Date _____

National University “Kyiv-Mohyla Academy”

Abstract

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Poverty alleviation was defined as one the main goals of social policy in Ukraine. However, detailed analysis of poverty shows that poor status of household depends on the poverty specification. For present analysis were used three different poverty specifications: absolute, relative and subjective. Results of the study showed that even though all chosen factors influences chances of household to be poor in the same direction, but significant difference in comparative value of coefficients suggests that different policy actions should be applied to each specification.

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ACKNOWLEDGMENTS

The author wishes to thank Prof. Hartmut Lehmann for guidance, valuable advice, and ongoing inspiration. The comments and suggestions of the research workshop professor Tom Coupé helped the work sound better and more convincing.

Introduction

A poverty problem for Ukraine has been appeared in the period of transition and now is treated as central point of social policy. A World Bank study (2000) estimated proportion of Ukrainian population in poverty to be equal 26.7% and the proportion of population that experiences extreme poverty - 13.5%.

One way to reduce poverty is redistribution of income flows through the central budget, but situation when one third of population needs help obviously can not be sustainable. Definitely, eliminate reasons that cause poverty is more efficient way to influence social well-being. The big set of factors that caused poverty was rapid worsening of economic situation in the period of transition. Macroeconomic reasons of poverty are: sharp fall in GDP and real wages, rise in unemployment, decrease of resources reallocated trough central budget and, consequently, fall in social spending – the overall stagnation of economy significantly lowered well-being of population.

However, decrease in the well-being was not homogenous throughout the population, that assumes the significance of the microeconomic characteristics of the household for the danger of poverty. Specifying household characteristics that can be policy influenced and effect the probability of being poor, will give starting point for poverty-reducing policy.

Most often made poverty analysis (also made for Ukraine by World Bank in 2000) defines poverty profile of the country. Poverty profile is unconditional analysis of correlation pattern between poverty and characteristics that are assumed to be significant. Such analysis can give good first insight on the nature of poverty, but if different characteristics are correlated, pure effect of policy action is not clear.

Analysis of poverty determinants on the micro level is of especial interest now, when Ukrainian economy has been experiencing significant growth during last four years, since economic growth is expected to alleviate macroeconomic burden on households' well-being.

The goal of this research is to specify share of population in poverty in Ukraine, determine household-specific and individual-specific characteristics that are associated with poverty reduction and define what policy actions can be provided for poverty elimination.

Chapter 1 of the paper gives short review of literature related to the topic, describes approaches for poverty specification and determines set of variables that are considered to influence poverty. Chapter 2 described methodology and model specification used in the study. Chapter 3 contains data description; chapter 4 gives analysis of estimation results. Chapter 5 concludes and provides

policy implications. Descriptive statistics and estimated coefficients can be found in Annexes.

Chapter 1

LITERATURE REVIEW

1.1 Defining poor.

The first step in modeling determinants of poverty in society is to define who is poor. To do this, initially we need to construct appropriate poverty line. Initial moment in defining poverty line is to decide whether income or consumption should be used as a base for comparison. The difference between them can be treated as difference between opportunities (income) and realized choice (consumption). Argument in favor of consumption is that consumption is less volatile than income since it is planned on the base of permanent income. The fact that makes consumption more preferable for Ukrainian situation is measurement bias - due to high taxation and black economy, income is often underreported; furthermore, income from farming is not reflected in official statistics about income. Alternative to money poverty metric are poverty indices based on such indicators as infant mortality, life expectancy at birth, health status, access to education. Motivation for using such poverty measures is that household's well-being is not totally reflected in either income or household's paid consumption – at least consumption of public goods is not reflected. But such data is available only on the national level and not on the individual.

There are four different approaches for defining money poverty line: absolute, relative, official and subjective.

Official poverty line can be defined regarding to official benefits to population, i.e. minimal pension benefits or minimal payments in case of unemployment. If poverty is measured based on the official poverty line, it can be decreased easily just by lowering minimal benefits. Since this situation is paradoxical, official poverty line is rarely used.

Subjective poverty line is defined on the respondents' answers about what level of income is considered to be minimally sufficient for living. Subjective approach also is rarely used since it does not seem to be a good base for political decisions. However, a number of studies were made using subjective poverty line. Ferrer-i-Carbonell and van Praag (2001) in their research about poverty in Russia Federation argued using subjective approach by suggesting that 'It is doubtful whether monetary income is a good determinant of well-being in a society where there are a lot of transactions in kind. More fundamentally, the question may be posed: Is money the primary determinant of life satisfaction?' As a result, they found that while in Western countries the level of subjective poverty is higher than the level of the relative one (defined as the percent of the income of the median household), it is not true for Russia Federation. The same result (that is, subjective poverty line is very close to line used for official estimates of poverty) was obtained by Gustafsson *at al* (2002) for China. Disadvantages of subjective

poverty line is that respondents' answers are highly dependent on the way how question is formulated and are highly correlated with current respondent's income.

Absolute measure specifies particular fixed level of income y_{min} , and all households whose income is lower than y_{min} are considered to be poor. Minimum income required most often is defined on the base of minimal subsistence level or a social minimum. Absolute poverty line, defined by World Bank, is 1\$/day per person. Absolute poverty is most expected to be eliminated by economic growth.

Relative poverty line links the y_{min} to the specific position of the income distribution in the society, for example, define the poor as a fixed part of population that has the lowest income or relate y_{min} to the mean or median income. Relative poverty line is mostly often used in researches since it can be used to show not only size of population in poverty, but also to analyze efficiency of income distribution inequality. If economic growth mainly benefited the richest part of population, poverty measurement based on relative poverty line may increase. Relative poverty line allows varying to the composition and size of poverty population, but if all income in the economy doubles, it will stay the same, while we can expect that the poverty reduced. Similar problem arises if all prices have been doubled - the measure will not reflect changes in real income distribution, it will just show that distribution of the nominal income is the same. Poverty studies for transition countries (Gorniak, 2000) showed that absolute

poverty line seems to be more appropriate in poor countries or countries that experienced rapid transition or economic changes, while relative poverty line gives better results for richer countries where income distribution is more in the focus of study.

After identifying who is poor, next step is aggregation them into one poverty index. Most often used indices are headcount, Poverty gap, Sen Index and Pa Index.

$$\text{Headcount} = \frac{\text{Number of people whose income is below poverty line}}{\text{Total size of population}}$$

Headcount is appropriate if the goal of study is to model probability for person (household) to be poor given present characteristics. Shortcoming of Headcount is that it assumes homogeneity among poor.

$$\text{Income gap ratio } I = \sum_{i \in S(x)} \frac{g_i}{qz}$$

Where g_i - income of i 's person, z -poverty line.

Sen index $P = H[I + (1 - I)G]$ where H is a headcount, G is Gini coefficient and I is income-gap ratio.

Pa measure of poverty was proposed by Foster and is defined as

$$Pa = \frac{1}{n} \left(\sum_{i=1}^q g_i / z \right)^a$$

Where g_i - income of i 's person, z -poverty line. Coefficient a shows the weight that is given to inequality within society.

For the purposes of current analysis more appropriate is bi-variable dependent variable with value 1 for poor and 0 for non-poor. Hence, our research models headcount Index, in our case index shows probability for household to fall into poverty given its characteristics.

The most interesting researches from the point of choosing poverty line are ones made in Bulgaria (1998) and Estonia (1999).

Bulgarian researches showed significant sensitiveness of estimation results to the choice of poverty line. Bulgarian researches used 10 different poverty lines, absolute and relative, and obtained great discrepancy in estimated headcount index. The lowest absolute poverty line, which corresponded to the level of income that defines eligibility to the social welfare assistance, showed that only 3.9 per cent of households should be treated as poor, at the same time other methods revealed substantially higher level of poverty – from 53 to 68 per cent. When different relative poverty thresholds were used, headcount index varied from 4.2 to 49.2 per cent of households. After considering different alternatives, researchers chose poverty line based on the share of food expenditures in household's budget. Initially this measure was proposed by Orshansky (1963) who assumed that poor American family spends one third of its income on food consumption and established poverty line as three times more than minimal food

basket. Bulgarian researches used coefficient 2 and estimated proportion of poor household in 65.5 per cent.

