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DETERMINANTS OF UNEMPLOYMENT DURATION IN RUSSIA

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Abstract

Using information contained in a nationally representative, longitudinal survey of Russian citizens, this research analyzes the determinants of unemployment duration during the early stages of economic transition. A competing-risks, discrete-time waiting model, augmented to incorporate unobserved heterogeneity, is employed to analyze whether there is evidence of duration dependence in unemployment, and the role of demographic characteristics, alternative income support, and local demand conditions in explaining unemployment duration for working-age individuals. Married women are found to experience significantly longer unemployment spells before exiting to a job compared to married men. Older individuals can expect to be unemployed longer than comparable younger workers. Persons with higher education do not have significantly longer unemployment spells than those with secondary or even primary education. Having children has no effect on the duration of unemployment, however they do appear to motivate women to drop out of the labor force, significantly decreasing the time spent searching for work. Local labor market demand conditions have a significant effect on duration. Individuals in regions with higher unemployment rates, all else equal, have longer unemployment spells. With respect to the reason for the entering unemployment, persons laid off from their last job have shorter durations relative to quitters. Finally, there is evidence of duration dependence in the re-employment hazard in Russia, with a period of positive duration dependence in the first 7 months, followed by a declining hazard until approximately eighteen months. These results are robust to the introduction of unobserved heterogeneity.

KEY WORDS: Unemployment Duration, Economic Transition, Russia

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I. Introduction

Prior to the dissolution of the Soviet Union in December 1991, the population of Russia enjoyed virtual job security and the official rate of unemployment was zero.[1] The subsequent economic and political transformations have led to an increase in the number of unemployed as well as under-employed individuals. Moreover, with the emergence of a formal private sector, there exist new opportunities for non-state employment as well as the right to choose not to participate. The labor market now presents a greater array of states, notably higher paying jobs in the private sector and the prospect of becoming unemployed.

Periods of unemployment may have long-term employment consequences. First, the loss of valuable work experience may make it more difficult to find employment. Human capital theory implies that since substantial investment in human capital should occur in the early working years, joblessness for the young is particularly costly. This would also apply to older individuals facing a changing economic system and attempting to learn new, more applicable skills. If there is no investment in human capital during periods of unemployment, the subsequent earnings profile of the unemployed will be depressed.

Moreover, periods of unemployment might lead to poor work habits, weak labor force attachment, and general alienation from society. The joblessness experience itself may alter the attitudes of the unemployed if they become discouraged about their prospect of obtaining work, thus affecting their search efforts. This is likely more severe in an economy such as

[1] The government of the Soviet Union claimed to have eradicated unemployment in the 1930s. Evidence from the Soviet Interview Project (see Millar (1987) for details) estimates the actual average unemployment rate in the USSR from 1974-1979 at 1.2 percent for spells of one month or longer, with an average duration of approximately 4.8 months (Gregory and Collier, 1988). Granick (1987) presented a range for the Soviet unemployment rate in the late 1970s covering all unemployment spells of 1.5 to 3.0 percent.

Russia's which has a history of high labor force participation. In addition, employers might use employment history as a signal of potential productivity, preferring to hire workers who have not been unemployed.

Unemployment is a complicated phenomenon and numerous statistics have been employed to analyze its determinants and dynamics. The unemployment rate measures the proportion of the workforce which, although not currently employed, is actively seeking employment. While such a ratio is a key indicator of the average severity of the problem for an entire population, it masks the dynamic nature of the labor market by failing to capture the length of time individuals spend unemployed. In order to properly design policies to alleviate the growing problem of unemployment in transition economies, it is important to know the unemployment rate, but it is more useful to understand how the probability of exiting unemployment varies with demographic and economic characteristics.

