ON THE DURATION AND THE DETERMINANTS OF UKRAINIAN REGISTERED UNEMPLOYMENT. A CASE STUDY OF KYIV.

by

Serhiy Stetsenko

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Abstract

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Head of the State Examination Committee: Ms.Svitlana Budagovska,
Economist, World Bank of Ukraine

In our work we assess the factors affecting the duration of registered unemployment and the transition from the state of registered unemployment to alternative states using micro data collected by the Kyiv Public Employment Center during 2001-2003 years. Our study reveals significant heterogeneity across socio-demographic groups of individuals and significant positive effect of the amount of unemployment benefits on the duration of registered unemployment. The results of the multinomial logit analysis show that educated individuals, displaced workers, professional workers and females have difficulties in obtaining a job within a week after registration at the Public Employment Center. These findings have important implications for policymakers, for example, indicating the target groups for policy tools. For the empirical modelling of duration we employ the Kaplan-Meier product limit estimator and two competing risks models, one based on the Cox proportional hazard model and one based on the piece-wise constant exponential model.

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LIST OF ABBREVIATIONS

CEE	Central and Eastern Europe
FSU	Former Soviet Union
IIA	Independence of Irrelevant Alternatives
ILO	International Labor Organization
PCR	Personal Card Record
PEC	Public Employment Center
PH	Proportional Hazard
RLMS	Russian Longitudinal Monitoring Survey
SA	Social Assistance
SB	Social Benefits
UI	Unemployment Insurance

GLOSSARY

Registered Unemployment. An individual of working age is defined as unemployed if he or she does not have any earnings or other statutory income and if he or she is registered at Public Employment Center as looking for a job, ready and able to start suitable work.

International Labor Organization (ILO) Criteria of Unemployment. An individual aged in 15 – 70 (registered or not registered at the Public Employment Center) considered as unemployed if he or she have been out of job, have looked for a job actively during the last four weeks and have been ready to start work within two weeks.

Chapter 1

INTRODUCTION

The problem of unemployment attracts a lot of attention in the modern world. One of the statistics that is most often used in economics is the unemployment rate. This statistic involves both the fact of being unemployed and the duration of unemployment spell. Kiefer (1988) highlights the importance of the latter statistic. First, it is more useful than the rate of unemployment from the point of view of an individual's welfare, which depends on the time out of a job. Long period of unemployment may lead to the loss of work skills decreasing chances to find a job. In addition, employers may consider joblessness as a signal of low productivity. Being out of job for a long time may discourage the workers about future prospect and reduce their job search efforts. Second, unemployment duration is one of the key parameters in job search theory, which is outlined briefly later on.

There is a large discrepancy in unemployment inflow rates and durations across countries. In North America inflows into unemployment are high and unemployment durations are very low. In the EC durations are long and inflows are low. Norway, Sweden, Finland and Japan have both low inflows and low durations. At the present time about one hundred and fifty thousand individuals register themselves as unemployed each month in Ukraine. Some of them leave the register within a few weeks and others remain on it for a long time. Substantial resources are required to give unemployed workers social protection. Careful evaluation of incidence and duration of unemployment for different

socio-economic population groups will allow Ukrainian policy makers to work out an efficient social support system.

Particular attention is paid to the impact of unemployment benefits on duration of unemployment spells. It is widely thought that amount and timing of benefit payments to unemployed persons affect their reservation wages, and hence outflows from unemployment and the natural rate of unemployment.

There are important differences between labor markets under normal conditions and during the transition process. For example, in the former case the choice of education depends on the labor supply decision and thus, the study may be complicated by endogeneity bias. In a transition economy most educational choices were made before the drastic changes in labor markets and as a result, the problem of endogeneity was avoided. Another example is the radical changes in unemployment compensation system during transition. This fact allows evaluating the effect of the social benefits on job search efforts. Therefore, the labor markets in transition provide an excellent framework for labor supply studies.

The remainder of the paper is set out as follows. In the next chapter we present a review of the recent studies of the incidence and duration of unemployment in transition economies. Chapter 3 analyzes Ukrainian legislation which regulates the behavior of Labor Market participants. In Chapter 4 we provide a theoretical framework for modeling unemployment duration. Chapter 5 describes the data and econometric approach used for the estimation and presents the results of the analysis. Finally, we discuss the results and offer concluding remarks.

C h a p t e r 2

ANALYSES OF INCIDENCE AND DURATION OF UNEMPLOYMENT IN TRANSITION ECONOMIES: A REVIEW

Understanding the labor market is central
to understanding the modern economy
Devine and Kiefer, 1991

Boeri and Terrell (2001) show that the path of labor market adjustment is different in many countries with transition economies. They distinguish the CEE countries from the FSU countries and argue that differences between these two groups can be explained by differences in social policies. High non-employment benefits in most of the CEE countries imposed a lower bound on the wage distribution and thus, contributed to the steep increase in unemployment and accumulation of long-term unemployment. Despite the fact that the initial falls in output were similar between two groups the increase in unemployment was gradual in the FSU countries. The price for low non-employment was the drastic fall in real wages.[1] The wage adjustment trajectory of the FSU countries should have generated a relatively small pool of unemployment with a low share of long-term unemployment. In the absence of the upward pressure on the minimum wage low-skilled workers should have relatively high chances for employment. Many papers have recently been devoted to the evaluation of the labor market dynamics in the CEE countries. However, few of them use micro data sets for duration analysis because such data sets are very hard to obtain. Ham et al.(1998)

[1] The question of optimal path of reforms in transition economies is hotly debated in modern economic literature (Stiglitz, 1999, Gomulka et al.,2000) and is beyond the scope of this work.

investigate unemployment in the Czech Republic compared to Slovakia using data from local labor offices. Their study reveals three to four times longer average unemployment spell in Slovakia than in Czech Republic and only a moderate negative effect of unemployment benefits on the length of the spell. Education has a significant positive effect on the exit rate from unemployment in Slovakia but not much effect in Czech Republic. This implies that individuals with less education should be target groups for policies in Slovakia. The impact of age is negative and similar in quantity in both countries. Single males have similarly lower hazard rates.

Earle and Pauna (1996) investigate registered unemployment in Romania. They found long duration and high unemployment among people with secondary and vocational education pointing to potential target groups for policy interventions.

Non-parametric and parametric duration models are employed to analyze unemployment in Hungary in the series of works by Micklewright and Nagy (1995, 1996a, 1996b). Using a large sample(about 100 000) of individuals who registered in December 1992 and January 1993 they discovered positive effect of education and negative effect of age on the probability to enter employment. Reducing entitlements in January 1993 did not lead to increase in exit rates from the register. The empirical job exit hazard for UI recipients reveals the spike in Spring 1993, when unemployment in Hungary started to decrease. At the same time no rise in hazard is observed just before the time of entitlement exhaustion. The authors find it difficult to explain this fact since welfare transfers for UI exhausters are much lower than UI. Using the data from the March and April 1994 inflow to the register and follow-up survey of the individuals whose entitlement expired Micklewright and Nagy found the steep increase in the hazard of exit to a job in the first week after the entitlement exhaustion, which

may indicate that many people plan their return to work to coincide with the exhaustion of UI.

Lubyova and van Ours(1998) find that male, young, higher educated job losers in districts with low unemployment rates have shorter unemployment spells. The novelty in their work is the distinction between job losers and school leavers. The authors find no disincentive effect of the Slovak benefit system.

Vodopivec (1995) uses records on registered unemployed to analyze the duration of unemployment in Slovenia. The results show that more skilled and younger workers have higher probabilities to enter a job, males and females have equal chances to find a job. He finds also significantly lower probabilities of finding job for the recipients of unemployment benefits than for the non-recipients and argues that shortening of benefits would shorten the period of unemployment.

In general, most existing studies find positive effect of education and negative effect of age on the probability to exit unemployment and higher employment chances of males compared to females.

Despite the differences in labor market adjustments among CEE countries they share many common features, for example, generous unemployment benefits. We observe completely different stories in FSU countries. Since this work is devoted to studying of Ukrainian labor market, the papers analyzing labor markets in these counties deserve a lot of attention. Unfortunately, only a few papers are devoted to the analysis of labor markets using individual labor force histories in FSU countries.

Foley (1997) analyzes the determinants of Russian unemployment duration using the data from 1992-1994 RLMS (Russian Longitudinal Monitoring Survey) panel.

Employing a discrete time duration model the author shows that married men have an advantage in finding a job compared to married women. Older individuals have longer unemployment spells than young workers. The effect of higher education on the jobless spells is insignificant as well as the effect of the existing safety net. Introduction of unobserved heterogeneity does not alter the major results in case of exit to employment model and increases the magnitude of significant coefficients in case of exit to out of the labor force model. Finally, Foley finds evidence of duration dependence, which is positive in the first 7 months and then declines until approximately 18 months. The data used in this study have one significant drawback. Individuals are interviewed a maximum of four times with intervals of six months. Such low frequency data might seriously distort the results because of possible round tripping and because only unemployed persons were asked about their unemployment duration and those who exited unemployment between the consequent interviews were assumed to have their spells completed halfway between these interviews.

