INCOME MOBILITY 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)

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Program to Offer Degree — Authorized Master's Program in Economics

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Date _____

National University "Kyiv-Mohyla Academy"

Abstract

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The study is devoted to the analysis of income mobility in Ukraine. The issue of income mobility is examined on both macro and microeconomic levels using a number of statistic and econometric tools. The findings of the study include the analysis of mobility direction, mobility intensity, the behaviour of income movements of people in different income intervals, and the adjustment of different individual skills and characteristics in the transition period.

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ACKNOWLEDGMENTS

The author wishes to thank his thesis adviser Larysa Krasnikova for invaluable help and support in writing the research. Also, the author would like to express gratitude to Professors Tom Coupé for his particular help with data processing and econometric estimation and Andriy Bodnaruk for his sound comments concerning presenting the material.

Chapter 1

INTRODUCTION

The transition that Central and Eastern European economies undergo is by no means limited by the transformation of their production patterns and the establishment of market institutions, which can be relatively easily captured by economic statistics. The transition process affects the behaviour of people who suddenly find themselves in totally different economic and social situation. This research explores the people's response to the transition. More specifically, this research focuses on income mobility of Ukrainians.

High income mobility and substantial income inequality can roughly be associated with efficient economic system in which economic agents successively reap their factor rents. If people have specific highly demanded skills, then they can expect to be generously remunerated for their skills in that type of economy. Furthermore, if people suddenly lose their skills, they will be immediately forced to the low end of the income distribution. However, if a country sacrifices efficiency in the name of social equity, economic agents will be deprived of the part of their factor income in order to support those who are in the trouble. The main goal of the former USSR social policy was to eliminate poverty, i.e. to maintain relatively high minimum wage. Obviously, being an inefficient economy with a large military sector, the USSR could achieve this goal only by a substantial

redistribution of factor incomes from skilled to unskilled people. Hence, income inequality was low. Further, in the situation of fairly small wage differentials, the amount of salary could not be a good motivating factor. Instead, people could enjoy gradual career growth which guaranteed a certain set of benefits at their retiring age. Consequently, almost all people could enjoy some little increments to their wages but the level of relative income mobility was very low.

The transition introduced market forces in the remuneration process which influenced the level of income mobility in Ukraine. However, we did not encounter any paper which deals with income mobility in Ukraine in a direct way so we believe that this research is the first comprehensive attempt to analyse the income mobility pattern for Ukraine.

Effective transition implies considerable level of income mobility which stems from the adjustment and reallocation processes. Relatively high level of income mobility in Ukraine would indicate that Ukrainian economy adjusts (or adjusted) to the new state.

High income mobility levels out the poor and the rich in the long run, and thus it enhances equity which might be beneficial for the society (see, for example, Aaberge et al. (2002)). Thus, in the presence of high income mobility, any level of income inequality is perceived by the society less painfully. Further, income mobility increases efficiency in the society because it implies quicker response to any external shock.

We are also interested in the comparison of the Ukrainian income mobility level to those of developed countries (see, for example, Kuhl (2003) who compares the levels of income mobility between different European countries).

Besides this, the exploration of income mobility constitutes another approach towards the research of the structure of labour market in Ukraine. More specifically, it will help to identify non-competing groups of workers (if any) and possible stratification criteria which limit inter-group income mobility. For example, elder people who are engaged in the agriculture sector or who have obtained technical education are not likely to perform stable upward mobility patterns. The identification of these criteria is useful for the elaboration of efficient social and labour market policies. Further, the analysis of income mobility could help to outline the individual factors, which are important for the upward income mobility in the period of transition.

We are going to use the Ukrainian Longitudinal Individual Survey, which contains the data needed for our research. The Survey contains the information on the incomes of individuals in 1986, 1991, and 1997 through 2003. The main problem with this data set is the recall bias that results from the fact that the data for the years 1986 through 2001 were formed retrospectively.

Chapter 2

LITERATURE REVIEW

The issue of income mobility has been the subject of fundamental research. Initially, the studies of income mobility that were carried out in the 60's and 70's aimed to explain the existing inequality patterns in the society. The main question that was implicitly raised in those studies concerned the possibility (or impossibility) of people to exert a substantial influence on their social position in the society.

This intellectual discussion was heated up by different social tensions, e.g. blacks vs. whites or women vs. men. Two conflicting streams of thought were given birth as a result of this discussion. On the one hand, stratification models adherents suggested that the society assumed a dominating role in determining a person's social status; on the other hand, human capital theorists believed that people make their life themselves.

Despite the apparent heterogeneity of the stratification models, one general conclusion may be drawn. The stratification models suggest that the society creates a number of deeply rooted barriers that restrict social and income mobility. Moreover, these barriers are traditionally seen as the cause of the decrease in a general economic efficiency. Thus, the models of stratification emphasise the binding role of a society, which restricts the income mobility.

Krueger (1963) points to the economic benefits for the majority from a minority discrimination policy. She asserts also that the possibility for a minority to resist is fairly limited. Roughly the same conclusion follows from the paper of Bergmann (1971) who claims that Afro-Americans are likely to be crowded out into low-paid occupations as a result of the unwillingness of white people to provide them with prestigious jobs.

The racial issue is not the only approach underlying the stratification models. In his paper "Understanding Unequal Economic Opportunity", Bowles (1973) argues that the inequality of economic opportunity stems from the differences in the type of family life and schooling system. According to this research these two institutions perpetuate the economic inequality "from generation to generation". Hence, only little relative mobility is to be observed.

Another approach to explain the stratification nature of labour markets is to assume the so-called duality barrier. According to this approach, the people who did not manage to overcome this barrier will find themselves unwelcome to prestigious jobs and so they will be forced to search a job in a "secondary" sector. At the same time the lucky people will enjoy the possibility to be employed in a "primary" sector. There is no absolute consensus among the adherents of dual labour market about the nature of the duality barrier. Nonetheless, it was empirically demonstrated that this barrier existed not only in the strictly structured labour market of the USA but also in the countries like the UK. For example, Bosanquet and Doeringer (1973) claim that British "primary" workers

had higher earnings and lower mobility than "secondary" workers who were constantly looking for better job but were incapable of finding one.

The hypothesis of the existence of significant social or economic barriers can be effectively tested if the income ranking of children is compared with the ranking of their parents. This approach was not applicable until recent time because of the lack of appropriate data. The first attempts to estimate the intergenerational income mobility seemed to reject the hypothesis that the income ranking is prescribed to people at the moment of their birth. For example, Behrmann and Taubman (1985) estimated the intergenerational earnings mobility for the USA and they found small though statistically significant correlation (which was estimated to be no greater than 0.2). Becker (1988) found the earnings to be strongly regressed to the mean between fathers and sons, and that this conclusion relates to a very broad number of countries. In his opinion, parents' abilities to earn money can be hardly transmitted to their children. However, starting from the early 90's most economists come to the conclusion that intergenerational mobility is substantially limited. For example, Corcoran at al. (1990) made the effort to eliminate the estimation bias that was popping up in the regressions of intergenerational income mobility because of the errors-in-variables problems. In order to resolve this problem, they carried out the analysis-of-variance technique and they separated the transitory from permanent variation, which gave them the estimate of 0.45 for the brother correlation in the permanent component of log earnings. This estimate is much higher than the

estimates of brother correlation which included both transitory and permanent variation components. To sum up, Corcoran at al. point to significant underestimation of the influence of family and community background on economic status in previous studies. According to this paper, the children's economic outcomes can be successfully explained by such factors as parental income, race, and initial welfare.

Dearden et al. (1997) explored the intergenerational earnings mobility in the UK. In general, the UK is considered to be similar to the USA in terms of income inequality and economic mobility patterns (see, for instance, Gottschalk (1997)). So, one would expect that the study of the intergenerational mobility in the UK would be in close resemblance with that carried out for the USA by Behrmann and Taubman in 1985. However, the evidence presented in the paper is out of tune with the above paper. Dearden et al. came to the conclusion about the limited character of intergenerational mobility expressed in terms of earnings and education. Also, the authors concluded that the up-to-down earnings mobility from higher cohorts is less likely than the upward mobility from the bottom cohorts.

The development of human capital (HC) models, on the contrary to stratification models, fits very well into the framework of strong individualistic behaviour. The HC models focus on the maximisation behaviour of individuals who try to maximise their present value earnings. People decide to invest in and to accumulate their HC today in order to reap the benefits of increased incomes

tomorrow. The individuals will intensively invest in their HC only in the early stages of their lives. As they get older the return on their investment will decrease. Johnson (1970) explored the hypothesis of the decreasing profile of the HC investment along the lifetime if measured as the proportion of the earning capacity. He proposed the following schedule for the level of the HC investment: at the beginning the individuals will forego their entire earning capacity on the behalf of education, or put differently, they will focus on investment only. As they start working they will forego less then 100% and this share will decrease in a linear fashion up until the point of their death at which this share will be equal to zero. Haley (1973) made the attempt to estimate the investment profile of a typical individual along her life that was put forward by Johnson (1970). He presented the data that roughly support this framework. However, the decrease of the HC investment share did not prove to be at constant rate but rather at an increasing rate first and then with a considerable slowdown.

Lillard (1977) made another contribution to the HC theory. He managed to confirm with the data the basic prediction of HC theory: those individuals who presumably invested in their HC are likely to be compensated by higher earnings later on in the life.

So, according to the human capital theorists, the relative income mobility could be attributed to the amount of initial investment that took place before the individual entered a labour market. However, if everyone tried to maximise her present value earnings, all individuals would do the same sacrifices in terms of the

ratio of present consumption forgone and no income mobility would be observed.

This weak point was partly eliminated with the development of on-the-job training (OJT) variant of HC theory. The OJT framework regards the working experience as a valuable asset for getting promoted. In addition, the employees are believed to have different tastes and time preferences. Consequently, this framework ascribes the relative income rotation to the fact that different workers have different endowments. Hence, any crossovers within income rankings (i.e. upward or downward shifts) are easily justified. The above stream of thought can be found in Haley (1973) and Schiller (1977).

The paper of Schiller (1977) and that of Lillard and Willis (1978) can retrospectively be thought of as seminal works. They gave birth to transitional matrix approach and to econometric approach which are the two mainstream concepts in exploring income mobility.

Schiller (1977) made extensive use of longitudinal earnings data for the estimation of the intracohort income mobility within the transitional matrix approach. On doing this, Schiller came to the conclusion that roughly 70 percent of the male workers are mobile. High level of earnings mobility was observed both across the distribution of a specific age cohort and also it was observed throughout the lifetime.

Lillard and Willis (1978) presented the econometric methodology for the estimation of the dynamics of earnings distribution. The authors used the panel

data on log earning to derive the earnings function with the specific error structure, the so-called "autocorrelated individual component model". Assuming normality, they worked out the probability statements for individual's relative earnings.

The importance of the two above papers can hardly be overestimated. Since that time different researchers tended to integrate these approaches in order to get better understanding about both dynamics and causes of income mobility. For example, Jianakoplos and Menchik (1997) empirically estimated the change within the wealth distribution from 1966 through 1981 among American men and they also identified the factors that could explain this dynamics. The change within the distribution was explored by means of the transition matrices while the major determinants were found on the basis of the probit analysis. The overall conclusion of the study is that more than half of the Americans changed quintiles, 78% of the crossovers being to an adjacent quintile.

The arsenal of the econometric tools that are being used for treating the issue of income mobility is constantly being enriched. Cowell (1998) suggested that the "two-stage" models of mobility should be used in the case of data contamination, for example, because of misprints. The "two-stage" models imply the following procedure of the data processing: in the first stage the distribution is "discretised" into income intervals and in the second stage different formal algorithms, such as transitional matrix analysis, is welcome.

One of the most recent studies made by Fields et al. (2002) introduces the technique for mobility dominance. The authors used the technique of first-order stochastic dominance to approach different mobility concepts:

- positional movement – the measure for the individual changes in quintile, decile, or rank position;
- share movement – the measure for the individual changes in income share;
- income flux – the income variability and uncertainty measure which does not account for the direction of movement;

directional income movement – the measure which captures the amount of the individual income change and also distinguishes between positive and negative movements.

Fields et al. conclude that the former three mobility measures applied for the analysis of the behaviour of the US men reach its peaks in 1980-1985 while the dominance methods for the latter one proved to be inconclusive.

Kuhl (2003) proposed a theoretical model which relates relative income mobility to the relative changes in unemployment and GDP rates. The data examined, however, did not support the model, macroeconomic factors of income mobility being insignificant. International income mobility data that are presented in the paper (14 European countries) indicate to the dominance of individual country effects. The author comes to the conclusion that the focus on

studying of income mobility should be shifted to the remaining sets of determinants, namely to

- life-event factors – changes in income due to different life events, namely: getting married, finding or losing a job, bearing children etc.;
- individual factors – gender, age, type of education etc.;
- socio-economic factors – factors that can be attributed to the political system of a country, for example: legislation or migration barriers;
- transition factors – these are adjustment factors that are put in motion when the economy is in transition.

Starting from the early 90's, the issue of income mobility became of particular concern in transitional countries, too. Bogomolova and Tapilina (1999) focus on both macroeconomic and individual factors of income mobility in Russia. Roughly 60% of Russian households were considered as "highly mobile". Despite the fact that the income mobility studies were carried out in a very broad number of countries (e.g. Spain, Italy, Scandinavian countries, Argentina, Mexico, Russia etc.), no similar study for Ukraine was carried out. The reason behind this was the absence of a comprehensive longitudinal study of Ukrainian households.