Estonian researchers in order to establish absolute poverty line examined different components of poverty and then incorporated obtained results in unique poverty threshold level. Identified poor categories are:

- Food poor – households, whose expenditures on food per capita were less than value of minimal food basket. (29.9% of households)
- Consumption poor – relative measure, accounted for households whose expenditures were less than one half of expenditures of the median household (8.5% of households)
- Life style poor – measure based on the share of food and housing consumption in the total expenditures, poor were considered households for whom proportion of such expenditures exceeded 80%. (24.1% of households)
- Housing poor are those who live in accommodation or have less than half a room per household member. (7.7% of households)
- Subjective poor - those who identify themselves as poor

It is expected that in the long-run correlation between all these types of poverty should be strong, but when poverty has incidental and transition nature, strong correlation is not necessary. Indeed, Estonia analysis showed presence of low correlation. It can be concluded from research that poverty is heterogeneous and that poverty of poor household has different character. In order to incorporate these differences into one absolute poverty measure, researchers chose minimal income level that included at least 50% of each poor category.

Often multidimensional poverty analysis can give good insight into the heterogeneity of poverty; and using multiple poverty lines is quite appropriate for research purposes, but it has little sense from the political point of view. More informative is multiple poverty line that defines several ordered poverty categories. This allows separating poor and non-poor households, but also define layer of population that is in danger to become poor. Such separation gives greater flexibility to policy actions that in this case are able not only to reduce poverty, but also to prevent households from becoming poor.

1.2 Determinants of poverty

Determinants of poverty in Ukraine can be divided into two categories: macroeconomic and microeconomic. On the macro level the biggest and the main factor was the destruction of the Soviet Union (Gorniak, 2000) that led to:

- Sharp decrease in GDP and real wages and the long period of stagnation
- Changes in composition of income, increased share of private sector activity
- Growth in open unemployment
- Decrease in resources that were reallocated through government budget
- Decrease in social spending
- Assets reallocation through privatization was unequal and not transparent

On the micro level poverty determinants can be ordered into regional level characteristics, community level, and household and individual level characteristics. (Richter, 2001)

On the regional level poverty determinants include geographic conditions; regional governance; level and development of public services, communication, infrastructure; economic, political, market stability; functional and effective judiciary.

At community level infrastructure is to be considered as a main determinant of poverty. This concept includes community's access to public goods: paved roads, electricity, health care, education, distance to administrative center and large markets. Also important are: human resource development, equal access to employment, social mobility and representation, land distribution. Recent researches found significance and importance of social networks and institutions, and social capital in community.

Household and individual level characteristics can be sub grouped into:

Demographic characteristics:

- household size and structure - poverty researches shows that larger households tend to be poorer;
- dependency ratio. It is calculated as a proportion of the number of non-labor force participants to the number of those in labor force within one household. It shows the burden on labor force and is expected to be positively correlated with poverty level;

- Gender of the household head – due to gender discrimination households headed by women are expected to be poorer

Economic characteristics:

- Household employment – possible indicators: participation in labor force, real rate of employment, rate of underemployment, rate of job changes
- Household consumption and its structure. It is expected that food consumption has greater weight in expenditures of poor households. This is important from the point of view that variation in food prices has significant impact on household's well-being.
- Household assets that include tangible goods and financial assets.

Social characteristics generally include health, education and shelter.

- Health can be characterized by nutrition status, disease status, availability of health care services and the use of these services by poor and non-poor households.
- Education is characterized by the level of education of household's members, access of education services to household and use of these services by household.

- Shelter includes housing (size, type of material, renting or owning house), services and environment.

All these factors are expected to be correlated with poverty; however, sometimes direction of causality is not well defined. For example, low quality housing or low level of education (especially children) may be the result of poverty as well as a cause.

Different combination of these factors was found to be significant in different countries; the magnitude of effect also substantially differs. What is in particular interest for current research, whether poverty functions were constructed for transition countries and what characteristics were found to be significant.

Poverty researches were supported by United Nations Development Program (UNDP) in 11 transition countries: Armenia, Bulgaria, Estonia, Kazakhstan, Kyrgyzstan, Moldova, Poland, Russia Federation, Tajikistan, Turkmenistan and Ukraine. Although methodologically researches were very different in these countries, they give good insight into the nature of poverty in transition countries.

Studies showed that macroeconomic factors significantly increased poverty in all countries. Microeconomic characteristics that are typical for poor households are:

- Single parent households, especially if single parent is mother. This is mostly explained by high dependence ratio.

- Households headed by non-earners: either unemployed or pensioner. But risk for pensioners is different in different countries and depends on social security policy. The lowest risk of being poor is experienced by Poland pensioners, while Estonian pensioners face significant risk because of low level of state pensions.

- Disable people

- Poverty was found to be higher in rural areas. In Asian republics it was also found to be higher in urban areas outside of capital and in urban areas in towns where there was only one company in Soviet times. In case this company became unprofitable after independence citizens of the whole town were unemployed.

- The impact of education is not clear. On the one hand, education is theoretically considered to be strong factor of poverty alleviation and households headed by low-educated person have greater probability to be poor. On the other hand, dependence between education and poverty is not equally strong in different countries. Studies for Kyrgyzstan (Ackland and Falkingham, 1997) and for Uzbekistan (Condouel, 1998) showed that secondary education reduces probability of being poor in comparison with both primary and higher education.

In Azerbaijan and Kazakhstan inverse relation was found, but association is relatively weak. Education was found to be crucial stratifying element in Poland where it explains differences in income more than all other factors. Similar situation was found for Baltic countries. But this is not the case for Ukraine and Tajikistan, where it important only for managerial position. Other professionals may be paid less than factory workers. It is expected that while economy becomes more market, return on education increases and consequently high level of education reduces risk of poverty.

- Gender risk was not found to be significant by most of the studies of UNDP. But studies for Asian republics showed that while unconditional correlation is absent, if data is controlled for size, age and allocation (urban or rural) female-headed households are much more pure.

- Poverty is the largest within families with large number of children (more than 3). Poverty among children is the most sever problem, since it can turn into poverty trap. In Estonia among children up to 10 years 48% are poor, in Poland one third of population in poor are children under 15 years, in Russia Federation 46% of children under 15 are poor.

- Transition economies added new phenomena to the world's poverty profile, specifically when employment status do not surely protect against poverty, due to high level of wage areas and low level of real wages.

The study made by World Bank for Ukraine (World Bank, 2000) showed that households headed by person with low level of education or with unemployment status are more expected to be poor. Poverty line was set on the level of 75% of the income of median household and extreme poverty line was settled on the level 60%. Calculated headcount indices were 26.7% and 13.5% of population respectively.

For analysis of poverty determinants was used technique of poverty profile –unconditional analysis of correlation between poverty index and single poverty determinant. Analysis of correlation between household structure and poverty showed that pensioner households and adult-only households experience lower level of poverty than households with children- this result is consistent with those obtained for other transition countries. Among pensioner households low level of extreme poverty was experienced by ones with two pensioners, this can be explained by scale effect. Oppositely, households with pensioners older than 70 years have higher level of poverty, possible explanation- high expenditures on health care.

Proportion of households with children that are in poverty significantly increases for households with 3 or more children. However, proportion of households with large number of children in Ukraine population is small- 83% of poor children live in households that have less than 3 children. Hence, reducing of poverty within households with 3 or more children does not influence much children poverty.

Analysis of the personal characteristics of household's head showed low correlation between proportion in poverty and age with somewhat lower rate for households headed by people under 30 and in range 55-65 years. But this is possibly due to lower dependence ratio.

There was not found a significant difference in poverty rate between man-headed and women-headed households.

Education was found to be negatively correlated with poverty, supporting hypothesis that return on education for Ukraine like for other transition countries is high. However, effect of education conditional on other characteristics is more interesting and relevant.

Unconditional analysis of primary activity of household's head showed that the highest rate of poverty for unemployed, following by employed in collective and cooperative enterprises; pensioner and employee household heads experienced lower rate of poverty. However, analysis was not made in dimension of employment in different sectors of economy: agricultural, manufacturing, services, while this factor can be significant.

Regional determinants were not subject to detail study, but unconditional analysis, like in Latvia and Kazakhstan, did not reveal significant differences between urban and rural areas.

Chapter 2

METHODOLOGY

Two different approaches are used in the literature for multivariate poverty modeling:

- Direct modeling of poverty index $P_{a,j} = \beta'_a x_j + \varepsilon_{a,j}$
- Two-step procedure where on the first step consumption is modeled $\ln c_j = \beta' x_j + \varepsilon_j$ and on the second poverty index is modeled using estimated consumption.