Grogan and van den Berg (1999) employ parametric and non-parametric models to investigate the duration of unemployment in Russia between 1994 and 1996 using RLMS data. Contrary to Foley (1997) they found that higher educated individuals have shorter unemployment spells than their less educated counterparts. The analysis suggests that females spend less time in unemployment pool than males and married females have relatively longer spells compared to unmarried females. The incidence of unemployment is higher for younger individuals but there is no significant difference across age groups in terms of expected duration. The mean duration of unemployment is 6.4 months, which is much lower than 10.3 months reported by Foley (1997). The authors explain this fact by differences in the sample frame. They found positive duration dependence and unimportance of unobserved heterogeneity in their data. This fact may indicate that unemployed individuals lower their reservation wage or

increase the search efforts as their spell lengths become longer. The problems similar to those discussed in previous paragraph have led to spurious spike in empirical hazard.

Nivorozhkina et al. (2002) employ transition data analysis to investigate the duration of registered unemployment using the data on individuals registered as unemployed at the public employment offices of the large Russian industrial city Rostov-on-Don. The results to a large extant are similar to the results of Foley (1997). The average spell of females is significantly longer compared to the one of males. Young individuals entering the labor market for the first time have high probabilities to exit unemployment. Unlike Foley the authors find that the timing and the size of unemployment benefits have positive effect on the length of the jobless spell.

To our knowledge there are no papers investigating the issue of the duration of unemployment for Ukrainian labor market using micro data. The causes are the non-availability of appropriate data sets and the fact that computer data collection began only recently.

Data availability and limitations constitute a set of constraints for a researcher both being forcefully bounding in FSU countries. The latter type of constraint restricts the choice of potential methodological approach to the problem. Duration models are powerful instrument for analysis of survival times but their merits are questionable when they are applied to LFS (Labor Force Survey) data, which are quarterly or annual data. Potential problems have been outlined above with respect to the work of Foley (1997). Estimating discrete transition probability models might be more appealing in this context.

The choice of Kyiv labor market is motivated by the availability of the data. The data set that is used in the current analysis is unique. It contains many records on registered unemployed, which are continuously updated whenever any changes take place. This fact allows employing duration models avoiding the above-discussed problems attached to survey data. Two other reasons are worth to be mentioned in support of the validity of this work. First, Kyiv is a city with a population of about three million people and should be treated separately from other regions because of its status and specific characteristics. Average monthly wage and as a consequence the average level of unemployment benefits in Kyiv is several times higher compared to the rest of Ukraine. The labor market in Kyiv is more flexible than that in other regions. For example, the number of unemployed per one vacant job reported by enterprises equals one in Kyiv compared to eleven in Ukraine as a whole in 2001. In some regions this number approaches one thousand. Second, registered unemployment is used for official statistics and elaborating of policy measures to combat unemployment and therefore, it needs investigation. There is a large discrepancy between the LFS and registered unemployment in FSU countries because many job seekers do not apply to the employment center for assistance. Registered unemployment is only a fraction of LFS unemployment in Ukraine and Kyiv in particular. However, the analysis can still be valid as long as registered unemployment is close to a random sample of LFS unemployment and, hence, selection biases are not too large. This problem is analyzed more carefully in Chapter 5.

Chapter 3

OVERVIEW OF LABOR REGULATIONS IN UKRAINE

This chapter covers the main aspects of Ukrainian labor market and regulations.

3.1. Laws on Employment of Population and on Compulsory State Social Unemployment Insurance.

In accordance with the Law of Ukraine on Employment of Population (1991) an individual of working age[2] is defined as unemployed if he or she does not have any earnings or other statutory income and if he or she is registered at Public Employment Center as looking for a job, ready and able to start suitable work. Persons under sixteen except those who were laid off, job seekers without experience and without profession (including school leavers) who reject an offer of training or a paid job and persons who have the right for pension according to the legislation cannot be admitted as unemployed(Article 2). In case there is no suitable job for a person, the Public Employment Center assigns the status of unemployed to such an individual on the eighth day after the date of registration as job seeker. In order to be registered an individual is required to produce a passport and a work history book and if necessary, military record, certificate of education or other documents that can replace them. A job is defined as suitable if it corresponds to the education, occupation and skills of the worker who lives where the job is offered. Wage has to correspond to its previous level taking into account the last month average wage in the industry. For individuals without profession who search for a job for the first time the job is said to be suitable if it requires prior vocational training or paid job (including temporary) that does not

[2] According to Ukrainian legislation working age starts at 16 and continues until 55 for females and 60 for males.

require training. Timing and amount of unemployment insurance is regulated by the Law of Ukraine on Compulsory State Social Unemployment Insurance (2001). By this Law Compulsory State Social Unemployment Insurance Fund, hereinafter Fund, was created to manage the unemployment insurance, to collect and accumulate insurance premiums, to control the usage of the funds and to provide social safety nets. Insurance premiums paid by employers and employees are one of the fund sources. According to the Law persons who work on terms of labor agreement including part-time workers and civil alternative servicemen are obliged to mandatory unemployment insurance. Working pensioners and persons who have rights for pension according to the legislation, foreigners and individuals without citizenship who work in Ukraine temporarily and does not fall into category regulated by international agreements are not obliged to mandatory unemployment insurance.

Any insured person is eligible for Unemployment Insurance (UI) and Social Benefits (SB). Non-insured persons eligible for UI and SB are militaries laid off without right for pension, individuals without work experience and other non-insured in case of their registration as unemployed in proper legal manner. Registered as unemployed insured persons who have worked during 12 months before the beginning of their unemployment no less than twenty six weeks and paid insurance premiums are eligible for UI that is calculated taking into account their work experience. Registered as unemployed individuals who have worked during 12 months before the beginning of their unemployment less than twenty six weeks, individuals who have been out of job more than six months and insured persons displaced from their last place of work for violating the terms of labor agreement are eligible for UI which does not taking into account their work experience. UI is paid starting from the eighth day after registration of an individual at Public Employment Center.

An entitlement period for an eligible unemployed individual must not exceed 360 days during two years. An entitlement period for an individual of pre-retired age[3] must not exceed 720 days.

The level of UI is set as the percentage of the individual's average wage (income)[4] for insured persons depending on the work experience and is shown in Table 1.

Table 1. Level of UI as the percentage of average wage (income) depending on work experience.

Work Experience, years	Percentage of average wage, %
Up to 2	50
From 2 to 6	55
From 6 to 10	60
Above 10	70

During the first 90 days the level of UI is set at 100% of the determined in Table 1 amount, during the next 90 days at 80% and further at 70%. For individuals whose work experience is not taken into account UI is set at minimum level defined by legislation. Workers who voluntarily quit their last place of job without important reason receive UI according to the rules determined above but payments start from 91st day. The level of UI cannot be higher than the last month average wage in the region and lower than minimum level of unemployment insurance.[5] Minimum monthly level of UI is set by decrees of Fund according to the economic situation in Ukraine. Table 2 shows the evolution of this level starting from the year 2001.

[3] A person is said to be of pre-retired age during 2 years prior the right for pension.

[4] Average wage (income) is determined according to the rule set by Cabinet of Ministers of Ukraine for calculation of state social insurance payments. All incomes charged for social insurance are taken into account. In 2001 average income was calculated based on income during two previous months.

[5] The body of the Law contains the term subsistence level, which is set by Ukrainian Parliament, to indicate the lower bound for UI, however, till the stabilization of the economic situation minimum level is determined on the strength of Fund capabilities

Table 2. The time path of the minimum monthly level of UI starting from the year 2001.

Time period	Minimum monthly level of UI, in nominal[6] UAH.[7]
January 2001 – April 2001	37
May 2001 – November 2001	45
December 2001 – January 2002	60
February 2002 – August 2002	67
September 2002 – Present	74

Table 3 shows the time path of average monthly wage, which determines the maximum level of unemployment benefits with one month lag, in Kyiv.

Table 3. Kyiv average monthly wage in 2001.

Month	Average monthly wage, in nominal UAH
January	434.0
February	458.3
March	492.7
April	511.3
May	533.6
June	576.6
July	574.3
August	574.6
September	580.1
October	564.2
November	565.1
December	733.1[8]

Source: Ukrainian State Statistics Committee.

[6] Average monthly change of CPI in Kyiv was 0.57 % in the year 2001 and 0.3% in the year 2002. Real values of UI are used for estimation.

[7] 1U$ ≈ 5.4 UAH in 2001.

[8] The increase of wage in December is explained by holiday bonuses, which are not taken into account calculating the level of UI.