Much research has focused on the effect of unemployment insurance (UI) on unemployment duration (Lancaster, 1979; Ham and Rea, 1987; Meyer, 1990; Katz and Meyer, 1990; Micklewright and Nagy, 1994; Hunt, 1995). For the US, Moffitt and Nicholson (1982) found that a 10-percentage point increase in the replacement rate was associated with about a one week increase in the average length of unemployment spells. Estimates in Solon (1985) imply that mean durations increase between one-half and one week following a 10-percentage point increase in the unemployment benefit replacement rate. While conclusions as to the effect of unemployment insurance on duration can inform policy decisions, the situation in Russia during its early reform period precludes a rigorous analysis of the effect of UI on unemployment duration. Although there was an unemployment benefit system in practice (see Layard and Richter (1994) for details), the level of the benefit was so meager,

approximately 11 percent of the average wage in 1993, and inflation so high that few actually bothered to register and receive it. This low take-up was also due in part to the fact that the replacement rate often did not reflect an individual's full-time wage.[2] The payment amount was calculated according to the wage actually received, so if a person had been on administrative leave or short hours, she received credit only for hours actually worked.

This paper investigates whether there is evidence of duration dependence in unemployment, and the role of personal characteristics, alternative income support, and local demand conditions in explaining unemployment duration for working-age individuals. A competing-risks, discrete-time waiting model augmented to incorporate unobserved heterogeneity is used to analyze the duration of unemployment. The paper is organized as follows. The next section outlines a conceptual framework for analyzing unemployment duration. Sections III and IV describe the econometric approach, while Section V puts the subsequent microeconometric analysis in perspective by presenting a breakdown of unemployment by demographic characteristics and an aggregate picture of unemployment during Russia's economic transition. Section VI describes the data and outlines the empirical specification with the results presented and discussed in Section VII. Section VIII offers concluding comments.

II. Conceptual Framework

Different theoretical models may be relevant for an analysis of the determinants of re-employment probabilities. A commonly chosen framework is a job search model as presented in Mortensen (1970) or Lippman and McCall (1976). This model assumes that when a worker

[2] Discussion with officials at the Federal Employment Service in Moscow, July 1994.

becomes unemployed, the expected completed duration of his or her unemployment spell depends upon the probability of receiving a job offer and the probability of then accepting that offer. The probability of receiving a job offer will be determined by factors which make a specific worker more attractive to an employer such as education, skill level, experience, and local demand conditions. The probability that an unemployed individual will then accept an offer will be determined by his or her minimum acceptable wage.[3] This "reservation" wage is determined by the cost of search, unemployment income if any, the expected distribution of wage offers, and the probability of receiving subsequent job offers. In short, the waiting time to re-employment, or exiting the labor force, will be influenced by the probability of receiving a job offer and the reservation wage.

III. Econometric Approach

A competing-risks waiting time model is used to analyze unemployment duration. The conditional probability of leaving unemployment at duration *t* in the unemployment spell, given that the spell has lasted until time *t*, is the hazard function.[4] It is assumed to take the form

$$(1) \qquad h_i(t|X_i) = \frac{\exp[\beta' \mathbf{X}_i + l(t)]}{1 + \exp[\beta' \mathbf{X}_i + l(t)]}$$

where β' is a vector of parameters, $\mathbf{X}_i$ is a vector of demographic variables plus other variables reflecting demand conditions, type of job separation, and alternative income support, and $l(t)$ captures the effect of duration on the hazard function.[5] The duration dependence

[3] The reservation wage can be thought of as a representation for a wage-benefit package, assuming that a direct mapping from the distribution of reservation wages exists.
[4] See Kalbfleisch and Prentice (1980) and Cox and Oakes (1984).
[5] Certain covariates such as the regional unemployment rate and household expenditure can change significantly over time. Time-varying covariates are not included in this version.

function $l(t)$ was modeled as a fourth-order polynomial, $l(t) = \sum_{j=1}^{4} g_j t^j$. This is the highest order polynomial for which the data yield precise estimates of the duration terms.

Two types of unemployment spells, right-censored and completed, contribute to the likelihood function. The probability of a completed spell is the conditional probability of leaving at month *t* times the product of the conditional probabilities of not leaving in each of the previous *t-1* months: $g_i(t) = h_i(t)\left\{\prod_{r=1}^{t-1} 1 - h_i(r)\right\}$. For incomplete spells, it is known only that the individual was unemployed at least *t* months. These spells contribute the survivor function at time *t* to the likelihood: $1 - G_i(t) = \prod_{r=1}^{t} 1 - h_i(r)$. Thus the overall likelihood function is

$$L = \prod_{i \in C} g_i(t) \prod_{i \in C'} 1 - G_i(t) \tag{2}$$

where C denotes completed spells and C' censored spells. Given the parameter estimates obtained by maximizing (2), the expected duration of unemployment is determined from

$$E(D) = \sum_{t=1}^{\infty} t\, g(t) \tag{3}$$

with the $\mathbf{X}_i$ variables entering (3) at their mean values.