Choice of relevant approach is based on the assumption made for values of β 's for poor and non-poor part of the population. If researcher considers that behavior of poor and non-poor is the same and that returns on assets are the same for both categories, then second approach is preferred. Dependent variable is a level of consumption in real terms corrected to account for differences in adult and children consumption and for existence of economy on scale within household. Advantage of modeling consumption is that it uses all available information, while first approach censors sample on the level of poverty line. Since choice of poverty line often is arbitrary, different levels of poverty line will censor sample on different level that can influence β 's. Econometric model for modeling consumption may be OLS or IV in the case of endogeneity.

Alternatively, if researcher suggests that coefficients are different for poor and non-poor, direct modeling of poverty index is more appropriate. Econometric model for modeling poverty index can be either Tobit or Probit model, depending on what index was chosen.

In our research we try to find what factors influence Headcount index and directly estimate it with probit model.

Dependent variable.

We used three different approaches for poverty determination: absolute, relative and subjective.

Absolute (nutrition) poverty line is defined on the basis of daily energy consumption. Poverty line was defined for each household, taking into consideration household's structure and settlement. Poverty line reflects that women requires less energy than men, that energy consumption is concave in age and that individuals in big cities require less energy than those in small towns and villages. Detailed energy requirements can be found in the Annex 1.

Relative poverty is defined similar to World Bank practice for Ukraine—poor are considered to be households whose per capita consumption is less than 75% of the per capita consumption of the median household, households whose expenditures are less than 60% of the consumption of the median household are considered to be extremely poor. For per capita consumption calculation was

used World Bank scale to calculate size of household in Adult Equivalents Units. According to this scale, the first adult member has weight 1, each next adult has weight 0.7, and children's weight is 0.5. Such scaling allows us to account for the effect of economy on scale within household.

Subjective poverty is based on the amount of per capita income that household consider to be enough for not being poor. If realized per capita cash income was lower than required, household was defined as poor.

For nutrition and subjective poverty specifications dependent variable takes value 1 for poor household and 0 otherwise. For relative poverty dependent variable takes value 0 for non-poor households, 1 for households that are in poverty, but not extreme one, and 2 for households that experience extreme poverty.

Independent variables.

Macroeconomic level variables are dummy for region, dummy that shows whether household's settlement and the rate of region's growth in Gross Value Added for the period from 1996 to 2002 years.

Microeconomic variables can be divided into several blocks.

Demographic variables include information about household structure and characteristics of household's head. Household's structure variables are

number of children (under 17 years), number of elder people (men after 60 years and women after 55 years), number of adult men and adult women. Also initially the household size squared was included to check whether there is scale effect. Presence of scale effect is theoretically reasonable due to economy of spending on public goods, but Daeton's research (1998) didn't find scale effect either in developed or in developing countries.

Household's head characteristics include age and gender – it is expected that households headed by women and by older people should experience higher probability of being poor.

Education.

Education variables block includes number of adult members in household who have higher education, uncompleted or base higher education or professional education. Only education of people older than 25 years was taken into consideration, since level of education of the younger household members can be endogenous to the well-being of household. Different poverty studies, including studies for transition countries, showed that education has very strong impact on poverty reduction. Hence, we expect positive influence of education with greater impact of completed higher education. Variable for secondary education was not included, since, according to Ukrainian legislation, it is mandatory.

Area of employment.

It is expected that employment of household members decreases probability of being poor, but we tried to check whether different economic sectors provide different return. Sectors of employment were decomposed into primary sector (including agriculture and fishing), mining, secondary sector, tertiary sector (trading + financial services + insurance) and budgetary sector (administration + education+ medicine). In Ukrainian economy mining sector was expected to be most profitable, while agricultural sector is in depression. However, in last year secondary and tertiary sectors of economy experienced significant growth (on the level higher than GDP growth), hence it cannot be predicted *a priori* what sector will be revealed to have the strongest impact.

In-kind production.

In-kind production includes goods that are produced and consumed inside of household. In our sample share of in-kind consumption has mean of 11% in the whole expenditures of household, reaching maximum of 80% with median 5%. Hence, including variables that reflect in-kind production is reasonable. Such variables are the presence of land plot, presence of poultry in the household and the total size of in-kind consumption. Variables that show the presence of land plot and size of in-kind consumption were divided into tree – controlling for household's settlement (village, small town or big city).

Self-estimations

Variable that reflects people's expectations about their future well-being was included into regression to check whether expectations influence current consumption.

Chapter 3

DATA DESCRIPTION

Data used for the research was provided by Derzhkomstat and contains household survey for the year 2003. Survey was conducted in the fourth quarter of the year during 2 weeks and after that results were interfered on the whole year. Survey contains data on the structure of household's income, expenditures, assets; age structure of household's members. Aside from objective information, survey also includes subjective information about people's estimation of their well-being – whether their well-being changed during last year and in what direction, how they expect their well-being to change in the next year, whether they expect overall economy growth in Ukraine. Question about the level of per capita income, that household considers being sufficient for living, allowed us to analyze subjective poverty.

The survey also provides information about every household member's age, gender, social status, education, area of employment, health status.

Survey is done over all regions of Ukraine and is representative for the whole population.

Number of households represented in data is 9422, number of individuals – 24274. Number of observation in the final regression – 9422.

Analysis of the structure of households' expenditures shows that annual expenditures per capita vary significantly among households.

Table 3.1

Descriptive statistics of expenditures per capita per year.

| | Mean | Std. Dev | Min | Max | Median |
|-------------------------|----------|----------|----------|----------|---------|
| Expenditures per capita | 3926.447 | 2642.813 | 385.9037 | 100672.7 | 3369.14 |

Expenditures can be divided into cash expenditures, in-kind consumption and residual component, the biggest part of which are government subsidies. Analysis over components shows that cash expenditures are most significant, while part of residual component is the smallest.

Table 3.2

Component structure of expenditures.

| | mean | St. dev. | Median |
|----------|-----------|-----------|-----------|
| Cash | 0.812296 | 0.161704 | 0.8423773 |
| In-kind | 0.1143134 | 0.148535 | 0.0531498 |
| Residual | 0.0733906 | 0.0835019 | 0.0469397 |

Analysis per income categories is made on category base, since desired income was provided not by number but by the range. Since people were asked about desired *income* per capita, subjective poverty was defined on income and basis.

Table 3.3

. Desired and actual division among income brackets.

| | desired | actual income |
|----------------|---------|---------------|
| less than 1800 | 151 | 2,628 |
| 1800-3240 | 938 | 4,321 |
| 3240-4200 | 1,412 | 1,225 |
| 4200-6000 | 3,463 | 824 |
| 6000-8400 | 1,342 | 293 |
| more than 8400 | 2,116 | 227 |

Since households were asked about desired income, subjective poverty was defined by comparing received cash flow per member and desired. Subjective poverty was found to be 82.06%

Poverty on the energy consumption basis was defined from data about total energy consumption of household and is 26.35% of the sample.

Table 3.4

. Energy consumption.

| | mean | St.dev | median |
|---------------------------|---------|---------|---------|
| Actual energy consumption | 3354814 | 1683038 | 3013555 |
| Energy poverty line | 2489501 | 1388503 | 2206060 |

Relative non-extreme poverty is 13.04%, and extreme poverty is 12.75%, where household is considered to be poor is its annual expenditures per capita

are less than 2527 hrn (75% from the expenditures of the median household) and extremely poor if annual expenditures per capita are less than 2021 hrn (60% from the expenditures of the median household). The same analysis can be done but with controlling for regionally specific relative poverty line. That is, median household should be defined for each region and poverty in each region should be defined subject to it. This specification shows that regionally specific non-extreme poverty is 13.06% and extreme poverty is 11.54%. Since we control for region specific by incorporating regional dummies and rate of growth in gross value added, for further analysis common for the hole population specification was chosen.

In Estonian poverty studying poverty was found to be highly heterogeneous. For the purpose of further analysis it is useful o check correlation between different kinds of poverty.

Interaction between different types of poverty:

Table 3.5

Joint distribution of relative and nutrition poverty.

| Nutrition poverty | Relative poverty | | | |
|-------------------|------------------|-----|--------|--------|
| | 0 | 1 | 2 | |
| 0 | 60.9% | 8% | 4.75% | 73.65% |
| 1 | 13.35% | 5% | 8% | 26.35% |
| | 74.25% | 13% | 12.75% | |

Table 3.6

Joint distribution of relative and subjective poverty.

| Subjective poverty | Relative poverty | | | |
|--------------------|------------------|-------|--------|--------|
| | 0 | 1 | 2 | |
| 0 | 16.1% | 1.2% | 0.64% | 17.94% |
| 1 | 58.15% | 11.8% | 12.11% | 82.06% |
| | 74.25% | 13% | 12.75% | |

Table 3.7

Joint distribution of relative and nutrition poverty.

| Subjective poverty | Nutrition poverty | | |
|--------------------|-------------------|--------|--------|
| | 0 | 1 | |
| 0 | 13.13% | 4.8% | 17.93% |
| 1 | 60.52% | 21.5% | 82.07% |
| | 73.65% | 26.35% | |

Share of population that belongs to all poverty specifications is 12.73%

Share of population that does not belong to any poverty specification is 12.32%.