During the period of vocational training insured individuals are eligible for social assistance according to the timing and amount of UI. An unemployment individual whose UI expires can receive social assistance if his or her average household income is lower than minimum level. An entitlement period for this welfare is 180 days and its amount is set at 75 percent of minimum level. Laid-off individuals who receive unemployment insurance from employers are eligible for UI or social assistance during the period of vocational training after up to three-month waiting period. An entitlement period for individuals who voluntarily quit their last place of work, displaced from their last place of work for violating the terms of labor agreement, reject two propositions of suitable job or training, withhold information about part-time job during receiving UI or break the terms of registration is shortened on the up to 90 day period. A job is defined as suitable if it corresponds to the education, occupation and skills of the worker who lives where the job is offered. Wage has to correspond to its previous level taking into account the last month average wage in the industry. For individuals without profession who search for a job for the first time the job is said to be suitable if it requires prior vocational training or paid job (including temporary) that does not require training.

Persons who look for a job for the first time and other non-insured persons are eligible for UI in case of their registration as unemployed in proper legal manner. UI is paid starting from the eighth day after registration of an individual at the Public Employment Center. The entitlement period of such an eligible unemployed individual can not exceed 180 days.

Chapter 4

JOB SEARCH THEORY

4.1. A Model of Job Search

This section presents the basic theoretical framework for the empirical analysis. Econometrics methods for studies of duration data are based on specification of the hazard rate. According to the job search models by Mortensen (1970) and Lippman and McCall (1976), the probability of being employed for a job seeker can be decomposed into the product of the probability to receive a job offer and the probability to accept this job offer. The former depends on personal characteristics such as education, skill level, experience and local demand conditions such as unemployment and vacancy rates. The latter depends on the reservation wage, which is determined by equating the cost of searching to the present value of future labor income at the margin. Formally, the probability of being employed in an interval Δt for a job seeker is denoted as $\lambda\Delta t$. The probability to receive a job offer equals $\delta\Delta t + o(\Delta t)$ under assumption of Poisson arrival process, where $o(\Delta t)$ is a negligible function such that $o(\Delta t)/\Delta t \to 0$, $\Delta t \to 0$. The probability to accept this job offer is denoted by $\pi(w^r)$ and equals

$$\pi(w^r) = \int_{w^r}^{\infty} f(w)dw = 1 - F(w^r),$$

where w^r is the reservation wage, F(w) - distribution function and f(w) – density of a known wage distribution. All structural parameters are supposed to be constant over time.

Thus,

$$\lambda\Delta t = (\delta\Delta t + o(\Delta t))\pi(w^r)$$

Dividing this equation by Δt and taking limits as $\Delta t \to 0$ we obtain $\lambda = \delta\pi(w^r)$, which is referred to as the instantaneous employment probability or hazard rate. The assumption of a stationary search environment implies that it is constant over the spell.

Now we allow the hazard rate to vary over time. Let T be the random variable, which defines the length of unemployment spell,

$F(t) = Prob(T < t)$ – distribution function.

$S(t) = 1\text{-}F(t) = Prob(T \geq t)$ – survival function

It is usually supposed that the probability of failure during the interval $[t, t + \Delta t)$ given that duration last till t equals:

$$Prob(t \leq T < t + \Delta t,\ T \geq t) = \lambda(t)\,\Delta t + o(\Delta t)$$

$\lambda(t)$ - the rate at which spells will be completed at time t given they last until t is the hazard function and

$$\lambda(t) = \lim_{\Delta t \to 0} \frac{\Pr ob(t \leq T < t + \Delta t, T \geq t)}{\Delta t} = \frac{f(t)}{1 - F(t)} = \frac{f(t)}{S(t)} = -\frac{d \ln S(t)}{dt}$$

Positive duration dependence exists at t^* if $\frac{d\lambda(t)}{dt} > 0$ at $t = t^*$.

Negative duration dependence exists at t^* if $\frac{d\lambda(t)}{dt} < 0$ at $t = t^*$.

4.2. Three-State Model

So far we have considered only movements into and out of employment. A more realistic model allows three labor market states: employment, unemployment and nonparticipation denoted as e, u, and n correspondingly. The hazard rate for leaving the state i, i = e,u,n is defined as

$$\lambda_i = \sum_{\substack{j=e,u,n \\ j \neq i}} \lambda_{ij}$$

Because the unemployment spell can end in different ways this setting is called "competing risks".

Chapter 5

EMPIRICAL ANALYSIS

5.1. Data Description

Duration data analysis is traditionally used for the estimation of the conditional probability to exit unemployment. There are two major sources of micro data sets used for such models. A first is Labor Force Surveys (LFSs) and a second is Unemployment Register data (Public Employment Centers (PECs)). In Ukraine official statistics report two rates of unemployment: one is based on the information from the PECs and the other is based on LFSs data. Registered unemployment rate is calculated using the outlined above definition stated in the Law of Ukraine on Employment of Population (1991). Statistics based on LFSs calculate the rate of unemployment according to the methodology of the International Labor Organization (ILO). According to the ILO definition an individual aged in 15 – 70 (registered or not registered at the PEC) considered as unemployed if he or she have been out of job, have looked for a job actively during the last four weeks and have been ready to start work within two weeks (Economically Active Population in Ukraine, 2001). Persons that have found a job and are waiting for a call as well as participating in the training programs organized by the PEC also fall under the definition of unemployed.

For this study we are going to use the data on 5251 men and women who registered at their employment office as unemployed between January 1, 2001

and December 31, 2001.[9] Two disadvantages arise from using such a sample. First, this data set enables us to investigate unemployment in the capital of Ukraine and does not permit to extend inferences to the whole territory of the country. Second, since registered individuals self-select themselves, potential selection biases arise that make it difficult to generalize the findings to the unemployed based on ILO criteria. Later on we will discuss the potential direction of the biases. Despite these obvious problems we hope that our work will help to shed some light on the issue of unemployment in Ukraine because no other micro data set is available for this kind of research at the present time.

We select for duration analysis the cohort of 1500 unemployed individuals who received the status of unemployed at the PEC from January 1, 2001 to June 31, 2001. Further we follow these individuals from the time of their registration to the termination of their unemployment or March 31, 2003, whichever comes first. Such a choice allows to observe these individuals during the period of time sufficient for reliable estimates and to control for macroeconomic environment. The sample contains both completed and censored spells. Individuals who transit to retirement or participate in training programs are removed from the analysis since they may be characterized by different behavior. We discard also the observations on individuals who have missing relevant values. For example, some individuals miss marital status indicators because employees of labor office were not obliged to record this variable in 2001. After adjusting the sample we are left with 1025 individuals for duration analysis.

The characteristics of individuals registered at the PEC are stored in personal card records (PCRs). There are above 200 entries in each PCR, which is updated whenever any change in the personal characteristics takes place. A PCR contains

[9] There are ten local employment offices in Kiev. All micro data are taken from the largest one, Desnyanskiy Employment Center.

socio-demographic and professional characteristics of a registered individual (age, gender, marital status, education, profession, etc.), reason for joblessness (voluntary quit, laid off, school leaver), information on the destination of an individual exiting the register (employment, early retirement, training, etc.) and timing and amount of unemployment benefits.
The list of variables used throughout the analysis and their descriptive statistics is given in Table 1 of the Appendix.

Further we consider comparative characteristics of registered and LFS unemployment in Kyiv. Figure 1 of the Appendix shows the age composition of unemployment in Kyiv in the year 2001 based on the data from LFS and our dataset. We can see that the statistics for two data sources are quite similar. LFS reports lower percentage of unemployed under 20 (5.6% vs. 9.7) and higher percentage of unemployed aged 25-34 years. As can be seen from the Figure 2 of the Appendix distribution of unemployed by education is akin for two samples. Figure 3 of the Appendix depicts the composition of unemployment in Kyiv in the year 2001 according to the cause of unemployment. We can see that distribution is almost identical for two samples. The analysis of the distribution of unemployment by three characteristics (age, education, cause of unemployment) shows that composition of unemployment in two samples is quite similar, which allows us to hope that selection biases might be not so significant. On the other hand some unobserved characteristics such as motivation may contribute to the potential biases. An interesting issue is the gender composition. According to the LFS data females constituted 48% of unemployed in Kyiv in 2001. Unemployment rate was 6% and 6.2% for women and men correspondingly. The same statistic was 1% for women and 0.27% for men based on registered data. Our data set contains 66.4% of females, which is consistent with the 62.8% of females out of all registered in Kyiv in the year 2001. Table 2 of the Appendix presents the dynamics of registered unemployment and layoffs in Kyiv by gender

for the years 1991-2001. As can be seen from the Table 2 of the Appendix the discrepancy between gender composition and unemployment rates for LFS and registered data can be explained by higher inflows of females into the register. At the same time proportion of females in outflows from the register is approximately the same as in inflows. Both these parameters oscillate around 60%. The persistent increase in the proportion of females in the stock of registered unemployed may be explained by longer unemployment spells of females. This fact also contributes to much higher unemployment rate for female. Females constitute significantly higher proportion of displaced workers during reference period although this number is decreasing over time. Vacancy rate[10] for females is much lower than for males, which indicates that employers are reluctant to hire women, probably at least partly due to the costs attributed to child care. Females also are more likely to be attracted by UI and they are typically more persistent in endeavoring of housing subsidies on the one hand and they rely on the help of the state more than males on the other. Summarizing, we can note that in terms of gender the selection bias is strong and we have to be careful with statements about the impact of gender on unemployment duration in general.