A reduced form model implies that the total effects of the variables on the unemployment exit probability are estimated rather than the distinct effects on the reservation wage and the probability of receiving a job offer. Thus, while this is not a direct test of search theory, it does have the advantage of not imposing further restrictive distributional

assumptions required for structural analysis.[6] Furthermore, this is not a labor supply model since the probability of receiving a job offer in any time period does not equal one.

IV. Unobserved Heterogeneity

Heterogeneity arises in a population when different individuals have potentially different duration distributions. Their waiting times are generated by different stochastic processes. Explanatory variables are included to control for observed heterogeneity. However, some differences may remain after including all relevant observed factors. Before concluding that there is duration dependence in the transition probability from unemployment, it may be possible that our parameter estimates are biased due to the omission of unobserved variables such as "motivation".[7] Such omission biases duration dependence downward.

Unobserved heterogeneity is controlled for in a manner similar to the Heckman-Singer (1984a) strategy.[8] Assume the population is composed of J homogenous groups. The probability function for the unobserved heterogeneity is supported at locations Z_j with probability masses p_j, j = 1, 2,..., J, which sum to one by definition. The method involves estimating not only the parameters of the hazard function, but also the number of types in the population, and the probability that a given person is of each type. The number of groups J is unknown so typically J is started at 1 and incremented until the likelihood fails to show significant improvement.

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[6] In terms of policy relevance, the total effects of various factors on re-employment probabilities are of primary interest.

[7] Motivation is used as a representative description of the source of unobserved heterogeneity. Other possibilities include differing tastes for leisure and the extent of a person's network of friends and colleagues since that is a common source of new job leads.

[8] This is the strategy employed in Guinnane (1987), and is close to the method employed by David, Mroz, and Wachter (1986).

There have been objections to this approach. Trussell and Richards (1986) have shown that, even with this type of nonparametric representation of unobserved heterogeneity, the results can be sensitive to the choice of functional form for the hazard. This is mitigated in the present setup in which duration dependence is captured by introducing polynomials in duration. Also, the cutoff point for J is arbitrary in the sense that while the likelihood may not change much in moving from J=2 to J=3, higher values for J may show significant improvement in the likelihood. In addition, the Heckman-Singer approach implies a very particular form of heterogeneity. They assume that the J stochastic processes result from densities which are, at each point in time, proportional to one another. Thus the model effectively estimates the probability that an individual has a particular "shift" value Z_j.

Let the probability that an individual is "motivated" be π. Suppose there are two types of individuals; those who are motivated, for whom the parameter $\mu = 1$, and those who are not motivated, for whom $\mu = 0$.[9] The probability that a person has exited unemployment by time *t* given that he or she is motivated is $G_i(t|m=1)$. The probability of exit by time *t* given the person is not motivated is $G_i(t|m=0)$. Thus, the unconditional probability of exit by time *t* is $p\,G_i(t|m=1)+(1-p)G_i(t|m=0)$, the sum of the weighted conditional probabilities. Some people do not exit unemployment within the sample period. The unconditional probability that someone has not exited by time *t* (censored observations) is one minus the chance that they are motivated and have exited minus the chance that they are not motivated and have exited: $1-p\,G_i(t|m=1)-(1-p)G_i(t|m=0)$. The individual log-likelihood in this case would be:

[9] The parameter μ is a placeholder for exposition. It represents the distinction in the underlying distribution of waiting times for unobservably different types of individuals.

$$\ln L_i = (1 - survive_i)\ln\{p\, g_i(t|m=1) + (1-p)g_i(t|m=0)\} + (survive_i)\ln\{1 - p\, G_i(t|m=1) - (1-p)G_i(t|m=0)\}$$

where $survive_i$ takes on a value of 0 if a person is known to have exited unemployment, and 1 otherwise.