Chapter 3

METHODOLOGY

Very straightforward way to draw preliminary conclusions about the nature of income mobility is to look at the association between observed incomes at periods *t* and *t+1*. This association can be seen by means of a number of analytical tools. We start with transition matrix approach. The number of people who belonged to j^{th} interval in time *t*, Y_j^t, is determined as follows:

$$Y_j^t = \sum_{i=1}^{q} P_{ij} Y_i^{t-1},$$

where P_{ij} is the percentage of those people who in time *t-1* found themselves in i^{th} income interval, Y_i^{t-1}, but moved to j^{th} interval in time *t*. The state of "no mobility" would occur if the main diagonals would be composed of ones only. On the contrary, the lower is the percentage of those who did not change their quintile, the smaller number is in the main diagonal boxes, and the higher mobility is.

A typical transition matrix in mobility analysis would contain 5, 10, or 20 income intervals. Due to data imperfection and low variability of data series we find it reasonable to divide income distribution into 5 quintiles. The division into 5 quintiles looks to be most frequently used by scientists who explore income mobility.

A useful extension of a mobility matrix is the analysis of mobility intensity. Here, we look at the movement of people across income quintiles. The formula for the computation of the percentage of people who stayed at the same quintile, moved 1, 2, 3, or 4 quintiles upward or downward is as follows:

$$p_{\Delta q,t,t+1} = \frac{n_{\Delta q,t,t+1}}{n_{t,t+1}},$$

where $n_{\Delta q,t,t+1}$ is the number of people who moved Δq quintiles upward or downward from the period *t* to the period *t+1*, and $n_{t,t+1}$ is the number of people who reported their incomes in both periods. High percentages of people who moved 3 or 4 quintiles upward and downward would mean that the society experiences high income turbulence. On the contrary, high percentages of people who moved 3 or 4 quintiles downward can be offset by even higher percentages of people who moved 1 or 2 quintiles upward. Thus, this knowledge is important in making inferences about the nature of income rotation.

The above presentations of transition probabilities and mobility intensity do not provide, however, the explicit link between mobility and income distribution. Therefore, we are also interested in the analytical tool that would help us to look at the changes of income distribution, or, put differently, at the changes of income inequality, over time as a result of income mobility. To look at income inequality, we construct "quintile mean / year mean" ratios:

$$r_{q,t} = \frac{\bar{y}_{q,t}}{\bar{y}_t}$$

The inferences about the changes of income inequality over time can be made through the comparison of the ratios of extreme quintiles: the ratio decrease in the poorest quintile and the ratio increase in the richest quintile would mean that the mobility increases inequality over time, and vice versa.

Finally, we can look at the chances of people with different income levels to quit their income category over time. For example, the chances of changing the income status for the people who were in the poorest and richest quintiles in the period *t* can be traced by the construction of Kaplan-Meier survival functions for these two categories. The formula is as follows:

$$k_{t+\tau}^{qt} = \frac{n_{t+\tau}^{qt}}{n_{t,t+\tau}},$$

where $n_{t+\tau}^{qt}$ is the number of people who were in quintile *q* in period *t* and stayed at that quintile in period $t+\tau$, and $n_{t,t+\tau}$ is the number of people who reported their incomes in both periods *t* and $t+\tau$. The steeper the schedule of Kaplan-Meier survival function is, the higher chances to change their income status the people have.

Being good visual aids, transition matrices, intensity analysis, "quintile mean / year mean" ratios, and Kaplan-Meier survival functions, however, are of little help if one wishes to compare the direction and the intensity of mobility across countries. Here, the use can be made out of the following mobility indexes: Spearmen's mobility index, Gini-Shorrocks mobility index, Prais-Shorrocks

mobility index, the normalised Bartholomew mobility index, Cramer's V index, and, finally, Fields and Ok mobility index.

The first two indexes are very simple in their logic though their computation can be sometimes practically unrealisable: these indexes require that all observations be strictly ranked in two adjacent periods. This task cannot be resolved in the case of the data that we have at our disposal because our data are apparently plagued by insufficient variability and thus they cannot be ranked. This is why we focus on the last four indexes that do not require strict ranking.

The Prais-Shorrocks mobility index is based on the transition matrix approach and it looks at the probability that a person will stay the same income interval over time. Let us denote the number of income intervals by *q*. The Prais-Shorrocks mobility index is computed as follows:

$$M_{PS} = \frac{1}{q-1}\sum_{j=1}^{q}\left(1 - p_{jj}\right),$$

p_{jj} being the survival probabilities that are located on the main diagonal of the transition matrix. The term $\frac{1}{q-1}$ is introduced for the normalisation. Hence, near-zero values of the Prais-Shorrocks index should be associated with low mobility intensity, and those that are close to unity point to high intensity.

The normalised Bartolomew mobility index is different from the Prais-Shorrocks index in that it focuses on the transition probabilities off the main diagonal. It can be calculated as follows:

$$M_{NB} = \frac{3}{q^2 - 1} \sum_{i=1}^{q} \sum_{j=1}^{q} p_{ij} |i - j| .$$

The Cramer's V index can be computed as follows:

$$M_C = 1 - \sqrt{\frac{\sum_{i=1}^{q} \sum_{j=1}^{q} \left[\frac{p_{ij}}{q} - q^{-2} \right]^2}{(q-1) q^{-2}}} .$$

The last two indexes are also normalised, and their interpretation is comparable to that of the Prais-Shorrocks index.

These indexes, however, cannot be considered to be consistent mobility indicators. This was proven by Fields and Ok (See, f.e. Fields et al (1996)), who systemised a number of properties that a consistent mobility indicator should possess. These are linear homogeneity, translation invariance, normalisation, strong decomposability, weak decomposability, population consistency, growth sensitivity, and individualistic contribution. Fields and Ok proposed their own mobility index, which satisfies all the above properties:

$$M_{FO} = \frac{\sum_{i=1}^{n} |\log x_i - \log y_i|}{n},$$

$\mathbf{x} = (x_1, x_2, ..., x_n)$ and $\mathbf{y} = (y_1, y_2, ..., y_n)$ being the distributions of incomes in ascending orders in periods *t* and *t+1*, respectively. A very useful property of the Fields and Ok index is the possibility of decomposition into transfer and growth components:

$$M_{FO} = K + T = \frac{1}{n}\sum_{i=1}^{n}(\log y_i - \log x_i) + \frac{2}{n}\sum_{i \in L}(\log x_i - \log y_i),$$

L being the subset of individuals who suffered the decrease in their incomes during two periods. The component K captures all transfers of income from those who suffered from income loss to those who enjoyed the increase in income, while the component T summarises the effect of economic growth and higher salaries per se.

The computation of the above mobility indexes is important because it allows for the comparison of mobility intensity across countries. The deeper insight into the nature of mobility in one specific country, however, can be achieved only by factor decomposition through constructing the relevant econometric model.

The character of the dataset justifies the separation of the analysis of mobility into two independent sections. The first section concerns long run mobility, which can be estimated for the periods 1986-1991, 1991-1997, and 1997-2002. This long run analysis permits to catch the changes in the factors that explain mobility during the whole time span. We use three separate regressions to estimate the coefficients of the model.

The use of the only model based on the observations from three time periods seems to be inferior to the estimation of three separate models because of two stated below problems.

The first problem is that the second time period contains 6 years while the first and the third periods contain only 5 years. If estimated separately, the coefficients of the second model can be multiplied by 5/6 to be comparable with those from the first and third periods.

The second problem is a fairly small number of people who reported their salaries in all four years: 1986, 1991, 1997, and 2002. If estimated separately, the total number of observations increases because the necessary condition for the person to be accounted is to report his or her incomes in two adjacent years only: 1986 and 1991, 1991 and 1997, or 1997 and 2002.

The second section concerns short run mobility. This analysis is based on the longitudinal estimation of mobility for the period 1997 to 2002. Only those people who reported their salaries in all 5 years were considered. This approach is by far more powerful in explaining the effects of the changes in explanatory variables. The increased number of observations for short run analysis (typically more then 10,000 in our specifications) permits to obtain more easily statistically significant coefficients, which are robust to specification modifications.

In our first section, we use OLS with robust estimates and in the longitudinal section we follow Aaberge et al. (2002) who estimated their parameters by using the Generalised Estimating Equations [GEE] approach, which is the longitudinal extension of FGLS and GLIM. The GEE technique is particularly powerful estimation if dependent variables are discrete, which is the case with our data. Further, the GEE estimates are robust to any misspecifications of the error structure, which is a useful practical property for the models involving a long list of variables. So, the model we estimate is of the following form:

$$m_{i;t,t+1} = \beta_0 + \overline{\mathrm{X}}_{i;t,t+1}\overline{\beta} + u_i + \varepsilon_{i;t,t+1},$$

$\overline{X}$ being the mobility determinants, and m being the individual mobility between the periods t and $t+1$. The traditionally accepted approach to computing m is:

$$m_{i;t,t+1} = rank_{i,t+1} - rank_{i,t}.$$

However, this approach is practically unrealisable if the income distribution cannot be strictly ranked. To fix this problem, several solutions have been suggested. For example, Aaberge et al. (2002) use the following formula for computing individual mobility:

$$m_{i,t,t+1} = \frac{y_{i,t+1}}{\bar{y}_{t+1}} - \frac{y_{i,t}}{\bar{y}_{i,t}},$$

where $y_{i,t}$ is the income received by the individual *i* in year *t*, and $\bar{y}_t$ is the income mean for the year *t*. Although this measure of mobility looks very intuitive and simple, we prefer to follow its modified version used by Bogomolova et al. (2002):

$$m_{i,t,t+1} = \log\left(\frac{y_{i,t+1}}{\bar{y}_{t+1}}\right) - \log\left(\frac{y_{i,t}}{\bar{y}_{i,t}}\right)$$

The inclusion of logarithms permits to smoothen big jumps in income levels, which is likely to happen in transition economies. Further, taking logarithms can normalise the skewed income distribution.

The determinants of individual income mobility are of very different nature. Firstly, income mobility is affected not only by income determinants themselves but also by the changes in these determinants, or, put differently, income mobility is affected by events. Further, as Regoli et al. (2003) notes, the determinants differ with respect to the nature of an event, f.e. demographic vs. income events. Finally, the division can be done with respect to the scientific polemics between the adherents of stratification and human capital models.

Chapter 4

DATA DESCRIPTION

In our analysis, we use the data from the Ukrainian Longitudinal Monitoring Survey (ULMS). The dataset contains the information about earnings over 8641 individuals and it covers the years 1986, 1991, and 1997 to 2002.

The dataset does not provide the information about individual incomes; instead, it contains the retrospective data on individual salaries. We will use the data on individual salaries as the proxy for individual incomes. The use of salaries instead of incomes is perfectly plausible for the soviet period from 1986 to 1991 because the entrepreneurship activity was efficiently restricted. Starting from 1991, the choice of salaries as the proxy for incomes is partially justified by the fact that salaries constitute the main part of incomes in Ukraine, while incomes from stocks, property, heritage, and the like seem to be fairly small empirically.

The factor that can substantially distort the true values of individual incomes is unreported salaries. However, to our best knowledge, there does not exist any credible dataset on "true" salaries in Ukraine.

The ULMS contains the data on salaries made in December of every observable year. However, not all individuals provided information for the whole range from 1986 through 2002. Normally only slightly more than two thousands

of respondents reported their salaries in any particular year, the response rate ranging from 45.41% in 1986 down to 23.54% in 2002.

The data provided are obviously plagued by the recall bias. This means that people were asked questions in 2003 about their salaries in 1986 and 1991. The natural reaction to such questions was two report round numbers, e.g 100 instead of 106, or 200 instead of 188. This defect is reflected in the low variability of salaries over time, which significantly reduces explanatory power of any econometric model constructed with these data.

Another problem that complicates the comparison of salaries is that they are recorded in different currencies: hryvnias, soviet roubles, US dollars, and German DM. To adjust currency values, we used experts' estimates for currency exchanges to convert all the money into roubles for the years 1986 and 1991 and into hryvnias for the years 1997 to 2002. For the soviet period from 1986 to 1991 we equated one US dollar to three roubles and one German DM to two roubles, which were the true exchange rates in the black market at those times. Although this transformation seems to be ambiguous, it is not likely to influence the general conclusions of the model because only 0.15% and 0.72% of respondents reported their salaries in US dollars and DM in the years 1986 and 1991, respectively. Starting from 1997, we used the Ukrainian National Bank official exchanges to transform any currency into hryvnias. These rates can be found in the Appendix in Table 17.

The ULMS covers the whole area of Ukraine with the maximum of 930 observations for Donetsk region, which is the biggest in population, and the minimum of 117 observations for Chernivtsi region, which has the smallest population in Ukraine. Further, the dataset is likely to capture the urban/rural structure of the Ukrainian population: f.e., 33,49% of respondents come from villages.

To explain mobility, we make use of four groups of factors, which can be referred as to stratification factors, human capital factors, social events, and industry dummies.