5.2. The Econometric Methodology

Duration models have been introduced fairly recently in the economic literature but economists used them widely nowadays. Excellent econometric expositions can be found in Lancaster (1990) and Kiefer (1988).

Both nonparametric and parametric models are used for duration data analysis.

[10] Vacancy rate is calculated based on reports of enterprises to PECs.

Suppose we observe duration data $t_1, t_2, \ldots t_N$, where some observations are censored because at the date of termination of the monitoring the process is ongoing.

Nonparametric models. The Kaplan-Meier product limit estimator is an empirical approach to hazard function estimation. Assuming no censored observations empirical estimators of survival function and hazard rate will be accordingly

$$\hat{S}(t) = \prod_{i=1}^{j} (n_i - h_i)/n_i \quad \text{and} \quad \hat{\lambda}(t_j) = h_j/n_j,$$

where t_j – survival times, $1 \leq j \leq N$, N is the sample size, n_j - number of individuals whose observed duration greater or equal than t_j, h_j - number of observed spells completed at time t_j. Cumulative hazard can be estimated as

$$\hat{\Lambda}(t) = \sum_{i \leq j} \hat{\lambda}(t_j)$$

Allowing for censored spells modifies n_j leaving all other things unchanged:

$$n_j = \sum_{i \geq j}^{K} (h_i + m_i),$$

where K is the number of completed spells, m_j - the number of observations censored between t_j and t_{j+1} .

The nonparametric approach is immune to the problem of improper specification or heterogeneity, which may arise because different individuals may have different duration distributions, but cannot provide much information and used typically as a benchmark.

Parametric models. Assuming a specific distribution for T we make the data distribution to be known up to the vector of unknown parameter θ. Denoting the

known density of a duration of length t as f(t,θ), where θ is an unknown parameter, the log-likelihood is written as

$$L(\theta) = \sum_{i=1}^{N} d_i \ln f(t_i, \theta) + \sum_{i=1}^{N} (1 - d_i) \ln S(t_i, \theta),$$

where $d_i = 1$ if the ith spell is uncensored and 0 otherwise, $1 \leq i \leq N$, N – sample size. The exponential distribution assumes constant hazard and is of particular interest because of its simplicity. It plays the same role in the duration models as OLS in the linear regression model. To capture the effect of external factors explanatory variables may be incorporated into the model. While parametric models are simple and easy to interpret they impose specific structure on the data and thus, may distort the results.

Cox proportional model. To capture the effect of external factors on the distribution of duration proportional hazard (PH) specification has been proposed. In this model the hazard function for person *i* depending on a vector of individual characteristics x_i and a vector of unknown parameters β is assumed to take the following form:

$$\lambda_i(t, x_i, \beta, \lambda_0) = \exp(x_i \beta) \lambda_0(t),$$

where $\lambda_0(t)$ is a baseline hazard, which is unknown and describes the risk for individuals with $x_i = 0$. With this specification we have

$$\frac{\partial \ln \lambda_i(t, x_i, \beta)}{\partial x_i} = \beta$$

So the coefficient can be interpreted as the constant proportional effect of x_i on the conditional probability of completing a spell. This specification may be written in the linear model form

$$\ln \lambda_i(t) = \ln \lambda_0(t) + x_i \beta$$

In PH model $\exp(x_i \beta)$ scales the baseline hazard by the same proportion at each value of *t*. Partial-likelihood estimation is the appropriate estimation procedure in

this context. Assuming no censoring and no ties in the durations the conditional probability that observation 1 fails at duration t_1, given that any of the n observations has not failed yet at duration t_1, is

$$\frac{\lambda(t_1, x_1, \beta)}{\sum_{i=1}^{n} \lambda(t_1, x_i, \beta)}$$

Proportional hazard assumption reduces this expression to

$$\frac{\exp(x_i'\beta)}{\sum_{i=1}^{n} \exp(x_i'\beta)}$$

Censoring and ties can be easily handled in this framework.[11] The log-likelihood function is obtained by multiplication of the individual contributions and looks as follows:

$$\text{Ln } L = \sum_{j=1}^{D} \left\{ \sum_{k \in D_j} x_k'\beta - h_j \ln\left[\sum_{t \in R_j} \exp(x_i'\beta) \right] \right\}$$

where j indicates the ordered failures times t_j, (j = 1, … ,D), D_j is the set of h_j observations that fail at t_j, R_j is the set of observations k that are at risk at time t_j. The nature of PH model admits easily extensions that allows for covariates that change over time. Meyer (1990) highlights two advantages of nonparametric estimation of the baseline hazard. First, this approach avoids inconsistent estimation of covariate coefficients due to a misspecification of the baseline hazard. Second, the baseline hazard parameters can provide useful diagnostics.

Semi-parametric hazard model. The parametric models impose strong restrictions on the shape of the hazard function, and the Cox PH model imposes none. Piece-wise constant exponential model sometimes is used as an in between approach.

[11] For details, see Kiefer (1988)

The hazard is supposed to be constant within survival time intervals but allowed to differ for different intervals:

$$\ln\lambda_i(t) = \ln\lambda_{01} + x_i\beta \,,\ t \in [0,\tau_1)$$
$$\ln\lambda_i(t) = \ln\lambda_{02} + x_i\beta \,,\ t \in [\tau_1, \tau_2)$$
$$\dots$$
$$\ln\lambda_i(t) = \ln\lambda_{0K} + x_i\beta \,,\ t \in [\tau_{K-1}, \tau_K)$$

To estimate such model we need to generate variables that allow the constant to differ from interval to interval.

Competing risks model. Consider now a situation where an observed subject can have several possible destinations, in our case an exit from unemployment register can stem from employment or from other reasons. The proportional hazard model can be extended in this case considering J different exit destinations and can be tackled using latent variable framework. If we consider a latent random variable, which defines the length of the spell for each possible destination, then we observe only the minimum of latent lifetimes (right censoring is one of the competing risks) . Lancaster (1990) shows that assuming away correlation between the risks the log-likelihood of this model can be decomposed into the sum of terms, each of which is determined by the parameters of a single cause-specific hazard only. This separability property allows estimating the hazard of transition from state *i* to state *j*, for example, treating spells ending with a transition to state different from *j* as censored.

Unobserved heterogeneity(frailty). The specifications outlined above assume implicitly that the explanatory variables account for all heterogeneity across individuals. However, it is likely that unobserved and unobservable variables are the sources of differences between observations. Incomplete specification also leads to problem of heterogeneity. This problem is especially severe for hazard models

because it causes predictable overestimation of the degree of negative duration dependence even if omitted variables are orthogonal to included regressors. Parametric modeling of the heterogeneity is the common approach to deal with this problem. This approach assumes that unobserved differences across individuals are captured by multiplicative scaling term, ν_i. This is a positive random variable with unit mean and unknown variance σ^2, distributed independently from both x_i and t. Suppressing the subscript i for simplicity the hazard for each observation is written as

$$\lambda_v(t) = \lambda(t, x)v$$

For proportional hazard models the frailty hazard is

$$\lambda_v(t) = \lambda_0(t) \exp(x'\beta)v = \lambda_0(t) \exp(x'\beta + u) \text{ or}$$

$$\ln(\lambda_v(t)) = \ln(\lambda_0(t)) + x'\beta + u$$

where $u = \ln(v)$ error term with zero mean. Specifying the distribution for v unobserved effects are incorporated into estimation. Typically v is supposed to be gamma distributed with unit mean and unknown variance σ^2. If there is no frailty, then $\sigma^2 = 0$, or $\text{Var}(v) = 0$. This discussion suggests obvious test for no frailty. Recent studies have shown that in case of non-parametric hazard estimation the biases in the non-frailty models are negligible.

5.3. Estimation Results

A large part of individuals (42.5% in our sample) flows out of the register within 7 days after registration not receiving the status of unemployed. In order to analyze who these people are and to assess the effect of different factors that influence the probability of leaving the PEC to the states other than retirement within 7 days after registration we set up the multinomial logit model with the

dependent variable MULTIEXIT7DAYS. It takes three possible values. An individual can stay at the register, exit to employment or exit to states other than employment within 7 days after registration. In most cases individuals are denied receiving the status of unemployment because of nonattendance of the PEC. As can be seen from the Table 3 of the Appendix females have higher chances to stay at the PEC after 7 days from the registration. Youth has positive but insignificant coefficients in case of exit to employment and positive significant coefficients in case of exit to other states. Less educated people have significantly higher probability of transiting from the PEC to employment within 7 days than people with higher educational achievements. Coefficients on education are insignificant for transiting to other states model. Workers who voluntarily quit their last place of job have significantly higher probabilities to leave the register to any state within 7 days compared to displaced workers. There are two possible driving forces to explain this fact. First, individuals who voluntarily quit their last place of job tend to be more energetic and therefore, they put more job search efforts. Second, they receive UI after three month waiting period and therefore, have less incentive to stay at register attracted by unemployment payments. Workers without profession have higher chances to leave the register within 7 days. The results of the multinomial logit analysis indicate that educated individuals, displaced workers, professional workers and females have difficulties in obtaining a job within a week after registration at the PEC. Structural unemployment and high reservation wage are possible explanations in case of educated and professional workers. Displaced workers and females are probably discriminated by employers and attracted stronger by unemployment benefits. Youth seems to be disappointed with the PECs services because young individuals tend not to attend the PEC after initial registration.