Recall that the hazard function has been modeled as

$$h_i(t|X_i, m=1) = \frac{\exp[\beta' \mathbf{X}_i + l(t)]}{1 + \exp[\beta' \mathbf{X}_i + l(t)]},$$

which is the form for motivated individuals. For unmotivated individuals, this becomes

$$h_i(t|X_i, m=0) = \frac{\exp[\beta' \mathbf{X}_i + h + l(t)]}{1 + \exp[\beta' \mathbf{X}_i + h + l(t)]} \quad (4)$$

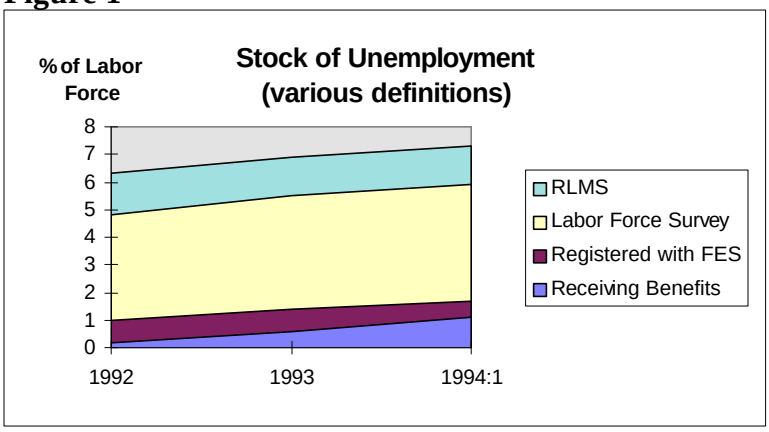
where h captures the degree to which an individual is *not* motivated. That is, negative values for h suggest that an individual is relatively unlikely ever to exit unemployment. In the extreme, if $h = -\infty$, the model simplifies to a "mover-stayer" type model in which a person is either a mover (motivated) or a stayer (unmotivated). This simplification is adopted in the estimation procedure and implies that p is the proportion of individuals who are motivated. Since p is a probability, in order to constrain it to the (0,1) interval, it is defined as $p = \frac{\exp[\gamma' \mathbf{X}_i]}{1 + \exp[\gamma' \mathbf{X}_i]}$, with γ being estimated. This specification allows one to estimate the effect of observed qualities on the probability of being motivated.[10]

V. Individual Characteristics and Unemployment

[10] The present estimations only include the constant term of γ. Selected observed characteristics such as gender and condition of job separation were not significant.

The labor market in Russia over its early transition period is characterized by a limited decline in employment in the face of a precipitous drop in output, officially on the order of 50 percent.[11] The total change in the numbers of employed and unemployed individuals provides a fairly consistent picture. Between 1992 and early 1994 employment fell about 2 percent with unemployment rising by about 1 percent. Underlying the slight fall in total employment is a large decline in industrial and state sector employment offset by growth in private sector and self-employment. The time series of unemployment is also consistent, albeit at different levels, across definitions. Figure 1 shows the level of unemployment according to four criteria. The Russian Longitudinal Monitoring Survey (RLMS) and Labor Force Survey show that the true level of unemployment is much higher than the official level reported by the Federal Employment Service (FES) which is limited to individuals who register at their local employment office.[12] A noticeable feature is that the FES number rose from 1 percent of the labor force in 1992 to 1.7 percent in the first quarter of 1994, approximately the same number of percentage points as the RLMS data analyzed in this study.

Figure 1



[11] Accounting for the burgeoning private sector activity which often goes unrecorded, Koen (1994) re-estimates the fall in the range of 35 percent.

[12] Differences in the two survey based measures are likely due to differing questionnaires and reference time periods.

Table 1 presents univariate tabulations of unemployment by age, gender, and education. Women initially have a higher rate but that changes by 1993 as male unemployment increases and female unemployment declines slightly. Women are experiencing longer unemployment spells than men. Younger individuals are more likely to be unemployed, with youth unemployment being particularly high. There is limited variance in duration by age or education level. A monotonic relationship between education and the rate of unemployment exists, with higher educated persons nearly half as likely to be unemployed as those who have completed only primary education.