The stratification factors primarily include the individual characteristics that cannot be changed by the individuals themselves. These are *age*, *gender*, his or her inherited skills proxied by the *education of his or her parents*, and the *city* the individual lives in. The last factor, however, cannot be treated as completely predetermined at the individual's birth but we find it reasonable to treat it as a stratification factor because the city the individual was born in or lives in influences his or her motivation. Thus, it exercises exogenous effect onto individual mobility and can be thought of as a stratification factor.

All 8641 respondents covered by the study reported their age, gender, city, and the size of the city they live in, and 96.58% of individuals reported the education degree of their parents. The *age* mean for the year 1997 was 37 years and 3 months; however, this figure was accordingly 11 years lower for the year 1986 and 6 years lower for the year 1991. In all estimated models, we filtered out

those individuals who were younger than 21 or who were exactly 21 at the first period under study, be it 1986, 1991, or 1997. The standard deviation for the year 1997 was 16.61, and this figure is only marginally different from that for 1986 and 1991. In our models, we also used the square of age to capture the effect of aging.

The panalset contains 57.26% of women and accordingly 42.74% of men. The *city* is also a categorical variable, and it ranges from 1 to 6 according to the city size. The *city* mean is 3.32 and the standard deviation is 2.01. We also included the dummy for marking the living in Kiev, the Ukrainian capital. Only 5.18% of all respondents lived in Kiev, which perfectly reflects the Ukrainian population structure.

The last stratification factor is the *education of his or her parents*. We do not have data on the number of years of education for the parents; instead we have the data describing the highest level of education obtained by the parents. This categorical variable ranges from 1 (in case mother or father did not have any formal education) to 11 (in case they obtained the degree of candidate of sciences). We came to the conclusion that this is the mother whose degree of education influences the mobility the most. We will use only the mother's degree of education because the use of both mother's and father's degrees is not reasonable because of high collinearity between the two.

Human capital factors can be thought of as individual characteristics that are important for the employer. These include *education*, *type of education*, *experience*,

health, the dummy for having *training* on the job, dummies marking the knowledge of *English*, *German*, and *French*, and finally, the dummy for the use of *computer*.

The group of human capital factors is characterised by a considerably lower response ratio than that in the stratification group. For example, only 80.71% of respondents provided the information that is necessary for the estimation of their working experience, and only 65.33% of respondents reported the number of years of education obtained.

The variable *education* ranges from 0 to 9 depending on the number of years spent on education after graduating from school. The mean of education is 2.83 and the standard deviation is 1.45. To capture the decreasing (or increasing) returns to education, we also used the square of education.

Another individual characteristic related to education is the *type of education* obtained. We distinguished three types of higher education: vocational, professional, and bachelor-type education. These dummies for different types of education, however, are expected to be highly collinear with the variable denoting the number of years of education after graduating from school. To cope with this problem, we estimated separate regressions for these two alternatives.

The variable *experience* has the mean of 6.05 years and the standard deviation of 9.31 for 1986, the mean of 8.74 years and the standard deviation of 10.97 for 1991, and the mean of 12.62 and the standard deviation of 12.85 for 1997. Likewise with the *education*, both the explicit form and the *square of experience* are included to capture decreasing (or increasing) returns.

The *training* is a categorical variable. It takes the value of 1 if a person had a training course on his or her job and 0 otherwise. We used this variable only for the period 1997 through 2002 because only a minuscule fraction of respondents who had training reported to have it before 1997. The mean of training is 0.0692, which means that only 6.92% of individuals passed a training course.

Approximately 15.26% of respondents claimed to speak foreign language (only English, German, and French were taken into account), and 29.06% of respondents had access to computer. We did not use the dummy for computer for the periods 1986 to 1991 and 1992 to 1997 because the extensive use of computers in Ukraine must have started from the late 90's.

Finally, the variable *health* ranges from 1 to 4. This is the individual estimate of person's state of health. The mean of health is 2.04, and the standard deviation is 0.72.

We do not have very clear expectations about the expected signs and values of stratification and human capital factors because the coefficients near them reflect the changes of returns of these factors on individual mobility. We think, however, that the sigh near the *gender* will be negative to reflect the fact that women managed to catch up with men in terms of income they get. The effect of education is expected to be positive, which means that returns on education increased during the transition period.

Highly statistically coefficients in these two groups of factors would suggest that income mobility exercised a profound effect on people's incomes.

The third group of factors explaining mobility includes social events. These include marriage, the birth of child, and the dummy for the change of residence. We also included in this group the variable for the salary that the individual obtained in the period *t-1* to proxy his or her social status.

We distinguish *marriage* and *marital status*. Both variables are categorical. The *marriage* takes the value 1 if the individual got married during the period in which the mobility is estimated and 0 otherwise. The variable *marital status* takes the value 1 if is married and 0 otherwise. The child is the interaction between woman and the number of children born in the observed period. We focus on women only because the effect of the number of children born on the mobility of men proved to be insignificant in all specifications that we estimated.

The descriptive statistics for these three variables is specific for each period. For example, 7.96% of respondents got married from 1987 to 1991, 8.47% - from 1992 to 1997, and 6.79% - from 1998 to 2002. Further, the mean of the interaction child was 0.096 for the period 1987 to 1991, 0.052 for the period 1992 to 1997, and 0.056 for the period 1998 to 2002. In the longitudinal section, the mean of this interaction was 0.009, which is roughly one fifth of the mean for the cross-section model estimated for the period 1998 to 2002.

Finally, the last group of factors contains ten industry dummies in which the individual was engaged at the corresponding period of time. These are dummies for *Agriculture, hunting, and forestry*; *Manufacturing and mining*; *Electricity, gas, and water supply*; *Construction*; *Wholesale and retail trade*, *repair of motor vehicles and*

motorcycles; *hotels and restaurants*; *Transport, storage and communication*; *Financial intermediation*, *real estate*, *renting and business activities*; *Public administration and defence*; *Education, health and social work*; *Other community, social and personal service activities*. The descriptive statistics for these dummies as well as for all variables used in the models are provided in the Appendix in Tables 18, 22, 26, and 30.

Chapter 5

EMPIRICAL RESULTS

The empirical results that we obtained can be divided into statistic and econometric parts. We start with statistic part, which includes transition matrices, mobility intensity analysis, "quintile mean / year mean" ratios, Kaplan-Meier survival functions, and, finally, mobility indexes.

We constructed 3 transition matrices that cover the periods 1986-1991, 1991-1997, and 1997-2002 and 5 transition matrices for the periods 1997-1998 through 2001-2002. All transition matrices can be found in the Appendix Tables 3 through 10.

As can be seen from the Tables 3 to 5, the percentage of those who stayed at the same quintile drops from 58.88% (in the first period: 1986-1991) to 42.00% (in the second period: 1991-1997) and rises somewhat to 44.38% (in the third period: 1997-2002). These figures, however, cannot be directly compared because the second period contains 6 years, while the first and the third periods contain 5 years only. However, even with slight upward correction for the second period, it can be noted that the percentage of those who were immobile significantly drops in the 90's if compared with the late 80's.

Another feature that is worth our attention is very pronounced upward movements in the second period. For example, 10.32% of respondents who were

in the lowest (poorest) quintile in the year 1991 jumped to the highest (richest) quintile in the year 1997 and 11.11% of respondents jumped to the highest quintile from the second lowest quintile (compared to 1.99% and 5.98% for the first period, respectively). Less pronounced, but more intensive than in the first period, the downward movements in the second period indicate that the mid 90's were also the time of worse opportunities for the richest quintile: 23.55% of those who were in the richest quintile in 1991 found themselves among three lowest quintiles in 1997 (compared to 12.31% for the first period).

So, it can inferred that the mid 90's were the time of relatively high income turbulence, which decreased somewhat in the late 90's and the early years after 2000 but still it was higher in the third period than in the first.

The transition matrix for the soviet period points to a very large level of immobility of those who were in the richest quintile in 1986 (73.01% - the highest immobility rate across all cells in three matrices). This observation can be explained by a stable high level of income of those who belonged to "nomenklatura" in soviet times. As can be seen from the second transition matrix, the position of the richest quintile became much less stable (53.17%).

Finally, it can be observed that there was no sign of labour market duality in the second period but there is a slight sign of its formation in the third period. In the third period, the movements between the first and second quintiles looked chaotic, while the positions of top three quintiles seemed to be more stable: for example, the sum of those who were immobile in top three quintiles was

137.35% in the third period and it was only 121.77% in the second period in top quintiles. The asymmetric transition matrix for the period from 1997 to 2002 with higher mobility at low end of income distribution and lower mobility at its high end also supports the hypothesis of middle class formation, whose primary characteristic is stable incomes.

The mobility intensity analysis, which is presented in the Appendix in Tables 11 and 12, also supports the hypothesis of higher income turbulence in the mid 90's: the percentage of people who moved 2 and more quintiles upwards or downwards in the second period was 21.55% (compared with 11.51% and 13.44% for the first and third period, respectively).

The effect of mobility on income distribution can be captured by "quintile mean / year mean" ratios, presented in the Appendix in Table 13. From the Table 13, we can infer that as a result of mobility the income inequality increased in 1991 and decreased somewhat afterwards. The relative incomes of those in the lowest quintile decreased further to 39.64% in 2002 (compared to 44.52% in 1986 and 41.73% in 1991) and the relative incomes of those in the highest quintile increased in 1991 to 232.52% and decreased to 222.85% in 2002.

Two survival functions for the lowest and highest quintiles for the period 1998 through 2002 are presented in the Appendix in Figure 34. The schedule for the lowest quintile looks to be more steeper than that for the highest. This finding again supports our conclusion about gradual formation of the middle class in Ukraine and the dual nature of the Ukrainian labour market in the late

90's and the early years after 2000. Besides this, the analysis of these two survival functions shows that it is easier for a poor person to become rich than for the rich person to lose his or her high-income status.

The visual comparison of transition matrices for Ukraine and other countries, found in e.g. Bogomolova and Tapilina (1999) for Russia and Schiller (1977) for the United States, suggests that the amount of mobility in Ukraine is considerably smaller. The same conclusion may be drawn from the comparison of different mobility indexes that are based on transition matrices. For example, Tables 14 and 15 in the Appendix provide four mobility indexes: Prais-Schorrocks index, normalised Bartholomew index, Cramer's V index, and Fields and Ok index computed for Ukraine and for other countries that were found in Kuhl (2002) and Regoli et al.(2003). The values of the above mobility indexes for Ukraine are approximately twice as low as for Germany, France, UK, Spain, and Italy. Two possible explanations can be proposed to explain the phenomenon of relatively low mobility in Ukraine.

The first explanation is that salaries might be not a very good proxy for incomes. However, even this is the case, what matters for our analysis is not the salaries or incomes themselves but their variability. It is then unlikely that the variability of incomes in Ukraine is from approximately two times larger than that of salaries.

The second explanation stems from the fact that our data series are significantly plagued by the recall bias, which reduces the variability of salaries and

thus any mobility measure underestimates the true mobility level for Ukraine. The Fields and Ok decomposition made for Ukraine, which is presented in the Appendix in Table 16, provides the intuition behind lower mobility rates for Ukraine: the transfers component *T* for Ukraine was estimated to be 30.5% for the period 1997 to 1998, while the estimate of the transfers component *T* for Italy was approximately 61% in the period from 1993 to 2000 in Regoli et al. (2003), and it was estimated to be 85%-95% for other big European countries in the period from 1994 to 1998 in Ayala and Sastre (2002). This means that the recall bias erases the information about downward movements across quintiles, or, put differently, people are very reluctant to report the drops in their salaries over time.

Keeping this in mind, we switch to the econometric part of the empirical results section. The fact that the recall bias distorts the information on downward income movements makes useless the separate estimations of upward and downward mobility. This is why we will focus on the explaining of the aggregate mobility, which we measure as

$$m_{i,t,t+1} = \log\left(\frac{y_{i,t+1}}{\bar{y}_{t+1}}\right) - \log\left(\frac{y_{i,t}}{\bar{y}_{i,t}}\right).$$

Three OLS models with robust estimates have been estimated for the periods 1986-1991, 1991-1997, and 1997-2002, and one GEE model was estimated in the longitudinal section for the period 1997-2002. Each model includes two specifications: one with the variable *number of years of education*, and

another with the variable *type of education*. Each model was then refined to include only significant, marginally significant, or critically important variables suggested by previous studies. All nine specifications can be found in the Appendix in Tables 19 through 29.