A strong assumption of multinomial logit model is the property of independence of irrelevant alternatives (IIA). We re-estimate the model, excluding the outcome

exit to employment, and perform a Hausman test. It reveals P-value = 0.99 and indicates that there is no evidence against IIA assumption. Testing against remaining alternative destination state produces negative χ^2 statistic. It provides strong evidence that we cannot reject the null hypothesis of not systematic difference in coefficients. Employing robust variance estimator does not lead to any significant changes in the results.

Figure 4 of the Appendix shows the Kaplan-Meier product limit estimate of the hazard function based on one month time intervals in order to avoid yielding more details than required. Straight vertical lines depict 95% confidence intervals. We can see that conditional probability is approximately stable during the first 350 days. Then the hazard function reveals a spike near the time of entitlement exhaustion, which may indicate that people plan their exit out of the register using UI as extra income to their informal earnings. Reaching the maximum the hazard gradually declines over the analysis time. We can see also that confidence intervals become wider as the duration increases. This is explained by the fact that standard errors become larger because the sample size is effectively smaller for inferences about long durations. Figure 5 and Figure 6 of the Appendix show the survival and hazard functions correspondingly, stratified by gender. Survival functions clearly show that males have significantly higher probability to exit registered unemployment. Likelihood-ratio and log-rank tests of homogeneity of gender groups are both rejected with p-values equal to zero. It indicates that group heterogeneity plays significant role in determining the duration of registered unemployment.

Tables 4 and 5 in the Appendix show the results of competing risks models estimation. One destination state is employment with or without assistance of the PEC. The other one consists of several possible outcomes and is called out of the register. Approximately two thirds of the individuals in this category are classified as those who violated the rules of registration. Violations are nonattendance of

the PEC every two weeks, rejection of the two suitable job offers, rejection of the training, fraud of the PEC. Some individuals leave the register because of imprisonment, change in residence, entering military service or educational institution, etc. The daily precision duration data and hence the absence of many failure time ties, allows us to adopt a continuous-time specification. The discrete-time procedure is a good approximation to continuous-time duration models and it allows making estimation easier, especially in case of unobserved heterogeneity. It would be interesting to employ discrete-time approach and to compare the results and may be considered as the prospect for further research. However, the STATA 7 framework allows setting up all necessary for reliable results continuous-time models and hence, we use this approach. Specifications (1a) and (1b) adopt Cox PH estimates, specifications (2a) and (2b) employ piecewise constant baseline hazard technique, while models (3a) and (3b) use semi-parametric hazard specification accounting for unobserved heterogeneity with gamma distributed scaling factor, where small a indicates a model of exit to employment and small b indicates a model of exit out of the register. For both models (1a) and (1b) the hypothesis of proportional hazard assumption cannot be rejected at conventional 5% significance level.. Global tests based on Schoenfeld residuals revealed p-value 0.07 in case of exit to employment model and 0.11 in case of exit out of the register model. We can see that adopting piecewise constant exponential model does not lead to any significant changes in the results. Specifications (3a) and (3b) show that unobserved heterogeneity does not appear to be the problem in our case. LR test of $\sigma = 0$ reveals p-value equals 1 for exit to employment model and 0.243 for exit to other states model. Employing robust estimation of variance does not alter the results significantly. The results of robust estimation are not reported for brevity.

The results show that age plays a significant role in determining the hazard. Younger workers tend to leave the register faster to both competing destinations than their older counterparts. The hazard of transition for individuals aged fewer

than 20 is approximately three times higher comparing to the default category of people over 50 years old. The finding of negative effect of age complies with findings of most works outlined in the literature review section.

Males have significantly higher chances than females of exiting the register. Possible explanations were discussed in data description section. Marital status per se appears to be insignificant in determining the hazard. Again the results are not reported. Interesting insight is obtained creating the interactive dummy variables for gender and marital status. Being married significantly decreases the probability of transition to employment for women, which may be explained by importance of family income. At the same time married males have higher probability to enter employment comparing to unmarried males probably because they are responsible for providing the income for family. We have not found any statistical difference between unmarried males and unmarried females in determining the transition to employment. It appears that marital status is an important determinant of the unemployment duration. Its statistical insignificance per se may be explained by counter effects for gender groups. The effects of these interactive dummy have the same directions but insignificant for exit out of the register model.

Individuals with less than general secondary education have higher probability of transition to employment relative to individuals with higher educational achievements; however, having profession increases chances to get a job. Most likely low educated individuals have low suitable job criteria on the one hand and employers while demanding low-skilled labor prefer to hire workers possessing some profession on the other hand. In case of exit out of the register model education coefficients have the same sign but are statistically insignificant.

The duration per se may influence the hazard rates, which being conditional on independent variables may change over spell. First, an individual may plan his or her exit based on the distribution of the UI over time. Second, the fear of

unemployment stigma may prompt the early exit. Third, long duration might discourage individuals and lower their job search efforts and finally, employers might prefer to hire workers with shorter jobless spells. It is hard, if possible, to estimate each effect separately but aggregate effect can be measured. For this purpose we set up specifications (2a) and (2b), where variables e1-e16 stand to capture the duration dependence effect. The estimation reveals quite explainable duration dependence profile. During first three months the transition to employment declines over time, increases in the fourth month, then decreases again till the seventh month when we observe upsurge and then the pattern is repeated with most pronounced upsurge in twelfth month, which corresponds to the end of entitlement period for most individuals. The fall of UI amount on 90^{th} and 180^{th} day of duration is likely to explain these findings. The group of individuals with 180 days entitlement period may also contribute to the upsurge in seventh month. The coefficients for durations above year are insignificant probably due to sample size problem for long spells. The probability of transition to out of the register is significantly lower during first 30 days. Probably, unemployed individuals have enough patience to obey the rules of the PEC only during first month. Then the hazard rate is fairy stable over time with a not surprising rise near the time of UI exhaustion.

The coefficient on UI is significant for both competing risks. It worth to mention here that most existing studies use replacement rates to capture the effect of unemployment benefits on the duration of unemployment, which is reasonable in case of flat rate of the benefits. In Ukraine unemployment benefits are calculated as a percentage of previous income and thus, the replacement rates cannot have much variation. We do not use the log of UI because of numerous zeros. The results provide strong evidence that unemployment benefits have a negative effect on the probability to exit unemployment. Not surprisingly, the absolute value of coefficient on UI is much higher for exit out of the register than to employment, which is in line with the hypothesis that registered individuals use

UI as extra income and many of them do not even plan to find a job with the assistance of the PEC. Ceteris paribus, one additional monetary unit of UI decreases the transition to employment by 0.2-0.4% and to other states by 1%.

Chapter 6

CONCLUSIONS

Registered unemployment is a relatively new target for empirical research. In this study we conduct research into the determinants of registered unemployment using micro data collected by the Kyiv Public Employment Center. We have addressed the following questions: which groups among the registered unemployed have difficulties in obtaining employment? Do the timing and the size of unemployment benefits have effect on the duration of registered unemployment?

Our major findings are:

1) The study of registered unemployment reveals significant heterogeneity across socio-demographic groups of individuals. Females appear to have significantly lower transition rates out of the register than males, which may be explained by the fact that they are more likely to be attracted by Unemployment Insurance and are typically more persistent in endeavoring housing subsidies on the one hand and that they rely on the help of the state more than males on the other hand.

2) The results of the multinomial logit analysis indicate that educated individuals, displaced workers, professional workers and females have difficulties in obtaining a job within a week after registration at the Public Employment Center.

3) The amount of unemployment benefits has a significant positive effect on the duration of registered unemployment. Coefficient on Unemployment

Insurance is negative and highly significant for models of transition from registered unemployment to employment and out of the register.

4) The transition out of register increases significantly just before the time of entitlement exhaustion, which may indicate that people plan their exit out of the register using Unemployment Insurance as extra income to their informal earnings.

These findings bring important implications for policymakers. First, our analysis indicates groups of individuals with difficulties in obtaining employment as the target groups for policy tools. Second, despite the relatively low level of unemployment benefits, they clearly have a significant disincentive effect on the job search effort. At the same time unemployment is an obvious cause of poverty in Ukraine. Since the idea behind this passive labor market policy is to provide for unemployed the assistance in the job search process it is important to target with this policy tool those individuals who search for jobs and require assistance.

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APPENDIX

Table 1. Variables used in the analysis.