Table 1 **Individual Characteristics and Unemployment**

	Unemployment Rate		Unemployment Duration (months)	
Category	1992	1993	Mean	Median
Gender				
Women	6.1	5.6	11.6	7
Men	4.9	5.8	9.1	5
Age				
Under 21	20.4	16.7	10.5	6
21-29	8.6	8.6	10.1	6
30-39	4.6	5.4	9.6	6
40-49	4.4	4.7	10.6	6
50-59	3.6	3.0	11.9	6
Education Level				
Higher	3.4	3.1	10.5	7
Special Secondary	5.4	4.5	10.7	6
Ordinary Secondary	6.8	6.9	10.2	6
Primary[1]	6.1	8.0	9.9	6
Overall	5.5	5.7	10.3	6

[1] Includes unfinished secondary education.
Source: Russian Longitudinal Monitoring Survey, 1992-93

VI. Data and Empirical Specification

The available data come from the Russian Longitudinal Monitoring Survey (RLMS), the first nationally representative sample of the Russian Federation. The RLMS is a household-based survey designed to systematically measure the effects of the economic

reforms on the welfare of households and individuals in Russia. The project is divided into two phases, with four waves of data collected in phase one, and two waves thus far in phase two. Each phase is a separate panel dataset. This research uses data from phase I which includes Round 1 (June-August 1992), Round 2 (December 1992-March 1993), Round 3 (July-September 1993), and Round 4 (December 1993-February 1994). Individuals are interviewed a maximum of four times, with their labor force status observed at each date, beginning approximately six months after Russia's extensive price and wage liberalization and six months before privatization of state enterprises started. Labor force status is determined according to answers to the question: "Indicate your *main* occupation at the present time." Only one answer was permitted from the following thirteen choices: student (high school/vocational or university), retired, disabled, on official leave to care for a child (not interrupting employment), housewife looking after family members, temporarily not employed for other reasons and looking for work, temporarily not employed for other reasons and not looking for work, working (at an enterprise, organization, state farm, collective farm, or cooperative), engaging in individual economic activity, farmer, entrepreneur, or other.

An individual was included in the sample if she or he was unemployed and searching for work at any interview date.[13] "Temporarily not employed and searching" is considered a definition according to the methodology of the International Labour Organization; that is, the person did no work for pay in the reference period, but is seeking and available for work.[14] This paper concentrates on the duration of unemployment according to this definition. Time spent out of work was calculated from the known interview date and the response to the

[13] As in most datasets without a full labor market history, there are "invisible" spells which go unnoticed since they fall between interview dates, a phenomenon termed "length-biased" sampling (Kiefer, 1988).
[14] It is possible of course that a person did receive payment for work but did not report it.

question "How many years and months ago did you leave your last job?" As with most recall surveys, there is some heaping of observations at certain intervals. Given the structure of the question, the most natural unit of analysis for the following estimations is one month. There are two types of observations, right-censored and *uncensored*.[15] The emphasis on uncensored stems from the fact that the exact spell length is unknown since persons are only asked about their unemployment duration if their labor force status is indeed unemployed. In short, a minimum duration is known for all observations, and a maximum duration for uncensored observations.

The sample was restricted to men aged 15 to 59 and women 15 to 54 at the beginning of their spell.[16] Older individuals could possibly have complicating reasons for their unemployment and be following a different behavioral model.[17] Three other characteristics of the sample deserve note. First, to avoid person-specific serial correlation, the sample consists of the most recent spell of unemployment for persons who experienced multiple spells.[18] Second, emphasis is placed on the behavior of unemployed individuals as opposed to non-employed persons since the probability of exit to employment is 5 times greater for unemployed individuals compared to those not in the labor force and specification tests rejected a restricted 2-state (employed and non-employed) model of labor market transitions

[15] Individuals were only asked about their unemployment duration if they were unemployed, or conversely, employed persons were not asked when they began working at their current job. Therefore, persons known to have exited unemployment were assumed to have exited midway between their known minimum and maximum durations. The average difference between known minimum and maximum durations for these observations was five months.

[16] Retirement age is 60 for men, 55 for women.

[17] Only 5 individuals aged 60 or greater were excluded from the sample.