The OLS models estimated for the periods 1986-1991, 1991-1997, and 1997-2002 proved to be of low explanatory power with R^2 ranging from 9.6% to 20.93% and fairly low z-statistics. This result comes with no surprise, however, because the constructed models lack intermediate data, e.g. for the years 1987, 1993, or 2000, and they were aimed at capturing only very common trends in explaining mobility during the last 16 years. These trends can be systematised after looking at refined versions of three models presented in the Appendix in Tables 21, 25, and 29. The general results are summarised in Table 1 and presented below:

Table 1: OLS General Results

Factors	1986-1991		1991-1997		1997-2002	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Stratification factors						
Gender	.0829569	0.000	-.0536404	0.084	nss	nss
City	.0090473	0.065	nss	nss	-.0205769	0.004
Kiev	-.1305054	0.003	nss	nss	nss	nss
Human capital factors						
Vocational education	.0445958	0.011	nss	nss	nss	nss
Professional education	nss	nss	nss	nss	.0895945	0.045
Bachelor education	nss	nss	nss	nss	-.1833296	0.112
English	nss	nss	nss	nss	nss	nss
German	nss	nss	nss	nss	.1569656	0.176
French	-.5359887	0.000	nss	nss	-.5555407	0.003
Computer	n/a	n/a	n/a	n/a	.0804599	0.115
Health	.0216578	0.098	nss	nss	nss	nss
Social events						
Residence change	-.068636	0.050	nss	nss	-.1552537	0.004
Salary (lag1)	-.0012539	0.000	-.0005007	0.002	-.0010116	0.000
Marriage	nss	nss	.1167272	0.124	.0823711	0.188
Industry dummies						
Agriculture (lag1)	-.0568261	0.022	nss	nss	nss	nss
Agriculture	.0347738	0.358	nss	nss	nss	nss
Financial sector (lag1)	.1687707	0.074	nss	nss	nss	nss
Financial sector	-.1807944	0.100	nss	nss	nss	nss
Public administration (lag1)	nss	nss	.2801097	0.017	nss	nss
Public administration	nss	nss	-.4721861	0.004	nss	nss
Education (lag1)	nss	nss	.1551038	0.009	nss	nss
Education	nss	nss	-.1309025	0.033	nss	nss

The following conclusions can be drawn after analysing Table 1.

The adjustment of human capital factors took place only in the last period. This means that despite the fact that mid 90' were the period of high income rotation, the returns on human capital did not change during that period.

The adjustment of stratification factors has the counterbalancing effect on what was observed in the late 80's. For example, men enjoyed upward mobility in the late 80's but this trend was broken in the second period when women started regaining their social positions. Consequently, the disproportion between the remuneration of men and women was partially fixed during the period of transition. The same reversal can be observed in the remuneration schedule of the inhabitants of small cities. In the late 80's they suffered relative income decrease while in the late 90's and the early years after 2000 they managed more than to offset their previous losses in terms of incomes.

The effect of social events remained relatively constant in the observed period. For example, residence change seems to have a certain negative effect on mobility. This result, however, should be treated carefully because the above models can point to the effect of the residence change on mobility after 5-6 years, being purely a long run effect. Here, it should be noted that normally only rich people can afford to change residence and that is why the dummy for the residence change may be correlated with incomes, which, in turn, have a very pronounced negative effect on mobility during the whole period. The negative effect of incomes on mobility is perfectly explained by the common logic: it is more troublesome for a rich person to become even more richer, while for a poor person it is easier to get richer than to become even more poorer.

Finally, significant coefficients in the section of industry dummies in periods 1986-1991 and 1991-1997 partially advocated the job competition model,

which states that relative income positions of individuals are determined by the industry the person works in. This seems to be false in the last period, in which no coefficient in the industry dummies section was significant.

The last part of empirical results concerns the analysis of the longitudinal data series in the period from 1997 through 2002. The estimated specifications are presented in the Appendix in Tables 31, 32, and 33. The estimated specifications seem to have bigger explanatory power, with Wald chi^2 ranging from 143.86 to 166.82, and higher z-statistics. The general results are summarised in Table 2 below:

Table 2: GEE General Results

Factors	Coefficient	p-value	Factors	Coefficient	p-value
Stratification factors					
Age (lag1)	nss	nss	City	-.0046747	0.004
Square of age (lag1)	nss	nss	Kiev	.0192675	0.037
Gender	nss	nss	Education of mother	nss	nss
Human capital factors					
Education	-.0083071	0.069	Computer	.0570222	0.011
Square of education	.0014667	0.088	Health	.0088051	0.052
English	.0221825	0.044	Training (lag1)	nss	nss
German	nss	nss	Experience (lag1)	nss	nss
French	-.0592296	0.031	Square of experience (lag1)	nss	nss
Social events					
Residence change	.030877	0.130	Marital status	-.0121418	0.053
Salary (lag1)	-.0001322	0.000	Child	-.0461598	0.098
Marriage	.0689509	0.008			
Industry dummies					
Agriculture (lag1)	.0816756	0.020	Public administration (lag1)	nss	nss
Agriculture	-.0845509	0.016	Public administration	nss	nss
Industry (lag1)	nss	nss	Education (lag1)	nss	nss
Industry	nss	nss	Education	nss	nss
Electricity (lag1)	nss	nss	Service (lag1)	nss	nss
Electricity	nss	nss	Service	nss	nss
Sales (lag1)	nss	nss	Finances (lag1)	.0816756	0.035
Sales	nss	nss	Finances	-.24608	0.022
Transport (lag1)	nss	nss	Construction (lag1)	nss	nss
Transport	nss	nss	Construction	nss	nss

The obtained coefficients roughly support the conclusions obtained after the OLS estimation.

In the period from 1997 to 2002, the intensive adjustment of human capital factors took place, which means that the transition processes in the society have not stopped yet. For example, the returns on education seem to increase for more educated people than for the less educated, which is captured by the negative coefficient near the *Education* and the positive coefficient near the *Square of education*. Another specification including the *Type of education* pointed to the upward mobility of those who had obtained professional education and the downward mobility of those who had obtained vocational or bachelor-type education. So, we may conclude that professionally trained people with fundamental knowledge (proxied by the number of years of education) enjoyed positive mobility adjustment. Further, people speaking English enjoyed upward mobility, while those who speak French suffered relative income losses. However, it should be noted that French is not very widespread in Ukraine and the majority of those who speak French are school teachers, whose relative incomes behaved ambiguously. The effect of using computer and that of having good health are positive and statistically significant at 5% and 10% significance level.

The adjustment of stratification factors was only partial because their adjustment must have taken place in the mid 90'. The only evidence that the stratification section provides is that the inhabitants of small cities enjoyed

positive mobility in the period from 1997 through 2002, which goes in line with OLS estimation. Here, we can conclude that in the late 90's and the early years after 2000 the general convergence was observed across Ukrainian cities of different size with the only exception of Kiev, whose inhabitants enjoyed a pronounced upward swing in their income status, which can be seen by observing statistically significant coefficient near the variable *Kiev*.

All social events proved to be significant or marginally significant. In contrast to OLS estimation, the effect of residence change has marginally significant positive effect on mobility. The section of social events also provides the intuition of how marriage influences the mobility of spouses. In the short run, the marriage stimulates to earn more, which is captured by the coefficient near the variable *Marriage*; however, it takes only some 5-6 years of the matrimonial life to offset the positive effect of getting married, after which the downward mobility of married people takes place. It is to be also noted that the number of children born during the observed period seems to exercise downward mobility on women.

Finally, the majority of industry dummies were insignificant, with two exceptions: *Finances* and *Agriculture*. Both exercised positive effect on mobility: the incomes of people engaged in the agriculture must have risen because they received relatively lower remuneration in the previous periods, while the incomes of those engaged in the Financial Sector seem to diverge upwards.

Chapter 6

CONCLUSIONS

Our study was the attempt to look at income mobility in Ukraine during the transition period from 1986 through 2002. We approached the issue of income mobility by using a number of statistic and econometric tools which permitted us to draw general conclusions about mobility direction and mobility intensity, about the behaviour of income movements of individuals located in different income quintiles, and, finally, to draw the conclusions about the individual factors which were important in explaining upward and downward income swings during the observed period. Here, we summarise our findings.

The highest mobility intensity, or, put differently, the highest income turbulence was observed in the mid 90's. This was the period when people's skills and individual characteristics started getting reappraised by the labour market. Many of those who were among the poorest people in 1991 found themselves in the top income intervals in 1997. Such an increase in mobility intensity prevented the Ukrainian society from further growth of income inequality, which started to augment in the late 80's.

The asymmetric structure of the transition matrix for the period 1997 to 2002 points to the process of parallel formation of the dual labour market and the middle class in Ukraine. These are two indicators of the developed society, so we

may conclude that the pattern of income mobility that took place was beneficial for Ukraine.

The analysis of factors that explain income mobility points to a gradual adjustment of stratification and human capital determinants. This means that the reappraisal by the market of different individual characteristics and skills did not happen instantaneously. The extensive adjustment process of human capital determinants started in the late 90's and it is expected to continue.

During the process of adjustment, many distortions were fixed. Among the primary ones come the levelling of incomes of women with those of men and the levelling of incomes of those who live in small cities and large cities. People with better education and professional skills enjoyed the upward mobility thus re-establishing the natural status quo.

It can be claimed that mobility managed to smooth away a number of social issues, e.g. long run poverty. The income mobility in Ukraine increased the chances of poor people to leave their low-income status. This means that the problem of poverty did not look to have a chronic character.

Carrying many beneficial features for the society in transition, the intensity of income mobility in Ukraine looked to be pretty low, however. Four calculated mobility coefficients pointed to a lower mobility intensity in Ukraine comparing to other European countries. Although it is possible that the data that we had at our disposal somewhat biased downwards our estimates of income intensity, the retarded adjustment of individual skills and characteristics signals that the

mobility in Ukraine was indeed lower than it had to be for the transition process to pass quickly.

The main application of this study for the governing authorities is to intensify income mobility in Ukraine, which can be achieved by the abolishing of the restrictions that limit mobility, e.g. the registration procedure, and by refocusing the attention from poverty programs to the regulation of labour market.

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APPENDICES

Table 3

TRANSITION MATRIX 1986 TO 1991, percent

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Quintile 1	68.66	19.02	6.52	3.80	1.99
Quintile 2	21.70	50.99	16.46	8.14	2.71
Quintile 3	5.25	18.12	48.19	18.84	9.60
Quintile 4	2.17	5.97	25.68	53.53	12.66
Quintile 5	1.99	5.98	3.44	15.58	73.01

Table 4

TRANSITION MATRIX 1991 TO 1997, percent

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Quintile 1	53.44	23.02	13.76	5.03	4.76
Quintile 2	18.21	34.83	33.25	9.76	3.96
Quintile 3	10.55	18.47	30.61	30.87	9.50
Quintile 4	7.39	12.66	13.47	37.99	28.50
Quintile 5	10.32	11.11	8.99	16.40	53.17

Table 5

TRANSITION MATRIX 1997 TO 2002, percent

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Quintile 1	51.63	31.37	7.52	7.52	1.96
Quintile 2	32.25	32.90	22.48	9.45	2.93
Quintile 3	9.77	24.43	36.16	24.10	5.54
Quintile 4	4.56	7.82	28.99	35.18	23.45
Quintile 5	1.63	3.59	4.90	23.86	66.01

Table 6

TRANSITION MATRIX 1997 TO 1998, percent

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Quintile 1	82.98	12.13	2.13	1.70	1.06
Quintile 2	13.16	73.04	10.19	1.70	1.91
Quintile 3	1.49	13.40	72.13	11.06	1.91
Quintile 4	1.70	0.42	13.59	73.04	11.25
Quintile 5	0.64	1.06	1.91	12.55	83.83

Table 7

TRANSITION MATRIX 1998 TO 1999, percent

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Quintile 1	81.26	11.51	4.97	1.81	0.45
Quintile 2	14.41	68.92	13.06	3.60	0.0
Quintile 3	2.03	18.92	70.72	7.21	1.13
Quintile 4	2.25	0.68	9.91	79.50	7.66
Quintile 5	0.0	0.0	1.35	7.90	90.74

Table 8

TRANSITION MATRIX 1999 TO 2000, percent

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Quintile 1	79.10	15.44	3.80	1.19	0.48
Quintile 2	16.86	64.37	15.91	2.38	0.48
Quintile 3	1.90	18.29	64.37	14.25	1.19
Quintile 4	0.71	1.43	14.01	67.93	15.91
Quintile 5	1.43	1.19	1.90	14.25	81.95

Table 9

TRANSITION MATRIX 2000 TO 2001, percent

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Quintile 1	82.79	13.22	2.99	0.50	0.50
Quintile 2	15.17	70.90	12.19	1.24	0.50
Quintile 3	1.24	14.93	70.65	11.44	1.74
Quintile 4	0.25	1.00	13.68	78.11	16.97
Quintile 5	0.50	0.0	0.50	8.73	90.27

Table 10

TRANSITION MATRIX 2001 TO 2002, percent

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Quintile 1	80.22	17.03	1.65	0.55	0.55
Quintile 2	17.26	72.60	7.67	2.19	0.27
Quintile 3	1.10	8.24	76.37	13.19	1.10
Quintile 4	1.10	1.37	12.60	75.34	9.59
Quintile 5	0.27	0.82	1.65	8.79	88.46

Table 11

MOBILITY INTENSIT YANALYSIS
1986-1991, 1991-1997, 1997-2002, percent

Number of quintiles passed	1986-1991	1991-1997	1997-2002
-4	0,40	2,06	0,33
-3	1,63	3,70	1,63
-2	2,93	6,44	4,50
-1	16,22	13,31	21,92
0	58,87	42,00	44,36
+1	13,40	23,14	20,29
+2	4,85	6,60	4,50
+3	1,30	1,80	2,09
+4	0,40	0,95	0,39

Table 12

MOBILITY INTENSIT YANALYSIS
1997-1998, 1998-1999, 1999-2000, 2000-2001, 2001-2002 percent