Correlation between relative poverty and nutrition poverty is 0.35.

Correlation between extreme poverty and nutrition poverty is 0.31

Our analysis confirms *a priori* hypothesis about poverty heterogeneity; this result is consistent with previous findings for transition economies. The since choice of the poverty specification that should be influenced is subject to politician decision, further analysis would include modeling of all specification, providing policy recommendations for all specifications.

Descriptive statistics of independent variables can be found in the Annex B.

Chapter 4

ESTIMATION RESULTS

As was shown in the previous chapter, our poverty is highly heterogeneous, while poverty determinants are stated without dividing for absolute, relative or subjective one. However, it is highly possible that different factors have different impact on different kinds of poverty.

For modeling subjective and nutrition poverty probit model was used, due to binary character of the dependent variable. For relative poverty dependent variable is equal 0 if household is not considered to be poor, 1 if household is in poverty, but not in extreme one, and 2 if household is extremely poor. Although dependent variable is clearly ordered, Brant test suggests that multinomial logit model should be applied.

Estimation results for subjective poverty shows, that economic growth of region has positive and significant effect.

People who live in village are least incentive to identify themselves as poor, living in town increases probability of subjective poverty, but living in small town has bigger negative impact than living in a big city. This result reflects the fact that in most big cities growth of industrial production is observed, while small towns need more time to recover. Low subjective poverty in village reflects lower requirements.

Large households are more probable to identify themselves as poor. Controlling for household structure, we can conclude that additional adult member has the strongest negative impact on household's self-estimation, while elder people have smaller effect and number of children revealed to be insignificant.

Households headed by older people have more probability of being poor. While there is no statistical difference in influence between additional adult man or woman on the probability, coefficient before gender of the head of the household shows that households headed by women are subject to greater poverty risk.

Higher level of education reduces probability of being poor and with significantly greater return for higher education.

Increase in number of employed members of the household reduces probability of poverty; however, influence of different sectors of economy is not homogenous. The greatest positive effect gives mining industry, while services (defined in questioner as 'collective, civil or personal services' and 'house servant services') and agricultural sectors have the smallest effect. The impact of secondary, tertiary sectors of economy and government employment are almost the same.

Presence and size of in-kind production is of low significance.

To sum up, analysis of subjective poverty shows that it is extremely high in Ukraine. Danger of poverty increases with the size of household. From the geographical point of view, city settlement is associated with the higher probability of being poor. However, increase in education and level of employment has to improve situation. This kind of poverty is non-sensitive to the in-kind production, that can reflect the fact that house production has low efficiency and people are willing to exit it in favor of employment in other sectors of economy.

For nutrition poverty, our analysis shows that it is increasing with the size of household. The highest negative impact has increase in number of children, the lowest – increase in number of elder people. Block of in-kind production variables shows that just the fact of the presence of the land plot doesn't influence probability of being undernourished; however, size of in-kind production matters and coefficients have expected negative sign. Effect diminishes with the increase in the size of town. Effect from having poultry is significant and size of it is comparable with the having additional member employed – employment in primary, tertiary, government sectors or in services decreases probability of being poor on smaller per cent than just having poultry, while employment in mining, secondary sectors or construction has stronger positive influence. Education reveals to be insignificant. Macroeconomic variables show that nutrition poverty diminishes with economic growth.

Estimation results for relative poverty revealed that all factors included have the influence both extreme and non-extreme poverty in the same direction (and are consistent with previous specification), however, amplitude of the influence differs. Analysis of household structure shows that extreme poverty is highly possible in households with high number of children, while households that consist from elder people are in lower danger.

Higher level of education of the household's members is associated with lower probability of poverty; return for households in extreme poverty is higher.

Analysis of in-kind production shows that it is significant for both types of poverty, but is more important for extremely poor households – presence of poultry has four times stronger positive effect for them. However, presence of land plot is associated with higher probability of poverty.

Employed status of household's members decreases probability of poverty, but different sectors of economy provides different returns, with highest one for mining sector and lowest for primary sector.

Our analysis of estimations shows that chosen factors influences all kinds of poverty in the same direction: higher probability of poverty is associated with large households, with households that have unemployed members or members employed in primary sector of economy, and with households, whose members

have low level of education. Probability of any kind of poverty decreases with economic growth in the region, with increase in the number of members employed and with increase in in-kind production.

However, the strength of impact of each factor on the different kind of poverty differs and this difference should be taken into consideration. Table 4.1 shows the marginal effects of employment in different sectors of economy and marginal effect of different kinds of in-kind production.

Table 4.1

Marginal effects of households' employment and in-kind production

| Variable | Marginal effects | | | |
|---|------------------|------------|-------------------|--------------------|
| | Relative poverty | | Nutrition poverty | Subjective poverty |
| | Non-extreme | Extreme | | |
| In-kind production | | | | |
| Presence of Land plot for big city | .02702* | .0378*** | -.01078 | .040945*** |
| Presence of Land plot for small town | .05307*** | .06219*** | .00964 | |
| Presence of Land plot for village | -.0053 | .05405* | .03867 | |
| Presence of Poultry | -.0153** | -.0604*** | -.03378** | -.019287** |
| In kind production in big city | -.0077** | -.0162 *** | -.02039*** | -.00102 |
| In kind production in small towns | -.0089*** | -.0117*** | -.02320*** | .010804*** |
| In kind production in village | -.0164*** | -.0193*** | -.02886*** | .009513*** |
| Employment (number of people employed) | | | | |
| Primary sector | -.0262*** | -.0203*** | -.02163** | -.04597*** |

| | | | | |
|-------------------|-----------|-----------|-------------|------------|
| Mining sector | -.0707*** | -.0969*** | -.06629*** | -.11557*** |
| Secondary sector | -.0396*** | -.0497*** | -.03966*** | -.07488*** |
| Construction | -.0295** | -.0255** | -.04655*** | -.07358*** |
| Tertiary sector | -.0508*** | -.0458*** | -.03048 *** | -.07659*** |
| Government sector | -.0375*** | -.0537*** | -.02128** | -.05694*** |
| Services | -.0415 ** | -.0393*** | -.02869 | -.037401** |

Data suggests that having additional member employed in any sector reduces all kinds of poverty. The order of economy sectors also holds for all kinds of poverty: mining sector has the highest positive effect, while agriculture sector always has the lowest return with secondary, tertiary sectors and construction are located in the middle, having everything else constant. This pattern is consistent with general economic situation in Ukraine: mining sector is exporting and experienced the strongest growth during the recent period of economic recovery, growth in secondary and tertiary sectors is stable and high, but growth rate of these sectors has exceeded growth rate of mining sector only for the last year¹, agricultural sector is the most problematic one for Ukraine and has very low productivity.

The fact that presence of land plot is either insignificant or associated with higher probability of being poor also can be explained by low productivity of agriculture work, but now by low productivity of the private agricultural work. Fact of having poultry has significantly stronger positive effect on probability of exiting poverty. For severe kinds of poverty – extreme relative

and nutrition- effect from poultry is comparable with effect of having additional member employed (exception is for mining sector); for subjective and non-extreme poverty effect from poultry is significantly lower and is almost twice lower than effect from employment in even the least productive agricultural sector. Size of in-kind production matters and, as poultry, is more effective for severe poverty diminishing. Controlling for size of town, one percent increase in in-kind production more decreases probability of being poor for households located in small towns or villages.

To sum up effects of different sources of income on households' probability to fall in poverty, we can conclude that increase in both employment and in-kind production reduces danger of poverty. However, in-kind production is more effective for severe poverty, but its effect diminishes with increase in household's well-being, while effect of employment reveals to stay strong. This means that in the short-run severe poverty can be influenced by the government policy that promotes in-kind production, but in the long-run developing of labor market is more efficient.

One more common for different poverty specifications conclusion is that large households are subject to greater danger of poverty. The marginal effects of increase in household's size are shown in Table 4.2.

¹ Data was taken from International Center for Policy Studying.