Variable	Total sample,%	Exit within 7 days, %	Exit to job,%	Exit out of the register, %
FEMALE = 1, if female = 0, otherwise	65.55	58.28	70.50	68.32
AGE20 = 1, if age <20 = 0, otherwise	13.98	16.83	11.93	13.89
AGE25 = 1, if 20≤age<25 = 0, otherwise	17.98	20.05	14.91	21.18
AGE30 = 1, if 25≤age<30 = 0, otherwise	11.18	10.79	11.42	12.24
AGE35 = 1, if 30≤age<35 = 0, otherwise	7.66	8.06	7.68	7.38
AGE40 = 1, if 35≤age<40 = 0, otherwise	10.46	8.82	11.99	10.16
AGE45 = 1, if 40≤age<45 = 0, otherwise	14.11	11.59	17.32	13.36
AGE50 = 1, if 45≤age<50 = 0, otherwise	12.07	10.34	14.47	10.68
AGE60 = 1, if age≥50 = 0, otherwise	12.57	13.52	10.28	11.11
BELOW SECONDARY = 1, if below general secondary education, =0 otherwise	3.69	5.01	2.28	3.65
SECONDARY = 1, if general secondary education, =0 otherwise	29.12	37.74	21.70	25.26
VOCATIONAL = 1, if vocational education, =0 otherwise	25.46	27.84	22.14	27.43
COLLEGE = 1, if technical school education, =0 otherwise	22.49	16.83	28.24	23.78
HIGHER EDUCATION =1, if higher education, =0 otherwise	19.23	12.58	25.63	19.88

Table 1.(Continued). Variables used in the analysis.

Variable	Total sample,%	Exit within 7 days,%	Exit to job,%	Exit out of the register, %
REPEATED =1, if repeated registration, =0 otherwise	4.91	4.57	5.39	5.12
EXIT7DAYS =1, if exit within 7 days, =0 otherwise	42.54	100	0.00	0.00
CHILD6 = 1, if child under 6, =0 otherwise	7.29	6.40	8.63	7.47
WITHOUT PROFESSION =1, if individual without profession, =0 otherwise	16.42	23.10	10.47	14.24
BLUE COLLAR =1, if blue-collar profession during last employment, =0 otherwise	42.01	48.79	35.72	40.54
WHITE COLLAR = 1, if white-collar profession during last employment, =0 otherwise	41.57	28.11	53.81	45.23
SCHOOL LEAVER =1, if school leaver, =0 otherwise	8.09	7.97	8.12	9.72
VOLUNTARILY QUIT =1, if voluntarily quit last job, =0 otherwise	47.19	57.34	36.99	45.14
DISPLACED =1, if displaced from the last job =0 otherwise	32.26	19.87	45.69	30.73
OTHER = 1, if other cause of unemployment, =0 otherwise	12.45	14.82	9.20	14.41
ABOVE YEAR UNEMPLOYMENT=1, if above year from exiting official employment, =0 otherwise	25.25	29.19	18.85	28.99

Table 1.(Continued). Variables used in the analysis.

Variable	Total sample	Exit within 7 days	Exit to job	Exit out of the register
UI = monthly level of unemployment benefit				
DURATION = duration of unemployment spell, days				
MULTIEXIT7DAYS = 0, if not leave the register within 7 days,	3017			
=1, if exit to employment within 7 days,	850			
=2, if exit to other states within 7 days	1384			
Total number of observations	5251	2234	1576	1152

Table 2. Dynamics of registered unemployment and layoffs in Kyiv by gender for the years 1991-2001.

Year	Inflow	Outflow		Stock at the end of year	Vacancy rate, at the end of year	Layoffs
		To job	Out of register			
1991	23787	13098	2452	8237	2.5	-
Females, %	49.4	45.5	-	-	-	
1992	22287	10767	13289	6504	1.25	-
Females, %	-	58.2	65.8	70.9	0.36	
1993	14245	8949	8991	2809	5	14922
Females, %	62.4	59.9	69.6	66.7	2	73.6
1994	14699	8717	7280	1511	10	14483
Females, %	60.8	54.5	68.1	72.7	3.33	65.6
1995	14818	6904	7043	2382	5	13060
Females, %	58.8	50.1	65.5	73.3	1.43	64.6
1996	22801	6008	12902	6273	0.23	22211
Females, %	62.0	54.4	61.6	74.4	0.11	66.5
1997	26139	9836	13513	9063	0.18	22668
Females, %	60.7	55.3	59.6	77.8	0.06	63.2
1998	29961	11484	13588	13952	0.16	18387
Females, %	60.8	56.2	62.4	74.2	0.05	58.5
1999	31073	11596	16794	16635	0.21	13762
Females, %	61.8	58.8	61.4	74.6	0.05	59.6
2000	32456	14612	19731	14838	0.42	11126
Females, %	63.3	60.5	65.3	76.1	0.08	58.6
2001	28940	17280	14790	11910	0.91	8437
Females, %	62.9	60.5	66.7	78.0	0.20	-

Source: City Employment Center Report.

Notes:

(1) - – missing values

Table 3. Multinomial logit analysis for covariates determining outflow from the PEC to the states other than retirement within 7 days after registration.

Multinomial regression	Number of obs	=	5074
	LR chi2(38)	=	927.31
	Prob > chi2	=	0.0000
Log likelihood = -4370.288	Pseudo R2	=	0.0959

Exit to employment within 7 days

Explanatory variable	Coefficient	Standard error	P-value
Female	-0.326***	0.090	0.000
Age20	0.200	0.203	0.325
Age25	0.246	0.172	0.152
Age30	0.037	0.187	0.844
Age35	0.306	0.199	0.125
Age40	-0.012	0.186	0.947
Age45	0.007	0.175	0.967
Age50	-0.002	0.185	0.993
Child6	-0.056	0.171	0.743
General secondary education	0.123	0.201	0.539
Vocational education	-0.461**	0.210	0.029
College	-0.552**	0.223	0.013
Higher education	-0.961***	0.243	0.000
Above year unemployment	0.055	0.104	0.596
Voluntarily quit	0.568***	0.154	0.000
School leaver	-0.033	0.202	0.871
Displaced	-1.106***	0.195	0.000
Blue-collar	-0.600***	0.150	0.000
White-collar	-0.005	0.132	0.968
Constant	-0.629**	0.272	0.020

Table 3.(Continued). Multinomial logit analysis for covariates determining outflow from the PEC to the states other than retirement within 7 days after registration.

Exit out of the register within 7 days

Explanatory variable	Coefficient	Standard error	P-value
Female	-0.573***	0.078	0.000
Age20	0.827***	0.187	0.000
Age25	0.803***	0.163	0.000
Age30	0.572***	0.172	0.001
Age35	0.804***	0.183	0.000
Age40	0.313*	0.176	0.076
Age45	0.353**	0.166	0.034
Age50	0.525***	0.170	0.002
Child6	-0.067	0.149	0.654
General secondary education	0.127	0.189	0.500
Vocational education	0.010	0.196	0.959
College	-0.201	0.207	0.331
Higher education	-0.205	0.217	0.344
Above year unemployment	0.204**	0.092	0.026
Voluntarily quit	0.598***	0.134	0.000
School leaver	-0.155	0.177	0.380
Displaced	-0.516***	0.159	0.001
Blue-collar	-1.070***	0.131	0.000
White-collar	-0.466***	0.115	0.000
Constant	-0.647**	0.253	0.011

Notes:

(1) Outcome registered as unemployed is the comparison group.

(2) Age60, below secondary education, other cause of unemployment, without profession are default categories.

(3) Simple coefficients (β_i) are reported. Exponential coefficients ($\exp(\beta_i)$) allow interpretation of relative risk ratios.

(4) *** - 1% significance, ** - 5% significance, * - 10% significance.

Table 4. Competing risks model estimates (exit to employment).