Number of quintiles passed	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002
-4	0,13	0,00	0,29	0,10	0,05
-3	0,55	0,45	0,24	0,05	0,38
-2	0,77	0,81	1,05	0,55	0,82
-1	10,54	10,23	12,68	10,51	9,39
0	77,00	78,22	71,54	78,54	78,59
+1	8,93	7,89	12,30	8,76	9,50
+2	1,15	1,94	1,47	1,20	0,99
+3	0,72	0,36	0,33	0,20	0,16
+4	0,21	0,09	0,10	0,10	0,11

Table 13

"QUINTILE MEAN/YEAR MEAN" RATIOS
1986, 1991, 1997, 2002, percent

Quintiles	1986	1991	1997	2002
1	44.52	41.73	42.08	39.64
2	64.37	60.76	63.79	63.67
3	84.25	81.22	84.21	83.22
4	110.01	107.94	114.76	117.21
5	201.12	232.52	224.82	222.85

Table 14

Prais-Shorrocks, Normalised Bartholomew, and Cramer's V indexes

Ukraine					
	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002
Prais-Schorrocks index	0.2875	0.2722	0.3557	0.2683	0.2675
Normalised Bartolomew index	0.1776	0.1651	0.2106	0.1644	0.1549
Cramer's V index	0.2753	0.2566	0.3315	0.2524	0.2538
Germany					
	1994-1995	1995-1996	1996-1997	1998-1999	1999-2000
Prais-Schorrocks index	0.5387	0.5264	0.5271	0.5021	0.4945
Normalised Bartolomew index	0.3601	0.3489	0.3507	0.3428	0.3288
Cramer's V index	0.4898	0.4804	0.4813	0.4660	0.4552
France					
Prais-Schorrocks index	0.4435	0.4481	0.4488	n/a	n/a
Normalised Bartolomew index	0.2752	0.2728	0.2800	n/a	n/a
Cramer's V index	0.4044	0.4061	0.4114	n/a	n/a
UK					
Prais-Schorrocks index	0.5512	0.5840	0.5180	n/a	n/a
Normalised Bartolomew index	0.3984	0.4267	0.3472	n/a	n/a
Cramer's V index	0.5149	0.5446	0.4763	n/a	n/a
Italy					
Prais-Schorrocks index	0.5615	0.5205	0.5226	n/a	n/a
Normalised Bartolomew index	0.3888	0.3571	0.3588	n/a	n/a
Cramer's V index	0.5206	0.4851	0.4867	n/a	n/a
Spain					
Prais-Schorrocks index	0.6148	0.5910	0.5967	n/a	n/a
Normalised Bartolomew index	0.4164	0.4050	0.4045	n/a	n/a
Cramer's V index	0.5495	0.5342	0.5363	n/a	n/a

Source: Kuhl (2003) and own calculations based on the ULMS

Table 15

Fields and Ok mobility indexes for different countries

Ukraine	0.0614	France	0.166	Italy	0.278
Germany	0.192	UK	0.250	Spain	0.295

Source: Ayala and Sastre (2002), 1994/98 balanced panel; and own calculations based on the ULMS, 1997/98

Table 16

Fields and Ok decomposition for Ukraine and Italy, %

	Growth component K	Transfers component T
Ukraine	69.5	30.5
Italy	39	61

Source: Regoli et al. (2003), 1993/2000; and own calculation based on the ULMS, 1997/98

Table 17

Average Exchange Rates of UAH to USD and DM,

1997-2002

	1997	1998	1999	2000	2001	2002
USD	186.17	244.95	413.04	544.02	537.21	532.66
DM	107.61	140.69	224.63	257.12	246.11	-

Source:NBU

Table 18

STATA DESCRIPTIVE STATISTICS, 1986-1991

Robust OLS

Variable	Obs	Mean	Std. Dev.	Min	Max
mob_91_lr	2759	-.0449676	.4146782	-2.564412	3.309269
age1986	8640	26.26895	16.60798	1	59
age1986_sq	8640	965.8509	902.1452	1	3481
sex	8641	.4273811	.494727	0	1
city	8641	3.318713	2.012066	1	6
kiev	8641	.0518459	.2217285	0	1
educ_long	5645	2.83888	1.453026	0	9
educ_long_sq	5645	10.17015	9.42752	0	81
educ_voc	8611	.3989122	.489703	0	1
educ_prof	8611	.155769	.3626572	0	1
educ_bac	8611	.0146974	.1203455	0	1
education~ot	8346	4.358855	2.807254	1	11
marr_gain~91	8641	.0796204	.2707203	0	1
child_wom_91	8641	.0964009	.3362198	0	3
inc86_a	3924	173.5479	132.0324	2	4000
english	8641	.0481426	.2140798	0	1
german	8641	.0138873	.11703	0	1
french	8641	.0054392	.0735542	0	1
health	8581	2.039273	.7235439	1	4
resid_ch_~91	8641	.1079736	.310365	0	1
exp1986	6974	6.0499	9.302959	0	43
exp1986_sq	6974	123.1339	261.8522	0	1849
agricult1986	8641	.1205879	.3256666	0	1
agricult1991	8641	.0672376	.2504475	0	1
industry1986	8641	.2050689	.4037753	0	1
industry1991	8641	.1286888	.3348746	0	1
electric1986	8641	.0197894	.1392839	0	1
electric1991	8641	.0162018	.1262584	0	1
construc1986	8641	.0384215	.1922226	0	1
construc1991	8641	.0278903	.164668	0	1
sale1986	8641	.0869112	.2817212	0	1
sale1991	8641	.0698993	.254992	0	1
transpor1986	8641	.0724453	.2592388	0	1
transpor1991	8641	.0506886	.2193737	0	1
financia1986	8641	.0134244	.1150899	0	1
financia1991	8641	.0093739	.0963697	0	1
public_a1986	8641	.0357598	.1857013	0	1
public_a1991	8641	.0237241	.1521971	0	1
educatio1986	8641	.132855	.3394376	0	1
educatio1991	8641	.1080893	.3105112	0	1
other_se1986	8641	.049647	.2172272	0	1
other_se1991	8641	.0372642	.1894195	0	1

Table 19

STATA ESTIMATION OUTPUT, 1986-1991

Robust OLS, Specification with the *number of years of education*

```
Regression with robust standard errors                Number of obs =    1367
                                                      F( 37,  1329) =    2.36
                                                      Prob > F      =  0.0000
                                                      R-squared     =  0.1315
                                                      Root MSE      =  .40057
------------------------------------------------------------------------------
             |               Robust
   mob_91_lr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     age1986 |  -.0098737   .0127619    -0.77   0.439    -.0349093    .0151619
  age1986_sq |   .0001039   .0001721     0.60   0.546    -.0002337    .0004415
         sex |   .0914587   .0258554     3.54   0.000     .0407368    .1421806
        city |   .0040828   .0064585     0.63   0.527    -.0085871    .0167528
        kiev |  -.0908962   .0594365    -1.53   0.126    -.2074959    .0257034
   educ_long |   .0165461   .0317989     0.52   0.603    -.0458354    .0789277
educ_long_sq |   -.001594   .0046716    -0.34   0.733    -.0107586    .0075705
education~ot |   .0030818   .0049129     0.63   0.531    -.0065561    .0127197
marr_gain~91 |  -.0198947   .0709938    -0.28   0.779    -.1591669    .1193775
child_wom_91 |   .0699193   .0532212     1.31   0.189    -.0344874     .174326
     inc86_a |  -.0012603   .0001935    -6.51   0.000    -.0016399   -.0008808
     english |   .0453347   .0653621     0.69   0.488    -.0828894    .1735587
      german |  -.0430007   .0933248    -0.46   0.645    -.2260808    .1400793
      french |  (dropped)
      health |   .0128822   .0186736     0.69   0.490    -.0237507    .0495152
resid_ch_~91 |   -.089756   .0417892    -2.15   0.032    -.1717359   -.0077761
     exp1986 |   .0013722   .0038408     0.36   0.721    -.0061625    .0089069
  exp1986_sq |   7.19e-06   .0001296     0.06   0.956    -.0002471    .0002614
agricult1986 |    .037966   .0907209     0.42   0.676    -.1400057    .2159377
agricult1991 |   .0844958   .0544366     1.55   0.121    -.0222952    .1912868
industry1986 |   .1307869   .0840654     1.56   0.120    -.0341285    .2957024
industry1991 |   .0233266   .0438266     0.53   0.595    -.0626503    .1093035
electric1986 |   .2856753   .1870055     1.53   0.127    -.0811828    .6525333
electric1991 |  -.1078519   .1777307    -0.61   0.544    -.4565151    .2408113
construc1986 |   .1209776    .100735     1.20   0.230    -.0766393    .3185945
construc1991 |   .0640742   .0953927     0.67   0.502    -.1230625    .2512108
    sale1986 |   .1305754   .0891842     1.46   0.143    -.0443818    .3055327
    sale1991 |   .0231244   .0584337     0.40   0.692     -.091508    .1377569
transpor1986 |    .066323   .1082593     0.61   0.540    -.1460549    .2787008
transpor1991 |   .0320423   .0760059     0.42   0.673    -.1170623    .1811468
financia1986 |   .2254028   .1259065     1.79   0.074    -.0215943    .4723999
financia1991 |  -.2493427   .1483539    -1.68   0.093    -.5403761    .0416906
public_a1986 |   .1899534   .1048085     1.81   0.070    -.0156549    .3955616
public_a1991 |  -.2143982   .1001562    -2.14   0.032    -.4108796   -.0179168
educatio1986 |   .1380274   .0897299     1.54   0.124    -.0380003     .314055
educatio1991 |  -.0418837   .0436147    -0.96   0.337    -.1274448    .0436774
other_se1986 |   .1701981   .0971441     1.75   0.080    -.0203744    .3607705
other_se1991 |  -.1050473   .0846286    -1.24   0.215    -.2710676    .0609729
       _cons |   .1647189    .247177     0.67   0.505    -.3201808    .6496186
------------------------------------------------------------------------------
```

Table 20

STATA ESTIMATION OUTPUT, 1986-1991

Robust OLS, Specification with the *type of education*

```
Regression with robust standard errors                Number of obs =    2220
                                                      F( 38,  2180) =       .
                                                      Prob > F      =       .
                                                      R-squared     =  0.1109
                                                      Root MSE      =  .38494

------------------------------------------------------------------------------
             |               Robust
   mob_91_lr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     age1986 |  -.0066856   .0093296    -0.72   0.474    -.0249815    .0116104
  age1986_sq |   .0000694   .0001218     0.57   0.569    -.0001695    .0003083
         sex |   .0756255   .0189919     3.98   0.000     .0383813    .1128696
        city |   .0058048   .0049488     1.17   0.241       -.0039    .0155096
        kiev |  -.1280304   .0466616    -2.74   0.006    -.2195363   -.0365244
    educ_voc |   .0450322   .0209245     2.15   0.031     .0039983    .0860662
   educ_prof |  -.0064542   .0309261    -0.21   0.835    -.0671018    .0541935
    educ_bac |   .0235851   .0853483     0.28   0.782    -.1437874    .1909575
education~ot |   .0025343   .0042502     0.60   0.551    -.0058007    .0108692
marr_gain~91 |   .0191414   .0588447     0.33   0.745    -.0962562    .1345391
child_wom_91 |   .0313139   .0430848     0.73   0.467    -.0531776    .1158054
     inc86_a |     -.0012   .0001548    -7.75   0.000    -.0015036   -.0008964
     english |   .0424456   .0632914     0.67   0.503    -.0816722    .1665634
      german |  -.0500093    .086305    -0.58   0.562     -.219258    .1192395
      french |  -.5161037   .0353682   -14.59   0.000    -.5854625   -.4467449
      health |    .013547    .014119     0.96   0.337     -.014141    .0412351
resid_ch_~91 |   -.088664   .0364269    -2.43   0.015    -.1600991   -.0172289
     exp1986 |   .0010705    .002785     0.38   0.701    -.0043911     .006532
  exp1986_sq |   -.000016    .000089    -0.18   0.857    -.0001906    .0001586
agricult1986 |   .0050856    .063681     0.08   0.936    -.1197961    .1299674
agricult1991 |   .0607386   .0396681     1.53   0.126    -.0170527    .1385299
industry1986 |   .0829834   .0622761     1.33   0.183    -.0391434    .2051102
industry1991 |   .0476196   .0371387     1.28   0.200    -.0252113    .1204505
electric1986 |   .1446747   .1324344     1.09   0.275    -.1150361    .4043855
electric1991 |   .0055233   .1279083     0.04   0.966    -.2453116    .2563582
construc1986 |   .0785859   .0732252     1.07   0.283    -.0650126    .2221843
construc1991 |   .0782734   .0702254     1.11   0.265    -.0594424    .2159892
    sale1986 |   .0892644   .0671716     1.33   0.184    -.0424628    .2209915
    sale1991 |  -.0135427   .0487967    -0.28   0.781    -.1092356    .0821502
transpor1986 |   .0522826   .0719767     0.73   0.468    -.0888675    .1934326
transpor1991 |   .0434875   .0510478     0.85   0.394      -.05662    .1435949
financia1986 |   .1733067   .1059938     1.64   0.102    -.0345527    .3811661
financia1991 |  -.2223196   .1245084    -1.79   0.074    -.4664872    .0218481
public_a1986 |   .1777804   .0810293     2.19   0.028     .0188777    .3366832
public_a1991 |  -.2023848   .1214136    -1.67   0.096    -.4404832    .0357137
educatio1986 |    .088279   .0670461     1.32   0.188    -.0432019    .2197599
educatio1991 |  -.0354687   .0392467    -0.90   0.366    -.1124336    .0414962
other_se1986 |   .0910151   .0688123     1.32   0.186    -.0439295    .2259597
other_se1991 |  -.0412251   .0654693    -0.63   0.529    -.1696138    .0871637
       _cons |   .1362704   .1782016     0.76   0.445    -.2131923    .4857331
------------------------------------------------------------------------------
```