Table 4.2

Marginal effects of households' structure.

| Variable | Marginal effects | | | |
|--------------------|------------------|-----------|-------------------|--------------------|
| | Relative poverty | | Nutrition poverty | Subjective poverty |
| | Non-extreme | Extreme | | |
| Number of Children | .01449 | .02749*** | .17454*** | -.0226 |
| Number of Women | .01109 | .03609*** | .12827*** | .07797*** |
| Number of Men | .02161 | .04964*** | .12194*** | .08385*** |
| Number of Elder | -.00152 | .00293 | .03419*** | .05553*** |
| Age of the head | .00147*** | .00162*** | -.0021*** | .00195*** |
| Headed by woman | .02651*** | .01038** | -.0038 | .03002*** |

Analysis shows that all kinds of poverty are more probable for large households. This finding is not surprising and is consistent with previous studying though out the world.

However, our estimations show that effect of household's composition is not stable. For relative non-extreme poverty specification, composition revealed to be insignificant and only the total size matters. For relative extreme poverty addition of one more adult member has significant negative impact, but if this member is employed (except for primary sector), total effect would be positive. Additional child increases probability to fall in poor without any compensating effect, additional elder member is insignificant. This allows us to conclude that

that not any large household, but large household with high number of children or adult unemployed members are in high danger of poverty.

For nutrition poverty any additional member worsens situation, but effect is the strongest for child, smaller for adult member (the same for man and women) and significantly lower for elder people; for nutrition poverty fact of employment doesn't overweight the increase in size. Consequently, any large household is in danger of nutrition poverty. However, elder households are in low danger than households with a lot of children or adult members.

For households that experience subjective poverty, additional adult or retired member increases probability of being poor (with smaller effect for elder members), additional child is insignificant. Effect from employment is somewhat smaller, but, combining with effect from education, additional educated employed adult member will decrease probability of falling into poverty.

To conclude, large households are more probable to be poor, but size effect is most negative for households with many children, while large retired households are in lower danger. For relative and subjective poverty negative effect from additional adult member can be compensated by the fact of employment and level of education, while for household that experiences nutrition poverty size effect overweighs. Consequently, large households that

experience nutrition poverty have low chances to exit it without help and should be subject to special attention of authorities.

The last block of individually specific characteristics that are included in our analysis is education. Table 4.3 shows marginal effects of increase in number of households' members that have higher, uncompleted higher or professional education.

Table 4.3

Marginal effects of households' level of education.

| Variable | Marginal effects | | | |
|--------------|------------------|-------------|-------------------|--------------------|
| | Relative poverty | | Nutrition poverty | Subjective poverty |
| | Non-extreme | Extreme | | |
| Higher | -.057932*** | -.070305*** | -.00083 | -.07179*** |
| Uncompleted | -.031780*** | -.043272*** | -.00397 | -.01967*** |
| Professional | -.015483** | -.004826 | .007582 | -.01319* |

Effect of education reveals to be significant for exiting relative and subjective poverty, while probability to exit nutrition poverty is not sensitive to the education of the households' members. In case of education significance, higher education has the highest return, followed by uncompleted higher and lowest return for professional education. Hence, government policy that contributes to the increasing of the level of education would be poverty

reducing. However, it should be remembered that such policy doesn't influence the most dangerous kind poverty – nutrition one.

The block of macroeconomic variables includes the size of the settlement and rate of growth in region's value added for the period 1996-2002 years. Table 4.4 shows marginal effects for these variables.

Table 4.4

Marginal effects for macroeconomic variables

| Variable | Marginal effects | | | |
|-----------------------|------------------|-----------|-------------------|--------------------|
| | Relative poverty | | Nutrition poverty | Subjective poverty |
| | Non-extreme | Extreme | | |
| Rate of Growth in GVA | -.0488066 | -.0646585 | -.0668862 | -.0309913 |
| Big city | -.1065203 | -.1040411 | -.0419691 | .0381374 |
| Small town | -.1017791 | -.0925238 | -.0417244 | .0605154 |

Economic growth positively influences the probability to exit any kind of poverty. Comparing with returns for other factors, general economic growth becomes very important for nutrition poverty reduction.

Coefficients before type of settlement shows that relative and nutrition poverty tend to be lower in big cities or towns comparing with countryside; however, living in rural area reduces probability of subjective poverty –

households that live in towns are more probable to identify themselves with poor.

Chapter 5

CONCLUSIONS

The goal of current research was analysis of poverty in Ukraine and determining household's characteristics that influence probability for household to fall into poverty.

Data used for analysis is representative for the whole territory of Ukraine and is collected by the Derzhkomstat; this assumes the high quality of data.

For the purpose of analysis we defined three different poverty specifications: relative poverty, nutrition poverty and subjective poverty. Analysis of sets households, that are poor according to these specifications, showed that correlation between different kinds of poverty is low, that is poverty in Ukraine is not homogenous; this finding is consistent with previously done studies for transition countries.

All tree specifications were regressed on the set of household specifically characteristics. Results of estimations showed that for all poverty specification large households with low level of education and presence of unemployed members are in most danger of poverty. Probability of being poor decreases with the economic growth in the region, with improvement in employment status of household's members, and with increase in in-kind production.

However, despite the same direction of the influence of the chosen factors on the different kinds of poverty, the difference in the size of the coefficients suggests that different policies would be more efficient for the diminishing of the concrete poverty specification.

The most dangerous kind of poverty – nutrition – is most probable to be found in large households that have many children. Due to low child labor force productivity, negative effect from increase in size is not compensated by higher labor market participation. Due to high dependence ratio, it is very hard to increase well-being of such households by additional training or employment of adult members. But promotion of in-kind production allows children participation in production and was found to be efficient way to influence nutrition poverty. However, such families should be subject to social assistance, otherwise, household can be locked in poverty. This assistance would not be persistent, since nutrition poverty was found to be highly responsive to economic growth; hence, stable economic development would help to diminish this kind of poverty.

Large households were also found to be subject to higher risk of relative poverty. But negative effect from additional adult member of household can be compensated by positive effect from increase of household's participation in labor market. Positive effect is stronger for highly educated individuals. In-kind

production was found to be significant for the extreme poverty, while for non-extreme poverty developed labor market is more important.

Analysis of the return on employment in different sectors of economy revealed low productivity of agricultural sector. Since 15% of officially employed individuals and 10% of potential labor force are employed in this sector, increase in its productivity would have significant positive effect on all kinds of poverty, specified in research.

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Annex A.

Table A.1

Required energy consumption, in kilo calories

| Age | Required energy consumption | | | |
|--------------|-----------------------------|-----------------------|----------|-----------------------|
| | Man | | Woman | |
| | Big city | Small town or village | Big city | Small town or village |
| 14-17 | 3160 | | 2760 | |
| 18-60 | 3050 | 3250 | 2590 | 2790 |
| 60-70 | 2350 | 2500 | 2100 | 2200 |
| More than 70 | 2200 | | 2000 | |

Table A.2

Required energy consumption, in kilo calories

| age | Required energy consumption |
|-------|-----------------------------|
| 0.5-1 | 800 |
| 1-1.5 | 1330 |
| 3-4 | 1800 |
| 5-6 | 1990 |
| 7-10 | 2380 |
| 11-13 | 2860 |

Source: Russia Minister of Health Care.

Annex B.

Table B.1

Regional distribution

| | Freq. | Percent |
|------------------|-------|---------|
| Crimea | 416 | 4.42 |
| Vinnitska | 412 | 4.37 |
| Volynska | 256 | 2.72 |
| Dnipropetrovska | 632 | 6.71 |
| Donetska | 834 | 8.85 |
| Zhytomyrska | 300 | 3.18 |
| Ivano-Frankivska | 295 | 3.13 |
| Zakarpatska | 326 | 3.46 |
| Zaporizka | 290 | 3.08 |
| Kyivska | 328 | 3.48 |
| Kyrovogradska | 257 | 2.73 |
| Luganska | 527 | 5.59 |
| Lvivska | 530 | 5.63 |
| Mykolaiivska | 287 | 3.05 |
| Odeska | 397 | 4.21 |
| Poltavska | 341 | 3.62 |
| Rivenska | 232 | 2.46 |
| Sumska | 286 | 3.04 |
| Ternopil'ska | 216 | 2.29 |
| Harkivska | 435 | 4.62 |
| Hersonska | 248 | 2.63 |
| Hmelnytska | 272 | 2.89 |
| Cherkaska | 361 | 3.83 |
| Chernivetska | 194 | 2.06 |
| Chernigivska | 313 | 3.32 |
| Sevastopol | 369 | 3.92 |
| Kyiv | 68 | 0.72 |