Explanatory variable	Specification (1a)		(2a)		(3a)	
Married female	-0.305***	(0.112)	-0.314***	(0.112)	-0.314***	(0.112)
Married male	0.341**	(0.133)	0.315**	(0.132)	0.315**	(0.132)
Unmarried male	0.123	(0.153)	0.083	(0.153)	0.083	(0.153)
Age20	1.068***	(0.281)	0.613**	(0.279)	0.613**	(0.279)
Age25	0.630***	(0.205)	0.230	(0.201)	0.230	(0.201)
Age30	0.571***	(0.196)	0.308	(0.194)	0.308	(0.194)
Age35	1.049***	(0.196)	0.790***	(0.195)	0.790***	(0.195)
Age40	0.486***	(0.170)	0.448***	(0.168)	0.448***	(0.168)
Age45	0.516***	(0.151)	0.346**	(0.151)	0.346**	(0.151)
Age50	0.500***	(0.163)	0.335**	(0.161)	0.335**	(0.161)
Child6	0.141	(0.199)	0.113	(0.198)	0.113	(0.198)
General secondary education	-0.477**	(0.232)	-0.424*	(0.230)	-0.424*	(0.230)
Vocational education	-0.565**	(0.236)	-0.524**	(0.234)	-0.524**	(0.234)
College	-0.396*	(0.236)	-0.378	(0.235)	-0.378	(0.235)
Higher education	-0.300	(0.241)	-0.251	(0.240)	-0.251	(0.240)
Voluntarily quit	-0.074	(0.210)	-0.087	(0.208)	-0.087	(0.208)
Displaced	-0.032	(0.221)	0.156	(0.219)	0.156	(0.219)
Schoolleaver	-0.340	(0.321)	-0.362	(0.320)	-0.362	(0.320)
Blue-collar	0.411**	(0.194)	0.190	(0.190)	0.190	(0.190)
White-collar	0.372*	(0.200)	0.237	(0.195)	0.237	(0.195)
Real UI	-0.002***	(0.001)	-0.004***	(0.001)	-0.004***	(0.001)
e2 =1, if 30 < duration ≤ 60			-2.817***	(0.323)	-2.817***	(0.323)
e3 =1, if 60 <duration ≤ 90			-3.831***	(0.581)	-3.831***	(0.581)
e4 =1, if 90 <duration ≤ 120			-0.292**	(0.132)	-0.292**	(0.132)
e5 =1, if 120 < duration ≤ 150			-4.494***	(1.003)	-4.495***	(1.003)
e6 =1, if 150 <duration ≤ 180			-3.719***	(0.711)	-3.719***	(0.711)
e7 =1, if 180 <duration ≤ 210			0.231*	(0.125)	0.231*	(0.125)
e8 =1, if 210 <duration ≤ 240			-1.997***	(0.362)	-1.997***	(0.362)
e9 =1, if 240 <duration ≤ 270			-2.592***	(0.506)	-2.592***	(0.506)
e10 =1, if 270 <duration ≤ 300			-2.813***	(0.583)	-2.813***	(0.583)
e11 =1, if 300 < duration ≤ 330			-16.387	(523.1)	-31.921	(1234930)
e12 =1, if 330 < duration ≤ 366			0.567***	(0.126)	0.567***	(0.126)
e13 =1, if 366 < duration ≤ 390			-16.907	(944.9)	-32.360	(2142049)
e14 =1, if 390 < duration ≤ 420			-16.906	(976.5)	-32.356	(2211004)
e15 =1, if 420 < duration ≤ 450			-16.902	(1088.4)	-32.354	(2466061)

Table 4.(Continued). Hazard model estimates (exit to employment).

e16 =1, if duration > 450		-16.844	(663.7)	-32.284	(1495669)
Intercept		-4.737***	(0.332)	-4.737	(0.332)
Heterogeneity variance				$6.39*10^{-8}$	$(1.9*10^{-5})$
Sample size	1025	1025		1025	
Number of failures	543	543		543	
Log-likelihood value	-3229.4	-873.996		-873.996	

Notes:

(1) Standard errors are shown in parentheses
(2) Unmarried female, age60, below secondary education, other cause of unemployment, without profession, e1 =1, if $0 \leq$ duration ≤ 30 are default categories.
(3) Simple coefficients (β_i) are reported. Exponential coefficients ($\exp(\beta_i)$) allow interpretation of hazard ratios.
(4) *** - 1% significance, ** - 5% significance, * - 10% significance.

Table 5. Competing risks model estimates (exit out of the register).

Explanatory variable	Specification (1b)		(2b)		(3b)	
Married female	-0.008	(0.123)	-0.007	(0.123)	-0.039	(0.143)
Married male	0.287*	(0.165)	0.277*	(0.165)	0.268	(0.182)
Unmarried male	0.275*	(0.147)	0.273*	(0.147)	0.278*	(0.163)
Age20	1.242***	(0.272)	1.208***	(0.271)	1.248***	(0.297)
Age25	1.168***	(0.204)	1.128***	(0.204)	1.237***	(0.268)
Age30	0.623***	(0.208)	0.610***	(0.208)	0.698***	(0.267)
Age35	0.720***	(0.247)	0.689***	(0.247)	0.769***	(0.292)
Age40	0.262	(0.200)	0.230	(0.199)	0.305	(0.260)
Age45	0.290	(0.183)	0.272	(0.183)	0.272	(0.202)
Age50	0.415**	(0.192)	0.401**	(0.191)	0.408*	(0.210)
Child6	-0.263	(0.211)	-0.263	(0.210)	-0.304	(0.230)
General secondary education	0.081	(0.259)	0.088	(0.259)	0.134	(0.285)
Vocational education	-0.074	(0.267)	-0.069	(0.267)	-0.019	(0.293)
College	-0.310	(0.275)	-0.301	(0.274)	-0.292	(0.295)
Higher education	-0.191	(0.282)	-0.177	(0.281)	-0.129	(0.312)
Voluntarily quit	0.105	(0.189)	0.096	(0.189)	0.067	(0.207)
Displaced	-0.161	(0.212)	-0.110	(0.212)	-0.240	(0.299)
Schoolleaver	0.338	(0.252)	0.344	(0.252)	0.303	(0.271)
Blue-collar	0.003	(0.168)	0.003	(0.167)	-0.034	(0.195)
White-collar	-0.203	(0.178)	-0.209	(0.177)	-0.267	(0.213)
Real UI	-0.010***	(0.001)	-0.011***	(0.001)	-0.010***	(0.002)
e2 =1, if 30 < duration ≤ 60			3.896***	(0.716)	3.918***	(0.717)
e3 =1, if 60 <duration ≤ 90			4.178***	(0.716)	4.232***	(0.722)
e4 =1, if 90 <duration ≤ 120			3.901***	(0.729)	3.945***	(0.734)
e5 =1, if 120 < duration ≤ 150			4.161***	(0.728)	4.229***	(0.738)
e6 =1, if 150 <duration ≤ 180			3.933***	(0.740)	4.002***	(0.750)
e7 =1, if 180 <duration ≤ 210			3.599***	(0.752)	3.666***	(0.763)
e8 =1, if 210 <duration ≤ 240			4.109***	(0.742)	4.179***	(0.756)
e9 =1, if 240 <duration ≤ 270			3.555***	(0.777)	3.654***	(0.798)
e10 =1, if 270 <duration ≤ 300			3.351***	(0.805)	3.412***	(0.817)
e11 =1, if 300 < duration ≤ 330			3.718***	(0.785)	3.827***	(0.811)
e12 =1, if 330 < duration ≤ 366			4.918***	(0.729)	5.205***	(0.850)
e13 =1, if 366 < duration ≤ 390			4.779***	(0.732)	5.256***	(1.095)
e14 =1, if 390 < duration ≤ 420			3.879***	(0.764)	4.128***	(0.881)
e15 =1, if 420 < duration ≤ 450			4.523***	(0.748)	4.913***	(1.009)

Table 5.(Continued). Competing risks model estimates (exit out of the register).

e16 =1, if duration > 450		4.081*** (0.731)	4.413*** (0.927)
Intercept		-9.753*** (0.783)	-9.774*** (0.798)
Heterogeneity variance			0.083 (0.124)
Sample size	1025	1025	1025
Number of failures	462	462	462
Log-likelihood value	-2586.78	-671.971	-671.728

Notes:

(1) Standard errors are shown in parentheses
(2) Unmarried female, age60, below secondary education, other cause of unemployment, without profession, e1 =1, if $0 \leq$ duration ≤ 30 are default categories.
(3) Simple coefficients (β_i) are reported. Exponential coefficients ($\exp(\beta_i)$) allow interpretation of hazard ratios.
(4) *** - 1% significance, ** - 5% significance, * - 10% significance.

Figure 1. Composition of unemployment by age in Kyiv, 2001.

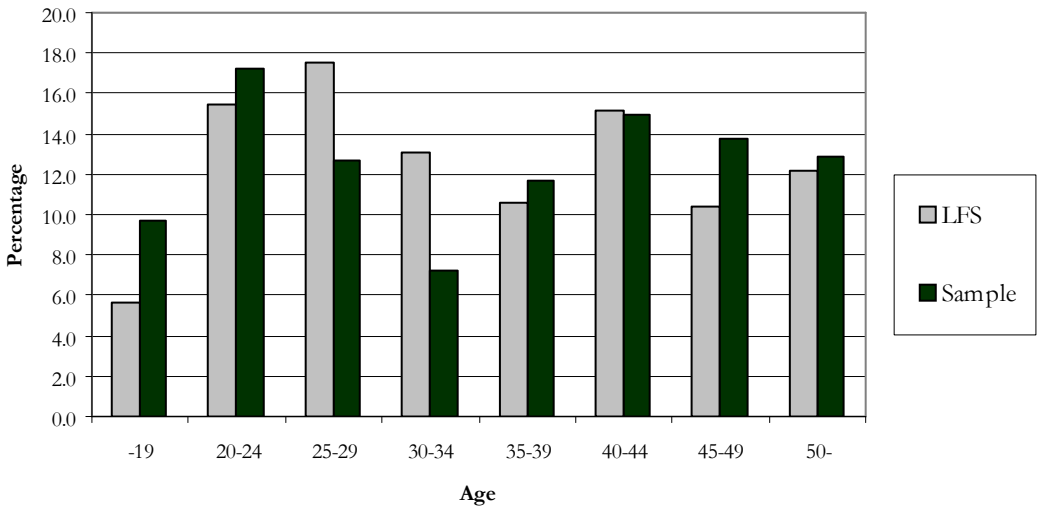

Figure 2. Composition of unemployment by education in Kyiv, 2001.