Table 21

STATA ESTIMATION OUTPUT, 1986-1991

Robust OLS, Refined

```
Regression with robust standard errors                Number of obs =    2379
                                                      F( 11,  2366) =       .
                                                      Prob > F      =       .
                                                      R-squared     =  0.1100
                                                      Root MSE      =  .39097

------------------------------------------------------------------------------
             |               Robust
   mob_91_lr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         sex |   .0829569   .0174562     4.75   0.000      .048726    .1171879
        city |   .0090473   .0049047     1.84   0.065    -.0005706    .0186652
        kiev |  -.1305054   .0441564    -2.96   0.003    -.2170947   -.0439161
    educ_voc |   .0445958   .0174403     2.56   0.011      .010396    .0787956
     inc86_a |  -.0012539   .0001438    -8.72   0.000    -.0015359   -.0009718
      french |  -.5359887   .0249662   -21.47   0.000    -.5849466   -.4870308
      health |   .0216578   .0130991     1.65   0.098    -.0040292    .0473448
resid_ch_~91 |   -.068636   .0350549    -1.96   0.050    -.1373775    .0001056
agricult1986 |  -.0568261   .0247006    -2.30   0.022    -.1052633    -.008389
agricult1991 |   .0347738   .0378618     0.92   0.358    -.0394718    .1090195
financia1986 |   .1687707   .0944857     1.79   0.074    -.0165126     .354054
financia1991 |  -.1807944     .11002    -1.64   0.100    -.3965399    .0349511
       _cons |   .0676853   .0324974     2.08   0.037     .0039589    .1314117
------------------------------------------------------------------------------
```

Table 22

STATA DESCRIPTIVE STATISTICS, 1991-1997

Robust OLS

Variable	Obs	Mean	Std. Dev.	Min	Max
mob_97_lr	1885	.0082789	.616839	-4.998161	2.521934
age1991	8641	31.26895	16.60798	3	64
age1991_sq	8641	1253.54	1062.621	9	4096
sex	8641	.4273811	.494727	0	1
city	8641	3.318713	2.012066	1	6
kiev	8641	.0518459	.2217285	0	1
educ_long	5645	2.83888	1.453026	0	9
educ_long_sq	5645	10.17015	9.42752	0	81
educ_voc	8611	.3989122	.489703	0	1
educ_prof	8611	.155769	.3626572	0	1
educ_bac	8611	.0146974	.1203455	0	1
education~ot	8346	4.358855	2.807254	1	11
marr_gain~97	8641	.0847124	.2784694	0	1
child_wom_97	8641	.0788103	.3064375	0	3
inc91_a	3339	202.942	337.1127	0	16000
english	8641	.0481426	.2140798	0	1
german	8641	.0138873	.11703	0	1
french	8641	.0054392	.0735542	0	1
health	8581	2.039273	.7235439	1	4
resid_ch_~97	8641	.1097095	.3125454	0	1
exp1991	6974	8.736593	10.97472	0	48
exp1991_sq	6974	196.7552	357.3111	0	2304
agricult1991	8641	.0672376	.2504475	0	1
agricult1997	8641	.0675848	.2510465	0	1
industry1991	8641	.1286888	.3348746	0	1
industry1997	8641	.1181576	.3228133	0	1
electric1991	8641	.0162018	.1262584	0	1
electric1997	8641	.0162018	.1262584	0	1
construc1991	8641	.0278903	.164668	0	1
construc1997	8641	.0282375	.1656602	0	1
sale1991	8641	.0698993	.254992	0	1
sale1997	8641	.073024	.2601909	0	1
transpor1991	8641	.0506886	.2193737	0	1
transpor1997	8641	.0488369	.2155395	0	1
financia1991	8641	.0093739	.0963697	0	1
financia1997	8641	.0099526	.0992705	0	1
public_a1991	8641	.0237241	.1521971	0	1
public_a1997	8641	.0223354	.1477804	0	1
educatio1991	8641	.1080893	.3105112	0	1
educatio1997	8641	.1053119	.3069726	0	1
other_se1991	8641	.0372642	.1894195	0	1
other_se1997	8641	.0364541	.1874281	0	1

Table 23

STATA ESTIMATION OUTPUT, 1991-1997

Robust OLS, Specification with the *number of years of education*

```
Regression with robust standard errors                Number of obs =     982
                                                      F( 37,   944) =    2.25
                                                      Prob > F      =  0.0000
                                                      R-squared     =  0.2093
                                                      Root MSE      =  .53148

------------------------------------------------------------------------------
             |               Robust
   mob_97_lr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     age1991 |  -.0156467   .0144395    -1.08   0.279    -.0439839    .0126905
  age1991_sq |   .0001485   .0001801     0.82   0.410     -.000205    .0005021
         sex |   .0011224   .0467402     0.02   0.981    -.0906043     .092849
        city |   .0236345   .0103286     2.29   0.022      .003365    .0439041
        kiev |  -.0233169    .066931    -0.35   0.728    -.1546677    .1080338
   educ_long |   .0259923   .0474791     0.55   0.584    -.0671846    .1191691
educ_long_sq |  -.0018276    .007321    -0.25   0.803    -.0161949    .0125398
education~ot |   .0015578   .0071379     0.22   0.827    -.0124501    .0155657
marr_gain~97 |   .0264357   .0885962     0.30   0.765    -.1474326     .200304
child_wom_97 |  -.1004062   .0524108    -1.92   0.056    -.2032613     .002449
     inc91_a |  -.0013135   .0002975    -4.42   0.000    -.0018973   -.0007297
     english |   .0244073   .0693312     0.35   0.725    -.1116539    .1604685
      german |   .0281249     .09056     0.31   0.756    -.1495973     .205847
      french |  (dropped)
      health |  -.0362818   .0270479    -1.34   0.180    -.0893629    .0167992
resid_ch_~97 |   .0130235   .0497621     0.26   0.794    -.0846336    .1106806
     exp1991 |   .0044881   .0067205     0.67   0.504    -.0087008     .017677
  exp1991_sq |  -.0001096   .0001809    -0.61   0.545    -.0004646    .0002454
agricult1991 |  -.1607621   .1046556    -1.54   0.125    -.3661467    .0446224
agricult1997 |   .2083851   .1075556     1.94   0.053    -.0026906    .4194608
industry1991 |  -.0734014   .0757084    -0.97   0.333    -.2219777    .0751748
industry1997 |   -.018386   .0830736    -0.22   0.825    -.1814164    .1446443
electric1991 |   .3248486   .1270015     2.56   0.011     .0756107    .5740864
electric1997 |  -.1695764   .1384359    -1.22   0.221     -.441254    .1021012
construc1991 |  -.2064517   .1252216    -1.65   0.100    -.4521966    .0392931
construc1997 |   .1787402   .1328293     1.35   0.179    -.0819347     .439415
    sale1991 |  -.0495126   .0900144    -0.55   0.582    -.2261641     .127139
    sale1997 |   .0726948    .079743     0.91   0.362    -.0837991    .2291888
transpor1991 |  -.0486156   .1388997    -0.35   0.726    -.3212035    .2239723
transpor1997 |  -.0033665   .1233505    -0.03   0.978    -.2454394    .2387063
financia1991 |   .3391514    .213512     1.59   0.113    -.0798617    .7581644
financia1997 |  -.1199368   .2009194    -0.60   0.551    -.5142372    .2743636
public_a1991 |   .1747078   .1444368     1.21   0.227    -.1087466    .4581622
public_a1997 |  -.3806035    .192929    -1.97   0.049    -.7592228   -.0019841
educatio1991 |   .0365025   .0725494     0.50   0.615    -.1058743    .1788793
educatio1997 |  -.0745364   .0793505    -0.94   0.348    -.2302601    .0811874
other_se1991 |   -.154877   .1539902    -1.01   0.315    -.4570797    .1473257
other_se1997 |   .1076776   .1488119     0.72   0.470    -.1843628    .3997179
       _cons |   .5700254   .2974726     1.92   0.056    -.0137585    1.153809
------------------------------------------------------------------------------
```

Table 24

STATA ESTIMATION OUTPUT, 1991-1997

Robust OLS, Specification with the *type of education*

```
Regression with robust standard errors                Number of obs =    1449
                                                      F( 38,  1410) =    1.54
                                                      Prob > F      =  0.0193
                                                      R-squared     =  0.1467
                                                      Root MSE      =  .56325

------------------------------------------------------------------------------
             |               Robust
   mob_97_lr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     age1991 |  -.0101576   .0125312    -0.81   0.418    -.0347394    .0144243
  age1991_sq |   .0001059   .0001522     0.70   0.487    -.0001927    .0004044
         sex |  -.0513498   .0342526    -1.50   0.134    -.1185414    .0158417
        city |   .0089994   .0089401     1.01   0.314     -.008538    .0265368
        kiev |   .0500362   .0595601     0.84   0.401    -.0667997    .1668721
    educ_voc |   .0165093    .034486     0.48   0.632      -.05114    .0841586
   educ_prof |  -.0419119   .0488948    -0.86   0.391    -.1378263    .0540025
    educ_bac |  -.1031233   .1240609    -0.83   0.406    -.3464872    .1402405
education~ot |   .0076634   .0069371     1.10   0.269    -.0059447    .0212716
marr_gain~97 |   .1207549    .089179     1.35   0.176    -.0541829    .2956927
child_wom_97 |  -.0643789   .0496501    -1.30   0.195    -.1617749    .0330171
     inc91_a |  -.0004616   .0001361    -3.39   0.001    -.0007286   -.0001946
     english |   .0096608   .0883867     0.11   0.913    -.1637227    .1830444
      german |   .0478067    .078192     0.61   0.541    -.1055784    .2011919
      french |  (dropped)
      health |   -.020901   .0239481    -0.87   0.383    -.0678788    .0260769
resid_ch_~97 |  -.0404261   .0499184    -0.81   0.418    -.1383484    .0574963
     exp1991 |   .0018147   .0057758     0.31   0.753    -.0095154    .0131448
  exp1991_sq |  -.0000205   .0001564    -0.13   0.896    -.0003273    .0002863
agricult1991 |   -.040176    .084583    -0.47   0.635     -.206098     .125746
agricult1997 |    .003311    .082092     0.04   0.968    -.1577246    .1643466
industry1991 |  -.0404909   .0625238    -0.65   0.517    -.1631405    .0821587
industry1997 |  -.0093076   .0701838    -0.13   0.895    -.1469835    .1283683
electric1991 |   .2495307   .1254369     1.99   0.047     .0034677    .4955937
electric1997 |  -.1407095   .1384501    -1.02   0.310    -.4122997    .1308808
construc1991 |  -.1877501   .1067301    -1.76   0.079     -.397117    .0216168
construc1997 |   .1380066   .1152604     1.20   0.231    -.0880938     .364107
    sale1991 |  -.0289513   .0834063    -0.35   0.729    -.1925651    .1346624
    sale1997 |   .0173564   .0930237     0.19   0.852    -.1651234    .1998362
transpor1991 |  -.1101168   .1123232    -0.98   0.327    -.3304554    .1102218
transpor1997 |   .0523846   .1074491     0.49   0.626    -.1583927    .2631618
financia1991 |   .3949364   .2118588     1.86   0.063    -.0206559    .8105287
financia1997 |   -.129439   .2003877    -0.65   0.518    -.5225292    .2636511
public_a1991 |   .2384504   .1348392     1.77   0.077    -.0260565    .5029574
public_a1997 |  -.4473083   .1843963    -2.43   0.015    -.8090289   -.0855876
educatio1991 |   .1160879   .0644824     1.80   0.072    -.0104039    .2425797
educatio1997 |  -.1259092   .0688649    -1.83   0.068    -.2609978    .0091794
other_se1991 |    -.03123   .1371417    -0.23   0.820    -.3002538    .2377938
other_se1997 |  -.0494016   .1350486    -0.37   0.715    -.3143195    .2155162
       _cons |   .3335454   .2613342     1.28   0.202    -.1791003    .8461911
------------------------------------------------------------------------------
```

Table 25

STATA ESTIMATION OUTPUT, 1991-1997

Robust OLS, Refined

```
Regression with robust standard errors                Number of obs =    1587
                                                      F(  7,  1579) =    5.51
                                                      Prob > F      =  0.0000
                                                      R-squared     =  0.1379
                                                      Root MSE      =  .57374

------------------------------------------------------------------------------
             |               Robust
   mob_97_lr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         sex |  -.0536404   .0310268    -1.73   0.084    -.1144984    .0072177
marr_gain~97 |   .1167272   .0758713     1.54   0.124    -.0320919    .2655463
     inc91_a |  -.0005007   .0001582    -3.16   0.002    -.0008111   -.0001903
public_a1991 |   .2801097   .1177246     2.38   0.017     .0491967    .5110227
public_a1997 |  -.4721861   .1632234    -2.89   0.004    -.7923435   -.1520286
educatio1991 |   .1551038   .0589869     2.63   0.009      .039403    .2708046
educatio1997 |  -.1309025   .0612851    -2.14   0.033    -.2511112   -.0106938
       _cons |   .1197956   .0341608     3.51   0.000     .0527902    .1868009
------------------------------------------------------------------------------
```