Table B.2

Type of settlement distribution

| Type of settlement | Freq. | Percent |
|--------------------|-------|---------|
| Big city | 3,275 | 34.76 |
| Small town | 2,778 | 29.48 |
| Village | 3,369 | 35.76 |

Table B.3

Descriptive statistics

| Variable | Mean | Std. Dev. | Min | Max |
|--|----------|-----------|-----------|----------|
| Rate of growth of Gross Value Added | 2.512411 | .7847105 | 1.77 | 6.1 |
| Age of the head of the household | 54.84239 | 15.8984 | 14 | 101 |
| log(In-kind production in big city, hrn) | .4964068 | 1.475592 | -2.184802 | 7.716238 |
| log(In-kind production in small town, hrn) | 1.093104 | 2.221754 | -2.207275 | 7.791862 |
| log(In-kind production in village, hrn_ | 2.394649 | 3.389671 | 0 | 9.679993 |

Table B.4

Number of children in the households.

| Number of children | Freq. | Percent |
|--------------------|-------|---------|
| 0 | 5,900 | 62.62 |
| 1 | 2,231 | 23.68 |
| 2 | 1,107 | 11.75 |
| 3 | 141 | 1.50 |
| 4 | 25 | 0.27 |
| 5 | 13 | 0.14 |
| 6 | 2 | 0.02 |
| 7 | 2 | 0.02 |
| 8 | 1 | 0.01 |

Table B.5

Number of adult women

| Number of adult women | Freq. | Percent |
|-----------------------|-------|---------|
| 0 | 3,942 | 41.84 |
| 1 | 4,542 | 48.21 |
| 2 | 866 | 9.19 |
| 3 | 70 | 0.74 |
| 4 | 2 | 0.02 |

Table B.6

Number of adult men

| Number of adult men | Freq. | Percent |
|---------------------|-------|---------|
| 0 | 4,384 | 46.53 |
| 1 | 4,141 | 43.95 |
| 2 | 806 | 8.55 |
| 3 | 89 | 0.94 |
| 4 | 2 | 0.02 |

Table B.7

Number of elder people

| Number of elder people | Freq. | Percent |
|------------------------|-------|---------|
| 0 | 4,540 | 48.19 |
| 1 | 3,136 | 33.28 |
| 2 | 1,684 | 17.87 |
| 3 | 61 | 0.65 |
| 4 | 1 | 0.01 |

Table B.8

Gender of the head of the household

| Gender of the had of the household | Freq. | Percent |
|------------------------------------|-------|---------|
| man | 4,222 | 44.81 |
| women | 5,200 | 55.19 |

Table B.9

Distribution of the level of education

| Level of education | Number of people older than 25 years | Percent |
|--------------------|--------------------------------------|---------|
| High | 2546 | 13.25 |
| Uncompleted | 3873 | 20 |
| Professional | 2725 | 14.2 |
| Total | 9144 | 47.45 |

Table B.10

Presence of land plot

| Type of settlement | Number of households with land plots | Percent, to the number of households in the settlement |
|--------------------|--------------------------------------|--|
| Big city | 1022 | 31% |
| Small town | 1947 | 70% |
| Village | 3322 | 98.6% |

Table B.11

Presence of poultry

| Fact of presence | Freq. | Percent |
|--------------------|-------|---------|
| Poultry is present | 3949 | 41.91 |

Table B.12

Distribution of employed members for the sectors of economy.

| Sector | Freq. | Percent from employed | Percent from labor force |
|-------------------|-------|-----------------------|--------------------------|
| Primary sector | 1266 | 14.86 | 10 |
| Mining sector | 358 | 4.2 | 2.8 |
| Secondary sector | 1800 | 21.1 | 14.4 |
| Construction | 442 | 5.2 | 3.5 |
| Tertiary sector | 2064 | 24.2 | 16.5 |
| Government sector | 2265 | 26.6 | 18.1 |
| Services | 329 | 3.9 | 2.6 |
| | 8524 | | 68 |

Annex C.

Table C.1

Nutrition poverty probit estimates and marginal effects

Marginal effects after probit
 $y = \text{Pr}(\text{nutrition_poor})$ (predict)
 $= .18690886$

| coefficient | Probit estimator | t-statistics | Marginal effect |
|---|------------------|--------------|-----------------|
| Crimea | -.7737505 | -6.26 | -.1445615 |
| Vinnitska | -1.340158 | -9.66 | -.18809 |
| Volynska | -1.116294 | -7.97 | -.1710496 |
| Dnipropetrovska | -.83549 | -6.99 | -.1547578 |
| Donetska | -1.016142 | -9.07 | -.177309 |
| Zhytomyrska | -1.305322 | -8.28 | -.1826242 |
| Ivano-Frankivska | -.7047992 | -5.43 | -.1348695 |
| Zaporizka | -.7430281 | -5.31 | -.1398299 |
| Kyivska | -.6605763 | -4.74 | -.1297596 |
| Kyrovogradska | -.7345089 | -5.20 | -.1379618 |
| Luganska | -.9248252 | -7.04 | -.1621257 |
| Lvivska | -1.074924 | -8.72 | -.1751185 |
| Mykolaivska | -1.276438 | -9.05 | -.1808195 |
| Odeska | -.9161851 | -7.48 | -.1588363 |
| Poltavska | -1.013409 | -7.21 | -.1659065 |
| Rivenska | -1.107686 | -7.38 | -.1698913 |
| Sumska | -.6913582 | -4.82 | -.1331855 |
| Ternopil'ska | -.8242922 | -5.44 | -.1469655 |
| Harkivska | -.845099 | -6.57 | -.1525742 |
| Hersonska | -.8346479 | -5.81 | -.1484926 |
| Hmelnytska | -.5930911 | -4.00 | -.1201257 |
| Cherkaska | -.6185581 | -4.22 | -.1244649 |
| Chernivetska | -1.043866 | -6.47 | -.1647816 |
| Chernigivska | -1.22441 | -7.99 | -.1789501 |
| Sevastopol | -.7209557 | -3.47 | -.1340737 |
| Growth in Gross Value Added (1996-2001) | -.2489863 | -6.58 | -.0668862 |
| Allocation | | | |
| Big city | -.1597263 | -0.70 | -.0419691 |
| Small town | -.1600348 | -0.69 | -.0417244 |

| | | | |
|---|-----------|-------|-----------|
| Household structure | | | |
| Number of Children | .6497436 | 15.49 | .1745432 |
| Number of Women | .477485 | 13.26 | .1282687 |
| Number of Men | .4539373 | 13.21 | .121943 |
| Number of Elder | .1273018 | 3.43 | .0341976 |
| Age of the head | -.0078358 | -4.85 | -.002105 |
| Headed by woman | -.014203 | -0.41 | -.0038154 |
| Education | | | |
| Higher | -.0030955 | -0.10 | -.0008315 |
| Uncompleted | -.0147891 | -0.55 | -.0039729 |
| Professional | .0282268 | 0.99 | .0075827 |
| | | | |
| Number of rooms per capita | -.0138676 | -5.67 | -.0037253 |
| In-kind production | | | |
| Presence of Land plot for big city | -.0401255 | -0.50 | -.0107791 |
| Presence of Land plot for small town | .0358719 | 0.40 | .0096364 |
| Presence of Land plot for village | .1439338 | 0.61 | .0386655 |
| Presence of Poultry | -.1269181 | -2.28 | -.0337786 |
| In kind production in big city | -.077177 | -4.37 | -.0203879 |
| In kind production in small towns | -.0884191 | -5.34 | -.0232009 |
| In kind production in village | -.1083967 | -6.80 | -.0288573 |
| Employment (number of people employed) | | | |
| Primary sector | -.0805112 | -1.99 | -.021628 |
| Mining sector | -.246782 | -3.33 | -.066294 |
| Secondary sector | -.1476188 | -4.26 | -.0396554 |
| Construction | -.1732882 | -2.68 | -.0465511 |
| Tertiary sector | -.1134791 | -3.35 | -.0304843 |
| Government sector | -.0792284 | -2.29 | -.0212834 |
| Services | -.1067905 | -1.45 | -.0286876 |
| Future perspectives | -.0263337 | -1.01 | -.0070741 |
| Constant | .9805757 | 3.13 | |