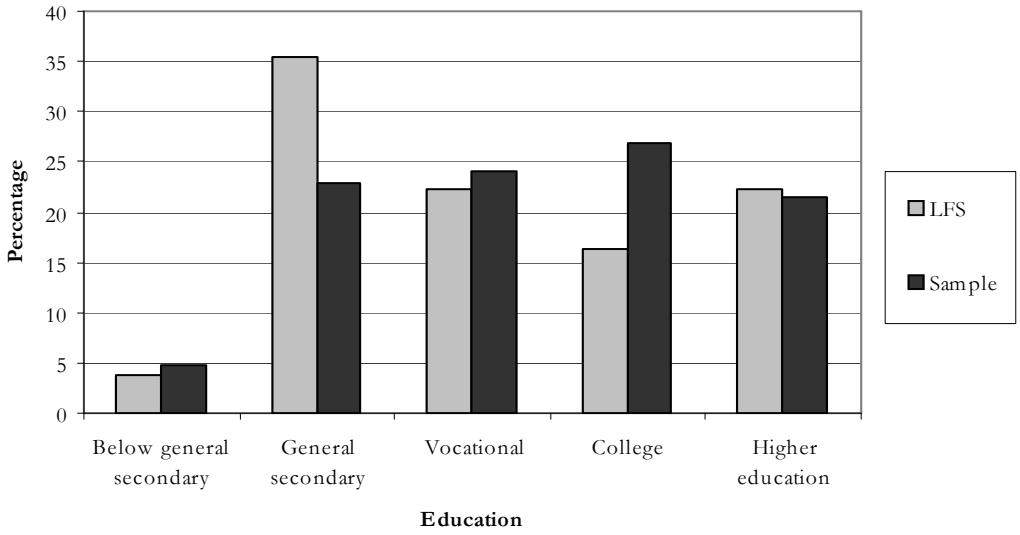

Figure 3. Composition of unemployment by cause of unemployment in Kyiv, 2001.

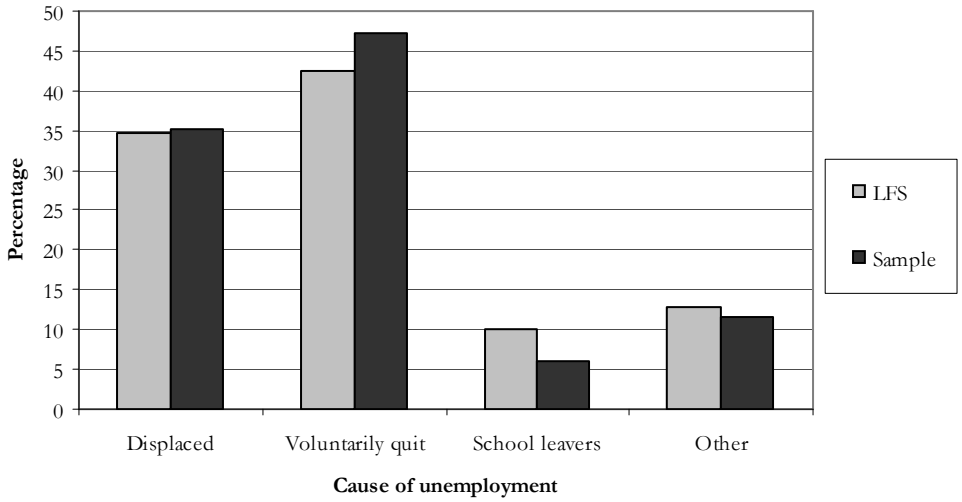

Figure 4. Hazard function.

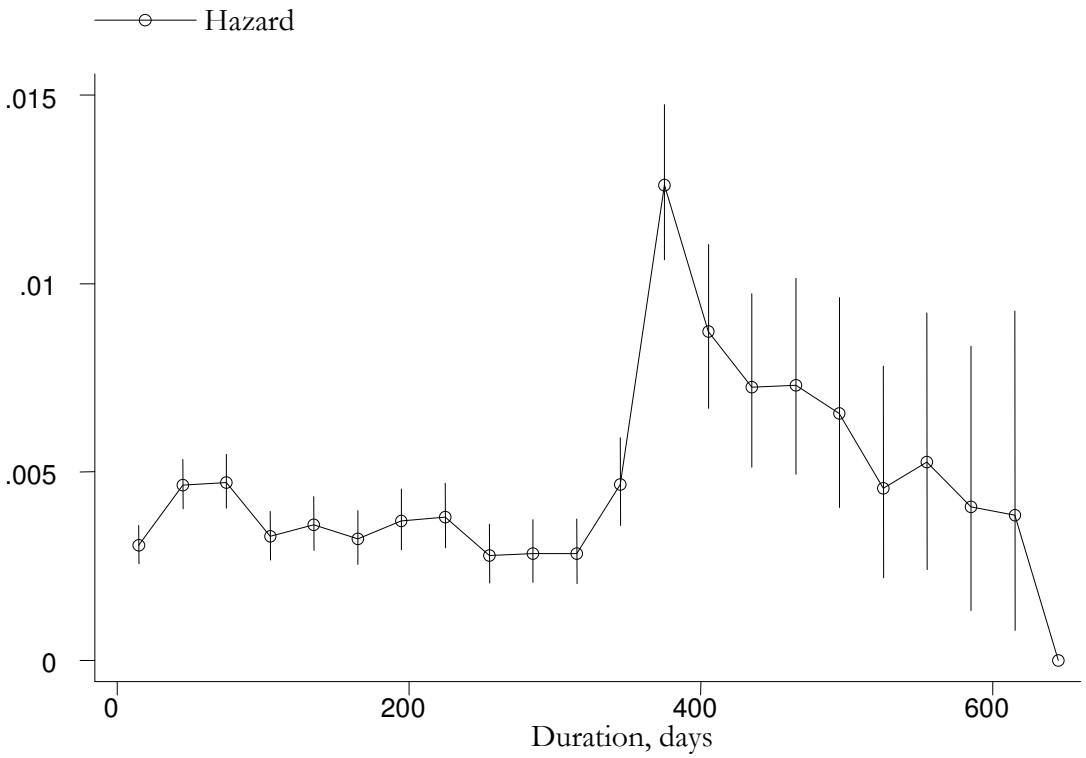

Figure 5. Survival functions for males and females.

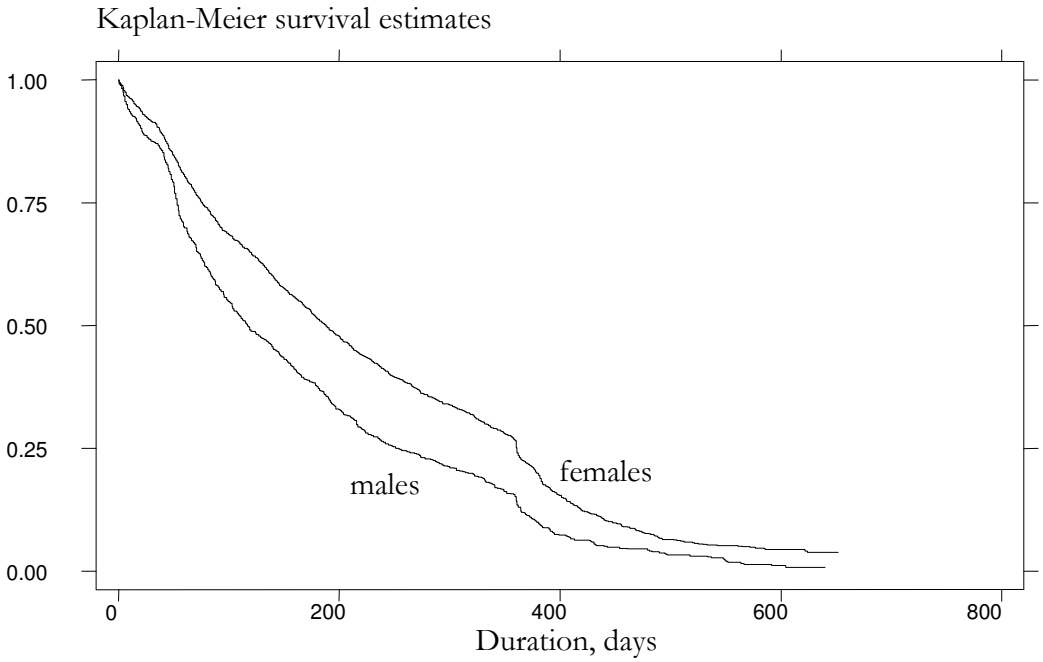

Figure 6. Hazard functions for males and females.