Table 26

STATA DESCRIPTIVE STATISTICS, 1997-2002

Robust OLS

Variable	Obs	Mean	Std. Dev.	Min	Max
mob_02_lr	1519	-.0326785	.5042195	-2.718714	2.700051
age1997	8641	37.26895	16.60798	9	70
age1997_sq	8641	1664.768	1257.114	81	4900
sex	8641	.4273811	.494727	0	1
city	8641	3.318713	2.012066	1	6
kiev	8641	.0518459	.2217285	0	1
educ_long	5645	2.83888	1.453026	0	9
educ_long_sq	5645	10.17015	9.42752	0	81
educ_voc	8611	.3989122	.489703	0	1
educ_prof	8611	.155769	.3626572	0	1
educ_bac	8611	.0146974	.1203455	0	1
education~ot	8346	4.358855	2.807254	1	11
marr_gain~02	8641	.067932	.2516437	0	1
child_wom_02	8641	.0561278	.2625943	0	6
inc97_a	2802	187.8995	184.3075	0	4000
english	8641	.0481426	.2140798	0	1
german	8641	.0138873	.11703	0	1
french	8641	.0054392	.0735542	0	1
comp_97_02	8641	.1536859	.3606683	0	1
health	8581	2.039273	.7235439	1	4
resid_ch_9~2	8641	.0924661	.2896996	0	1
exp1997	6974	12.61557	12.84528	0	54
exp1997_sq	6974	324.1303	491.8824	0	2916
train98_02	8641	.069205	.253817	0	1
agricult1997	8641	.0675848	.2510465	0	1
agricult2002	8641	.0668904	.2498466	0	1
industry1997	8641	.1181576	.3228133	0	1
industry2002	8641	.1173475	.3218526	0	1
electric1997	8641	.0162018	.1262584	0	1
electric2002	8641	.0159704	.125368	0	1
construc1997	8641	.0282375	.1656602	0	1
construc2002	8641	.0287004	.1669727	0	1
sale1997	8641	.073024	.2601909	0	1
sale2002	8641	.0726768	.2596202	0	1
transpor1997	8641	.0488369	.2155395	0	1
transpor2002	8641	.0482583	.2143239	0	1
financia1997	8641	.0099526	.0992705	0	1
financia2002	8641	.0098368	.0986975	0	1
public_a1997	8641	.0223354	.1477804	0	1
public_a2002	8641	.0223354	.1477804	0	1
educatio1997	8641	.1053119	.3069726	0	1
educatio2002	8641	.1053119	.3069726	0	1
other_se1997	8641	.0364541	.1874281	0	1
other_se2002	8641	.0366856	.1879995	0	1

Table 27

STATA ESTIMATION OUTPUT, 1997-2002

Robust OLS, Specification with the *number of years of education*

```
      Source |       SS       df       MS              Number of obs =     711
-------------+------------------------------           F( 37,   673) =    2.26
       Model |  17.6001672    37  .475680195           Prob > F      =  0.0000
    Residual |  141.826661   673   .21073798           R-squared     =  0.1104
-------------+------------------------------           Adj R-squared =  0.0615
       Total |  159.426828   710  .224544828           Root MSE      =  .45906

------------------------------------------------------------------------------
   mob_02_lr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     age1997 |    .012207   .0119494     1.02   0.307    -.0112556    .0356696
  age1997_sq |  -.0000914   .0001399    -0.65   0.514    -.0003661    .0001832
         sex |  -.0034398   .0398043    -0.09   0.931    -.0815954    .0747158
        city |  -.0210332   .0111263    -1.89   0.059    -.0428797    .0008133
        kiev |   -.004911   .0539393    -0.09   0.927    -.1108205    .1009986
   educ_long |  -.0949313   .0478576    -1.98   0.048    -.1888994   -.0009631
educ_long_sq |   .0113105   .0071719     1.58   0.115    -.0027715    .0253924
education~ot |   .0027806    .007466     0.37   0.710     -.011879    .0174401
marr_gain~02 |   .1074731   .0763162     1.41   0.160    -.0423734    .2573195
child_wom_02 |  -.0808951   .0857104    -0.94   0.346     -.249187    .0873969
     inc97_a |   -.000838   .0001318    -6.36   0.000    -.0010968   -.0005793
     english |   .0205216   .0769663     0.27   0.790    -.1306013    .1716444
      german |   .1471924   .1259351     1.17   0.243    -.1000806    .3944654
      french |  -.1678517   .2100269    -0.80   0.424    -.5802386    .2445352
  comp_97_02 |    .118896   .0562201     2.11   0.035     .0085081    .2292838
      health |   .0453583   .0295104     1.54   0.125    -.0125853    .1033018
resid_ch_9~2 |  -.1535807   .0632411    -2.43   0.015    -.2777543   -.0294071
     exp1997 |  -.0021449   .0049933    -0.43   0.668    -.0119493    .0076594
  exp1997_sq |  -.0000148   .0001351    -0.11   0.913    -.0002802    .0002505
  train98_02 |  -.0178689   .0611279    -0.29   0.770    -.1378933    .1021555
agricult1997 |  -.1457838   .3287362    -0.44   0.658    -.7912557    .4996882
agricult2002 |   .0266395   .3334325     0.08   0.936    -.6280535    .6813325
industry1997 |   .0115831   .2124633     0.05   0.957    -.4055876    .4287538
industry2002 |   .0662128     .21579     0.31   0.759    -.3574898    .4899154
electric1997 |  -.1106342    .138703    -0.80   0.425    -.3829768    .1617084
electric2002 |  (dropped)
construc1997 |  -.4574283    .471879    -0.97   0.333     -1.38396    .4691037
construc2002 |   .3891722   .4651995     0.84   0.403    -.5242447    1.302589
    sale1997 |   .0294417   .2103712     0.14   0.889    -.3836211    .4425045
    sale2002 |  -.0004644   .2118292    -0.00   0.998      -.41639    .4154611
transpor1997 |  -.1319921   .0817253    -1.62   0.107    -.2924594    .0284752
transpor2002 |  (dropped)
financia1997 |    .088867   .1690118     0.53   0.599    -.2429867    .4207208
financia2002 |  (dropped)
public_a1997 |   .0309229   .4743416     0.07   0.948    -.9004445    .9622904
public_a2002 |   .1076127   .4640186     0.23   0.817    -.8034856    1.018711
educatio1997 |   .5550681   .4633718     1.20   0.231    -.3547602    1.464896
educatio2002 |  -.5700434   .4639664    -1.23   0.220    -1.481039    .3409523
other_se1997 |   .3993866   .2708157     1.47   0.141    -.1323587    .9311319
other_se2002 |  -.4421623   .2723348    -1.62   0.105    -.9768903    .0925658
       _cons |   -.074853   .2645398    -0.28   0.777    -.5942755    .4445695
------------------------------------------------------------------------------
```

Table 28

STATA ESTIMATION OUTPUT, 1997-2002

Robust OLS, Specification with the *type of education*

```
      Source |       SS       df       MS              Number of obs =    1047
-------------+------------------------------           F( 40,  1006) =    3.46
       Model |  31.2948789    40  .782371973           Prob > F      =  0.0000
    Residual |  227.318179  1006  .225962405           R-squared     =  0.1210
-------------+------------------------------           Adj R-squared =  0.0861
       Total |  258.613058  1046  .247240017           Root MSE      =  .47536

------------------------------------------------------------------------------
   mob_02_lr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     age1997 |  -.0016211   .0099993    -0.16   0.871     -.021243    .0180009
  age1997_sq |   .0000802   .0001139     0.70   0.482    -.0001434    .0003037
         sex |  -.0162964   .0335781    -0.49   0.628    -.0821874    .0495947
        city |  -.0293652   .0093829    -3.13   0.002    -.0477775   -.0109529
        kiev |   .0490447   .0484383     1.01   0.312    -.0460069    .1440964
    educ_voc |  -.0786986    .036889    -2.13   0.033    -.1510867   -.0063104
   educ_prof |   .0821997   .0484945     1.70   0.090    -.0129622    .1773617
    educ_bac |  -.1701221   .1155315    -1.47   0.141    -.3968324    .0565883
education~ot |   .0034342   .0067132     0.51   0.609    -.0097393    .0166076
marr_gain~02 |   .0961088    .067731     1.42   0.156    -.0368015    .2290191
child_wom_02 |  -.0528733   .0763935    -0.69   0.489    -.2027822    .0970357
     inc97_a |  -.0009682   .0001121    -8.64   0.000    -.0011881   -.0007482
     english |   .0069321   .0796131     0.09   0.931    -.1492947    .1631588
      german |   .1694798   .1293569     1.31   0.190    -.0843604      .42332
      french |  -.6363059   .1983435    -3.21   0.001     -1.02552   -.2470915
  comp_97_02 |   .1027475   .0528976     1.94   0.052    -.0010547    .2065497
      health |   .0261156   .0249095     1.05   0.295    -.0227648    .0749961
resid_ch_9~2 |  -.1410037   .0562145    -2.51   0.012    -.2513148   -.0306926
     exp1997 |  -.0014227    .004255    -0.33   0.738    -.0097723    .0069269
  exp1997_sq |  -.0000504   .0001078    -0.47   0.640    -.0002619    .0001612
  train98_02 |  -.0175117   .0602729    -0.29   0.771    -.1357867    .1007634
agricult1997 |  -.0516992    .190832    -0.27   0.787    -.4261735    .3227752
agricult2002 |   .0018129   .1929884     0.01   0.993     -.376893    .3805188
industry1997 |   .1076472   .1851311     0.58   0.561    -.2556401    .4709344
industry2002 |  -.0495405   .1889669    -0.26   0.793    -.4203549    .3212738
electric1997 |   .1485054   .3590445     0.41   0.679    -.5560565    .8530674
electric2002 |   -.156017   .3585375    -0.44   0.664     -.859584    .5475499
construc1997 |  -.3578289   .4849803    -0.74   0.461    -1.309518    .5938599
construc2002 |   .2981389   .4791796     0.62   0.534    -.6421672    1.238445
    sale1997 |    .057724   .2161539     0.27   0.789    -.3664402    .4818881
    sale2002 |  -.0249763   .2170548    -0.12   0.908    -.4509083    .4009558
transpor1997 |  -.1235529   .3389512    -0.36   0.716    -.7886852    .5415794
transpor2002 |   .0110107   .3390102     0.03   0.974    -.6542375    .6762589
financia1997 |   .0905741   .1711375     0.53   0.597    -.2452532    .4264014
financia2002 |  (dropped)
public_a1997 |   .0712955    .489607     0.15   0.884    -.8894725    1.032064
public_a2002 |   .0886716   .4800156     0.18   0.853     -.853275    1.030618
educatio1997 |   .4327448   .3629521     1.19   0.233    -.2794853    1.144975
educatio2002 |  -.4215692   .3614758    -1.17   0.244    -1.130902    .2877637
other_se1997 |   .4229558   .2587749     1.63   0.102    -.0848447    .9307562
other_se2002 |  -.4118384   .2607649    -1.58   0.115    -.9235438     .099867
       _cons |   .1453703   .2214528     0.66   0.512    -.2891921    .5799327
------------------------------------------------------------------------------
```

Table 29

STATA ESTIMATION OUTPUT, 1997-2002

Robust OLS, Refined

```
      Source |       SS       df       MS              Number of obs =    1203
-------------+------------------------------           F( 11,  1191) =   11.49
       Model |  30.1956803    11  2.74506185           Prob > F      =  0.0000
    Residual |  284.433993  1191  .238819473           R-squared     =  0.0960
-------------+------------------------------           Adj R-squared =  0.0876
       Total |  314.629673  1202  .261755136           Root MSE      =  .48869

------------------------------------------------------------------------------
   mob_02_lr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         sex |   .0082445    .029086     0.28   0.777     -.048821      .06531
        city |  -.0205769   .0071288    -2.89   0.004    -.0345633   -.0065905
    educ_voc |   -.032027   .0341548    -0.94   0.349    -.0990373    .0349833
   educ_prof |   .0895945   .0445816     2.01   0.045     .0021273    .1770617
    educ_bac |  -.1833296   .1151579    -1.59   0.112    -.4092646    .0426054
marr_gain~02 |   .0823711    .062463     1.32   0.188    -.0401786    .2049208
     inc97_a |  -.0010116   .0001079    -9.37   0.000    -.0012234   -.0007998
      german |   .1569656   .1160214     1.35   0.176    -.0706634    .3845947
      french |  -.5555407   .1871947    -2.97   0.003    -.9228089   -.1882726
  comp_97_02 |   .0804599   .0509498     1.58   0.115    -.0195015    .1804213
resid_ch_9~2 |  -.1552537   .0533786    -2.91   0.004    -.2599803   -.0505272
       _cons |   .2290662   .0374573     6.12   0.000     .1555766    .3025557
------------------------------------------------------------------------------
```