Table C.2

Subjective poverty probit estimates and marginal effects

Marginal effects after probit

 $y = \text{Pr}(\text{subj})$ (predict) $= .84731157$

| coefficient | Probit estimator | t-statistics | Marginal effect |
|---|------------------|--------------|-----------------|
| Crimea | .0536658 | 0.35 | .0123443 |
| Vinnitska | -.3193499 | -2.10 | -.0864727 |
| Volynska | -.4924475 | -3.36 | -.1430128 |
| Dnipropetrovska | -.2634055 | -1.89 | -.0693633 |
| Donetska | -.1423245 | -1.08 | -.0355928 |
| Zhytomyrska | -.397261 | -2.25 | -.1112461 |
| Ivano-Frankivska | -.5221115 | -3.56 | -.1529767 |
| Zaporizka | .0238835 | 0.14 | .0055707 |
| Kyivska | -.9909045 | -6.35 | -.3279754 |
| Kyrovogradska | -.3374855 | -2.11 | -.0924713 |
| Luganska | -.3834498 | -2.48 | -.1059914 |
| Lvivska | -.5335396 | -3.75 | -.1553124 |
| Mykolaivska | -.60948 | -4.08 | -.1837738 |
| Odeska | -.27923 | -1.99 | -.0744439 |
| Poltavska | -.7735524 | -5.02 | -.2437852 |
| Rivenska | -.5427069 | -3.31 | -.1605214 |
| Sumska | -.5281489 | -3.22 | -.1550896 |
| Ternopil'ska | -.9521652 | -5.75 | -.3147066 |
| Harkivska | -.2496318 | -1.67 | -.0656953 |
| Hersonska | -.208356 | -1.23 | -.054112 |
| Hmelnytska | -.4927536 | -2.85 | -.1430241 |
| Cherkaska | -.1580329 | -0.89 | -.0400691 |
| Chernivetska | -.1259021 | -0.69 | -.0315408 |
| Chernigivska | -.2606072 | -1.50 | -.0691 |
| Sevastopol | .426597 | 1.78 | .0796758 |
| Growth in Gross Value Added (1996-2001) | -.131358 | -3.11 | -.0309913 |
| Allocation | | | |
| Big city | .1659254 | 1.42 | .0381374 |
| Small town | .2718728 | 2.27 | .0605154 |

| | | | |
|---|-----------|--------|-----------|
| Household structure | | | |
| Number of Children | -.0959278 | -1.62 | -.0226322 |
| Number of Women | .3304848 | 5.36 | .0779712 |
| Number of Men | .3554168 | 5.68 | .0838534 |
| Number of Elder | .2353544 | 3.88 | .0555271 |
| Age of the head | .0082688 | 5.06 | .0019509 |
| Headed by woman | .1272499 | 3.62 | .030022 |
| Education | | | |
| Higher | -.3042668 | -10.11 | -.0717856 |
| Uncompleted | -.0833909 | -2.92 | -.0196744 |
| Professional | -.055911 | -1.75 | -.0131911 |
| | | | |
| Number of rooms per capita | -.0072294 | -3.79 | -.0017056 |
| In-kind production | | | |
| Presence of Land plot | .173546 | 2.92 | .0409447 |
| Presence of Poultry | -.0812012 | -1.47 | -.0192869 |
| In kind production in big city | -.004349 | -0.30 | -.001026 |
| In kind production in small towns | .0457928 | 3.21 | .0108039 |
| In kind production in village | .0403215 | 2.72 | .009513 |
| Employment (number of people employed) | | | |
| Primary sector | -.1948555 | -4.30 | -.0459722 |
| Mining sector | -.4898449 | -6.66 | -.115569 |
| Secondary sector | -.3173791 | -8.55 | -.0748792 |
| Construction | -.3118584 | -4.70 | -.0735767 |
| Tertiary sector | -.3246314 | -8.80 | -.0765902 |
| Government sector | -.2413445 | -6.63 | -.0569403 |
| Services | -.158526 | -2.02 | -.037401 |
| Future perspectives | -.089132 | -3.46 | -.0210289 |
| Constant | .8389079 | 2.94 | |

Table C.3

Relative poverty, output 1, base category 0.

Marginal effects after mlogit

$$y = \Pr(\text{rel_poor}=1) \text{ (predict, outcome(1))}$$

$$= .12391321$$

| coefficient | Probit estimator | t-statistics | Marginal effect |
|---|------------------|--------------|-----------------|
| Crimea | -.908175 | -3.79 | -.0674159 |
| Vinnitska | -1.444605 | -5.61 | -.0923063 |
| Volynska | -.7453169 | -3.04 | -.0569983 |
| Dnipropetrovska | -1.296066 | -5.46 | -.0884877 |
| Donetska | -1.06323 | -4.93 | -.077434 |
| Zhytomyrska | -2.001651 | -6.41 | -.1080695 |
| Ivano-Frankivska | -.8369971 | -3.40 | -.0621426 |
| Zaporizka | -1.076073 | -3.94 | -.0753465 |
| Kyivska | -1.395539 | -5.0 | -.0898724 |
| Kyrovogradska | -.906738 | -3.36 | -.067059 |
| Luganska | -1.126996 | -4.40 | -.0797222 |
| Lvivska | -1.693963 | -6.83 | -.1022551 |
| Mykolaivska | -2.003742 | -6.69 | -.10799 |
| Odeska | -1.239866 | -5.13 | -.0842486 |
| Poltavska | -1.103079 | -4.20 | -.076522 |
| Rivenska | -1.067309 | -3.80 | -.0749673 |
| Sumska | -1.106409 | -3.94 | -.077945 |
| Ternopil'ska | -1.694772 | -5.51 | -.0987966 |
| Harkivska | -1.871372 | -6.84 | -.1071133 |
| Hersonska | -1.344938 | -4.66 | -.0874154 |
| Hmelnytska | -1.218302 | -4.16 | -.082353 |
| Cherkaska | -1.511489 | -5.11 | -.09454 |
| Chernivetska | -.8990689 | -3.16 | -.0649526 |
| Chernigivska | -1.385217 | -4.86 | -.0892364 |
| Sevastopol | -3.065056 | -2.99 | -.1187711 |
| Growth in Gross Value Added (1996-2001) | -.537406 | -5.90 | -.0488066 |
| Allocation | | | |
| Big city | -1.261132 | -3.00 | -.1065203 |
| Small town | -1.237423 | -2.90 | -.1017791 |
| Household structure | | | |
| Size squared | .0364226 | 2.48 | .0037726 |
| Number of Children | .1700544 | 1.39 | .0144906 |
| Number of Women | .1492308 | 1.21 | .0110952 |

| | | | |
|---|-----------|-------|-----------|
| Number of Men | .2645562 | 2.14 | .0216128 |
| Number of Elder | -.010481 | -0.09 | -.0015194 |
| Age of the head | .0158012 | 4.84 | .0014731 |
| Headed by woman | .2605919 | 3.66 | .0265081 |
| Education | | | |
| Higher | -.6297363 | -8.11 | -.0579322 |
| Uncompleted | -.3514105 | -5.99 | -.0317804 |
| Professional | -.1506417 | -2.40 | -.0154831 |
| | | | |
| Number of rooms per capita | -.0201772 | -4.84 | -.0017817 |
| In-kind production | | | |
| Presence of Land plot for big city | .300056 | 1.74 | .0270188 |
| Presence of Land plot for small town | .5741101 | 3.21 | .0530731 |
| Presence of Land plot for village | .0186999 | 0.04 | -.005321 |
| Presence of Poultry | -.2210086 | -2.14 | -.0152869 |
| In kind production in big city | -.0925273 | -2.47 | -.0077196 |
| In kind production in small towns | -.0979429 | -3.15 | -.0089074 |
| In kind production in village | -.1772034 | -6.00 | -.0163689 |
| Employment (number of people employed) | | | |
| Primary sector | -.2712417 | -3.13 | -.0262933 |
| Mining sector | -.7828496 | -4.36 | -.0707341 |
| Secondary sector | -.4328219 | -5.31 | -.0396354 |
| Construction | -.3081422 | -2.02 | -.0295521 |
| Tertiary sector | -.5322311 | -6.40 | -.050808 |
| Government sector | -.418637 | -5.10 | -.0375644 |
| Services | -.4373922 | -2.33 | -.0415276 |
| Future perspectives | -.119289 | -2.16 | -.0084169 |
| Constant | 1.461442 | 2.27 | |

Table C.4

Relative poverty, output 2, base category 0.

Marginal effects after mlogit

y = Pr(rel_poor==2) (predict, outcome(2))

= .08554572

| coefficient | Probit estimator | t-statistics | Marginal effect |
|---|------------------|--------------|-----------------|
| Crimea | -1.446724 | -6.24 | -.065384 |
| Vinnitska | -2.311571 | -8.49 | -.0817596 |
| Volynska | -1.366036 | -5.32 | -.0623329 |
| Dnipropetrovska | -1.735643 | -7.46 | -.073993 |
| Donetska | -1.839972 | -8.39 | -.0792627 |
| Zhytomyrska | -2.766499 | -8.82 | -.0847342 |
| Ivano-Frankivska | -1.802776 | -6.66 | -.0723763 |
| Zaporizka | -2.097927 | -7.29 | -.0776252 |
| Kyivska | -2.046342 | -7.25 | -.0765085 |
| Kyrovogradska | -1.270969 | -4.78 | -.0593552 |
| Luganska | -1.593304 | -6.32 | -.0697415 |
| Lvivska | -2.776815 | -10.43 | -.0898193 |
| Mykolaivska | -2.617905 | -8.89 | -.0829938 |
| Odeska | -1.643656 | -7.12 | -.0695798 |
| Poltavska | -2.367066 | -8.05 | -.0816523 |
| Rivenska | -1.643528 | -5.78 | -.0682529 |
| Sumska | -1.175625 | -4.43 | -.0562033 |
| Ternopil'ska | -2.429971 | -7.76 | -.0798826 |
| Harkivska | -2.188331 | -8.40 | -.0798516 |
| Hersonska | -1.788992 | -6.44 | -.0710438 |
| Hmelnytska | -1.666276 | -5.69 | -.0689309 |
| Cherkaska | -2.120668 | -7.14 | -.0780496 |
| Chernivetska | -2.41653 | -6.79 | -.0798741 |
| Chernigivska | -2.15421 | -7.39 | -.0780005 |
| Sevastopol | -2.594227 | -3.42 | -.0786725 |
| Growth in Gross Value Added (1996-2001) | -.8993645 | -7.82 | -.0646585 |
| Allocation | | | |
| Big city | -1.708439 | -4.27 | -.1040411 |

| | | | |
|---|-----------|--------|-----------|
| Small town | -1.607175 | -3.93 | -.0925238 |
| Household structure | | | |
| Size squared | .0171121 | 1.12 | .0009525 |
| Number of Children | .3745449 | 2.89 | .0274972 |
| Number of Women | .4816058 | 3.71 | .036093 |
| Number of Men | .6704629 | 5.19 | .0496444 |
| Number of Elder | .0359973 | 0.28 | .0029271 |
| Age of the head | .022858 | 6.52 | .0016206 |
| Headed by woman | .1680527 | 2.23 | .010384 |
| Education | | | |
| Higher | -.9840528 | -10.22 | -.0703048 |
| Uncompleted | -.6007696 | -9.17 | -.0432718 |
| Professional | -.0821049 | -1.35 | -.004826 |
| | | | |
| Number of rooms per capita | -.0385544 | -7.61 | -.0028021 |
| In-kind production | | | |
| Presence of Land plot for big city | .5240327 | 2.80 | .0378132 |
| Presence of Land plot for small town | .8727696 | 4.74 | .062189 |
| Presence of Land plot for village | .6934749 | 1.69 | .0540507 |
| Presence of Poultry | -.8336422 | -7.69 | -.0604332 |
| In kind production in big city | -.2193383 | -4.94 | -.0161775 |
| In kind production in small towns | -.1627513 | -4.98 | -.0116934 |
| In kind production in village | -.2705637 | -9.71 | -.0192872 |
| Employment (number of people employed) | | | |
| Primary sector | -.2973834 | -3.65 | -.0203884 |
| Mining sector | -1.344408 | -6.07 | -.0968715 |
| Secondary sector | -.6934937 | -8.00 | -.0496624 |
| Construction | -.3678592 | -2.45 | -.0255104 |
| Tertiary sector | -.6575593 | -7.74 | -.0457975 |
| Government sector | -.7435911 | -7.88 | -.0537317 |
| Services | -.5617912 | -2.77 | -.0393111 |

| | | | |
|---------------------|----------|-------|-----------|
| Future perspectives | -4276315 | -6.94 | -.0321881 |
| Constant | 3.767504 | 5.63 | |

Table B.5

Relative poverty, output 2, base category 1.

Marginal effects after mlogit

$$y = \Pr(\text{rel_poor}=2) \text{ (predict, outcome(2))}$$

$$= .08554572$$

| coefficient | Probit estimator | t-statistics | Marginal effect |
|---|------------------|--------------|-----------------|
| Crimea | -.5385494 | -2.02 | -.065384 |
| Vinnitska | -.8669658 | -2.76 | -.0817596 |
| Volynska | -.6207188 | -2.13 | -.0623329 |
| Dnipropetrovska | -.439577 | -1.61 | -.073993 |
| Donetska | -.7767428 | -3.09 | -.0792627 |
| Zhytomyrska | -.7648483 | -2.04 | -.0847342 |
| Ivano-Frankivska | -.9657786 | -3.20 | -.0723763 |
| Zaporizka | -1.021854 | -3.11 | -.0776252 |
| Kyivska | -.650803 | -1.96 | -.0765085 |
| Kyrovogradska | -.3642313 | -1.17 | -.0593552 |
| Luganska | -.4663076 | -1.60 | -.0697415 |
| Lvivska | -1.082852 | -3.54 | -.0898193 |
| Mykolaiivska | -.6141629 | -1.70 | -.0829938 |
| Odeska | -.4037896 | -1.48 | -.0695798 |
| Poltavska | -1.263987 | -3.82 | -.0816523 |
| Rivenska | -.5762184 | -1.76 | -.0682529 |
| Sumska | -.0692159 | -0.22 | -.0562033 |
| Ternopil'ska | -.7351994 | -1.99 | -.0798826 |
| Harkivska | -.3169592 | -0.99 | -.0798516 |
| Hersonska | -.4440546 | -1.34 | -.0710438 |
| Hmelnytska | -.4479741 | -1.32 | -.0689309 |
| Cherkaska | -.609178 | -1.74 | -.0780496 |
| Chernivetska | -1.517461 | -3.88 | -.0798741 |
| Chernigivska | -.7689924 | -2.27 | -.0780005 |
| Sevastopol | .4708285 | 0.38 | -.0786725 |
| Growth in Gross Value Added (1996-2001) | -.3619585 | -2.70 | -.0646585 |
| Allocation | | | |

| | | | |
|---|-----------|-------|-----------|
| big | -.4473064 | -1.01 | -.1040411 |
| Small | -.3697524 | -0.82 | -.0925238 |
| Household structure | | | |
| Size squared | -.0193106 | -1.37 | .0009525 |
| Number of Children | .2044906 | 1.51 | .0274972 |
| Number of Women | .3323749 | 2.41 | .036093 |
| Number of Men | .4059067 | 2.99 | .0496444 |
| Number of Elder | .0464784 | 0.34 | .0029271 |
| Age of the head | .0070568 | 1.70 | .0016206 |
| Headed by woman | -.0925392 | -1.02 | .010384 |
| Education | | | |
| High | -.3543165 | -3.07 | -.0703048 |
| Uncompleted | -.249359 | -3.17 | -.0432718 |
| Professional | .0685368 | 0.91 | -.004826 |
| | | | |
| Number of rooms per capita | -.0183772 | -3.09 | -.0028021 |
| In-kind production | | | |
| Presence of Land plot for big city | .2239766 | 0.98 | .0378132 |
| Presence of Land plot for small town | .2986595 | 1.33 | .062189 |
| Presence of Land plot for village | .674775 | 1.48 | .0540507 |
| Presence of Poultry | -.6126336 | -4.70 | -.0604332 |
| In kind production in big city | -.1268109 | -2.38 | -.0161775 |
| In kind production in small towns | -.0648084 | -1.65 | -.0116934 |
| In kind production in village | -.0933603 | -2.93 | -.0192872 |
| Employment (number of people employed) | | | |
| Primary sector | -.0261417 | -0.26 | -.0203884 |
| Mining sector | -.5615581 | -2.14 | -.0968715 |
| Secondary sector | -.2606718 | -2.47 | -.0496624 |
| Construction | -.059717 | -0.32 | -.0255104 |
| Tertiary sector | -.1253282 | -1.18 | -.0457975 |
| Government sector | -.3249541 | -2.90 | -.0537317 |

| | | | |
|---------------------|-----------|-------|-----------|
| Services | -1.24399 | -0.49 | -.0393111 |
| Future perspectives | -.3083425 | -4.19 | -.0321881 |
| Constant | 2.306062 | 3.06 | |