Table 30

STATA DESCRIPTIVE STATISTICS, 1997-2002

GEE

Variable	Obs	Mean	Std. Dev.	Min	Max
mob_	10420	-.0087948	.2734149	-5.768921	4.659561
age_1	43205	39.26895	16.66732	9	74
age_1_sq	43205	1819.844	1327.691	81	5476
sex	51846	.4273811	.4947032	0	1
health	51486	2.039273	.7235087	1	4
city	51846	3.318713	2.011969	1	6
kiev	51846	.0518459	.2217179	0	1
educ_long	33870	1.854586	1.790122	0	9
educ_long_sq	33870	6.643966	9.026712	0	81
educ_voc	51666	.3989122	.4896794	0	1
educ_prof	51666	.155769	.3626397	0	1
educ_bac	51666	.0146974	.1203397	0	1
education~ot	49974	4.343258	2.788647	1	11
comp_	51846	.0283532	.1659814	0	1
english	51846	.1065849	.3085877	0	1
french	51846	.0126143	.1116038	0	1
german	51846	.0451337	.2075993	0	1
marr_gain	51846	.0115342	.1067771	0	1
marr_	51846	.5990819	.4900892	0	1
inc_1	12387	220.9933	211.4975	1	8058.15
train_1	51845	.0105121	.1019892	0	1
exp_1	41844	14.59141	13.46751	0	59
exp_sq_1	41844	394.2788	558.2304	0	3481
resid_ch_	51846	.0211974	.1440433	0	1
agricult	51846	.0711916	.2571471	0	1
agricult_1	43205	.0720518	.2585767	0	1
industry_1	43205	.1245689	.3302333	0	1
industry	51846	.1233654	.3288593	0	1
electric_1	43205	.0164101	.1270481	0	1
electric	51846	.0163368	.1267685	0	1
sale_1	43205	.0797361	.2708874	0	1
sale	51846	.0785596	.2690527	0	1
transpor_1	43205	.0506654	.2193161	0	1
transpor	51846	.0502642	.2184918	0	1
public_a_1	43205	.0228214	.1493356	0	1
public_a	51846	.0227404	.1490762	0	1
educatio_1	43205	.1077422	.3100581	0	1
educatio	51846	.1073371	.3095444	0	1
other_se_1	43205	.038815	.1931559	0	1
other_se	51846	.0384601	.192306	0	1
construc_1	43205	.0308298	.1728583	0	1
construc	51846	.0304749	.1718916	0	1
financia	51846	.0104155	.1015243	0	1
financia_1	43205	.0105312	.102081	0	1

Table 31

STATA ESTIMATION OUTPUT, 1997-2002

GEE, Specification with the *number of years of education*

```
GEE population-averaged model                   Number of obs      =      7814
Group variable:                         v1      Number of groups   =      2309
Link:                             identity      Obs per group: min =         1
Family:                           Gaussian                     avg =       3.4
Correlation:                  exchangeable                     max =         5
                                                Wald chi2(41)      =    162.14
Scale parameter:                  .0757274      Prob > chi2        =    0.0000
```

mob_	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age_1	-.001055	.0017676	-0.60	0.551	-.0045195	.0024095
age_1_sq	.0000211	.0000201	1.05	0.294	-.0000183	.0000605
sex	-.0020374	.0064358	-0.32	0.752	-.0146514	.0105766
health	.0111324	.0049351	2.26	0.024	.0014597	.020805
city	-.0052503	.0017998	-2.92	0.004	-.0087779	-.0017228
kiev	.015375	.0098732	1.56	0.119	-.0039762	.0347262
educ_long	-.0104771	.0048994	-2.14	0.032	-.0200797	-.0008744
educ_long_sq	.0014072	.0009189	1.53	0.126	-.0003938	.0032083
education_~t	.0021141	.0013583	1.56	0.120	-.0005482	.0047763
comp_	.0623453	.022897	2.72	0.006	.017468	.1072227
english	.021043	.0119047	1.77	0.077	-.0022897	.0443758
french	-.0761679	.0302996	-2.51	0.012	-.1355539	-.0167819
german	.0218782	.0163008	1.34	0.180	-.0100708	.0538271
marr_gain	.0656144	.0277184	2.37	0.018	.0112873	.1199415
marr_	-.0107076	.0067177	-1.59	0.111	-.023874	.0024588
child_wom	-.0223153	.0369661	-0.60	0.546	-.0947676	.050137
inc_1	-.000133	.0000143	-9.30	0.000	-.000161	-.000105
train_1	-.0011101	.0295059	-0.04	0.970	-.0589405	.0567203
exp_1	-.0002398	.0007852	-0.31	0.760	-.0017787	.0012992
exp_sq_1	1.73e-06	.0000192	0.09	0.928	-.0000358	.0000393
resid_ch_	.0312501	.0213119	1.47	0.143	-.0105205	.0730207
agricult	-.0864994	.0381449	-2.27	0.023	-.161262	-.0117368
agricult_1	.0865989	.0381172	2.27	0.023	.0118904	.1613073
industry_1	.0371426	.035587	1.04	0.297	-.0326066	.1068918
industry	-.0107703	.0357284	-0.30	0.763	-.0807966	.059256
electric_1	.1056069	.0890666	1.19	0.236	-.0689605	.2801743
electric	-.0953175	.0896567	-1.06	0.288	-.2710414	.0804064
sale_1	-.0065285	.033481	-0.19	0.845	-.07215	.059093
sale	.0178632	.033435	0.53	0.593	-.0476681	.0833946
transpor_1	-.0410504	.0497401	-0.83	0.409	-.1385391	.0564383
transpor	.0382349	.0495386	0.77	0.440	-.058859	.1353288
public_a_1	.1144996	.0819495	1.40	0.162	-.0461186	.2751178
public_a	-.0673488	.0818137	-0.82	0.410	-.2277007	.0930032
educatio_1	.0311892	.041043	0.76	0.447	-.0492536	.1116319
educatio	-.0272564	.040959	-0.67	0.506	-.1075345	.0530217
other_se_1	.0229029	.0486341	0.47	0.638	-.0724182	.1182241
other_se	-.0089833	.048918	-0.18	0.854	-.1048608	.0868943
construc_1	-.0412887	.0470913	-0.88	0.381	-.133586	.0510087
construc	.0657127	.0467191	1.41	0.160	-.0258551	.1572805
financia	-.3254265	.1338791	-2.43	0.015	-.5878248	-.0630282
financia_1	.3367467	.1345619	2.50	0.012	.0730103	.6004831
_cons	.0147546	.0400039	0.37	0.712	-.0636516	.0931607

Table 32

STATA ESTIMATION OUTPUT, 1997-2002

GEE, Specification with the *type of education*

```
GEE population-averaged model                   Number of obs      =      7814
Group variable:                         v1      Number of groups   =      2309
Link:                             identity      Obs per group: min =         1
Family:                           Gaussian                     avg =       3.4
Correlation:                  exchangeable                     max =         5
                                                Wald chi2(42)      =    166.82
Scale parameter:                  .0756871      Prob > chi2        =    0.0000
------------------------------------------------------------------------------
        mob_ |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_1 |  -.0010194   .0017669    -0.58   0.564    -.0044825    .0024437
    age_1_sq |   .0000213   .0000201     1.06   0.289    -.0000181    .0000607
         sex |  -.0040091   .0064695    -0.62   0.535    -.0166891    .0086708
      health |   .0110668   .0049307     2.24   0.025     .0014028    .0207308
        city |  -.0054455   .0017896    -3.04   0.002     -.008953    -.001938
        kiev |   .0186749   .0099005     1.89   0.059    -.0007297    .0380795
    educ_voc |  -.0200454   .0070768    -2.83   0.005    -.0339157   -.0061752
   educ_prof |   .0152157   .0094526     1.61   0.107    -.0033111    .0337424
    educ_bac |  -.0360537   .0230611    -1.56   0.118    -.0812525    .0091451
education_~t |   .0020437   .0013643     1.50   0.134    -.0006303    .0047177
       comp_ |   .0629639   .0228989     2.75   0.006     .0180829    .1078449
     english |   .0223747   .0119541     1.87   0.061    -.0010549    .0458043
      french |  -.0805419   .0302563    -2.66   0.008    -.1398432   -.0212406
      german |   .0218033   .0163182     1.34   0.182    -.0101798    .0537864
   marr_gain |   .0664001   .0277137     2.40   0.017     .0120822    .1207179
       marr_ |  -.0104902   .0067068    -1.56   0.118    -.0236352    .0026549
   child_wom |  -.0217493   .0369605    -0.59   0.556    -.0941906    .0506919
       inc_1 |   -.000132   .0000143    -9.23   0.000      -.00016    -.000104
     train_1 |  -.0012858   .0294979    -0.04   0.965    -.0591006     .056529
       exp_1 |  -.0002424   .0007838    -0.31   0.757    -.0017787    .0012938
    exp_sq_1 |   2.69e-06   .0000191     0.14   0.888    -.0000348    .0000402
   resid_ch_ |   .0309311   .0213065     1.45   0.147    -.0108289    .0726911
    agricult |   -.086798   .0381376    -2.28   0.023    -.1615463   -.0120497
  agricult_1 |   .0871366    .038109     2.29   0.022     .0124445    .1618288
  industry_1 |   .0375776   .0355822     1.06   0.291    -.0321623    .1073175
    industry |  -.0116221   .0357212    -0.33   0.745    -.0816344    .0583902
  electric_1 |   .1032498   .0890531     1.16   0.246     -.071291    .2777905
    electric |  -.0948077   .0896526    -1.06   0.290    -.2705235    .0809082
      sale_1 |   -.007302    .033475    -0.22   0.827    -.0729118    .0583078
        sale |   .0187088   .0334302     0.56   0.576    -.0468132    .0842307
  transpor_1 |  -.0405002   .0497338    -0.81   0.415    -.1379766    .0569762
    transpor |   .0389833   .0495324     0.79   0.431    -.0580985    .1360651
  public_a_1 |   .1145871   .0819346     1.40   0.162    -.0460018     .275176
    public_a |  -.0682496   .0818128    -0.83   0.404    -.2285998    .0921006
  educatio_1 |    .031344     .04104     0.76   0.445     -.049093     .111781
    educatio |  -.0266451   .0409561    -0.65   0.515    -.1069177    .0536274
  other_se_1 |   .0242019   .0486335     0.50   0.619    -.0711181    .1195218
    other_se |  -.0106448   .0489211    -0.22   0.828    -.1065284    .0852388
  construc_1 |  -.0414729   .0470879    -0.88   0.378    -.1337636    .0508178
    construc |    .065031   .0467149     1.39   0.164    -.0265286    .1565906
    financia |  -.3233019   .1338604    -2.42   0.016    -.5856634   -.0609404
  financia_1 |    .336114   .1345379     2.50   0.012     .0724244    .5998035
       _cons |   .0096492    .039979     0.24   0.809    -.0687081    .0880065
------------------------------------------------------------------------------
```

Table 33

STATA ESTIMATION OUTPUT, 1997-2002

GEE, Refined

```
GEE population-averaged model                   Number of obs      =      8817
Group variable:                         v1      Number of groups   =      2593
Link:                             identity      Obs per group: min =         1
Family:                           Gaussian                     avg =       3.4
Correlation:                  exchangeable                     max =         5
                                                Wald chi2(21)      =    149.40
Scale parameter:                  .0770118      Prob > chi2        =    0.0000

------------------------------------------------------------------------------
        mob_ |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_1 |   -.001547   .0015305    -1.01   0.312    -.0045466    .0014527
    age_1_sq |   .0000202   .0000171     1.18   0.237    -.0000133    .0000538
         sex |   .0034611   .0057996     0.60   0.551     -.007906    .0148281
      health |   .0088051   .0045272     1.94   0.052    -.0000681    .0176783
        city |  -.0046747   .0016405    -2.85   0.004    -.0078901   -.0014593
        kiev |   .0192675   .0092318     2.09   0.037     .0011735    .0373614
   educ_long |  -.0083071   .0045713    -1.82   0.069    -.0172667    .0006524
educ_long_sq |   .0014667   .0008596     1.71   0.088    -.0002182    .0031515
       comp_ |   .0570222   .0223388     2.55   0.011     .0132388    .1008055
     english |   .0221825   .0109939     2.02   0.044      .000635    .0437301
      french |  -.0592296   .0274104    -2.16   0.031     -.112953   -.0055061
      german |   .0087587    .014468     0.61   0.545    -.0195981    .0371155
   marr_gain |   .0689509    .025872     2.67   0.008     .0182427     .119659
       marr_ |  -.0121418    .006276    -1.93   0.053    -.0244426     .000159
   child_wom |  -.0461598   .0278621    -1.66   0.098    -.1007686    .0084489
       inc_1 |  -.0001322   .0000139    -9.52   0.000    -.0001594    -.000105
   resid_ch_ |    .030877   .0203947     1.51   0.130    -.0090958    .0708498
    agricult |  -.0845509   .0351174    -2.41   0.016    -.1533797   -.0157222
  agricult_1 |   .0816756   .0350339     2.33   0.020     .0130105    .1503407
    financia |    -.24608   .1071399    -2.30   0.022    -.4560704   -.0360897
  financia_1 |   .2273339   .1076265     2.11   0.035     .0163899     .438278
       _cons |   .0484015   .0345843     1.40   0.162    -.0193825    .1161855
------------------------------------------------------------------------------
```

Figure 34

KAPLAN-MEIER SURVIVAL ANALYSIS

1997-2002