[18] Note that this refers to persons who are *known* to have experienced multiple spells. There could remain persons who experienced multiple spells which are "invisible". A framework in which a component of the hazard function persists across multiple spells for the same individual has been used by Ham and Rea (1987), utilizing the methodology suggested in Heckman and Singer (1984b).

in favor of the unrestricted 3-state model (Foley, 1997). Third, the final sample contains 1,089 observations of which 57 percent are censored.

The theoretical model implies that the re-employment probability, *h(t)*, is determined by the probability of receiving a job offer and the probability of then accepting that offer. Given the distribution of wages, the factors most likely to influence the probability of receiving a job offer include local demand conditions (proxied here by the local unemployment rate) and personal characteristics. Women might experience longer durations of joblessness if they are being discriminated against in the labor market or have a high shadow value of home production activities. Human capital variables will affect the probability of receiving a job offer by making a person more attractive to employers, thereby raising her wage offer relative to the value of home production. The duration will also be affected by the conditions of entering unemployment. Search intensity is likely to differ depending on whether an individual was laid off or quit her previous job. Job search theory predicts that as the spell of unemployment lengthens the reservation wage will fall, producing an increasing hazard (positive duration dependence). On the other hand, if employers use employment history as a signal of potential productivity or if long unemployment spells discourage search intensity, then the hazard will be decreasing (negative duration dependence).

VII. Empirical Results

The initial specification contains gender, dummy variables for age and education, marital status, a regional identifier, the regional unemployment rate, a dummy for receipt of unemployment insurance, and household expenditures. Direct duration dependence is

measured by a fourth-order polynomial. The goal is to estimate the parameters of the probability of leaving unemployment, either through finding a job or leaving the labor force.

To summarize the data, Figure 2 plots the empirical survivor function for unemployment duration, estimated using the Kaplan-Meier product limit estimator. The vertical lines represent 95 percent confidence intervals. This is the proportion of the sample still unemployed at each point in time, taking into account censoring.[19] The median time spent in unemployment is about one year. The variation in the probability of leaving unemployment over the course of a spell is of primary interest, but the survivor function in Figure 2 shows this only indirectly through changes in the slope. Figure 3 addresses this issue directly by plotting the Kaplan-Meier empirical hazard function, which plots the probability of leaving unemployment in a given time interval conditional on having survived up to that point. The general downward-sloping hazard, which indicates negative duration dependence, is expected for several reasons. If the behavior of the unemployed (and employers or others controlling exits) is constant during a spell, the overall empirical hazard must decline as those with characteristics positively correlated with finding a job (or exiting for other reasons) leave unemployment first, leaving behind those with lower exit probabilities. If time spent unemployed reduces motivation to search or is treated by employers as a signal of lower productivity a downward-sloping hazard will also result. Finally, the overall unemployment rate in Russia continued to increase throughout the sample period (Figure 1), suggesting that competition for jobs was getting tougher.

[19] Durations beyond 36 months are censored since the majority of these very long spells would have originated before the economic transition.

Table 2 shows the distribution of exit states by gender. Estimation was carried out conditional on exit state. The only evident difference by gender is in the rate of leaving the labor force; those not discouraged but dropping out of the labor force are unable to work for health reasons, raising a child, returning to full-time study or entering retirement. A notable exit category which does not appear, particularly in comparison to the outflow from unemployment in western economies, is exhaustion of unemployment insurance since few individuals receive it.[20]

Table 2 **Exit States for Unemployment Spells**			
Exit State	**Men**	**Women**	**All**
Employment	32.6	31.1	31.9
OLF: Other	3.5	10.9	7.1
Discouraged	4.6	3.3	3.9
Unknown: Censored	59.3	54.7	57.1
Total	100%	100%	100%
OLF = Out of the Labor Force; "Other" category includes students, persons staying home to take care of children or engage in home production, retirees, and disabled individuals.			

Tables 3 and 4 present results for the determinants of unemployment exit probabilities distinguished by destination state, the latter controlling for unobserved heterogeneity.[21] By setting $\eta = -\infty$ in equation (4), the estimates in Table 4 represent a "mover-stayer" specification of the exit to employment and exit to out-of-the-labor-force models. The estimated value for π in the exit to employment model is 0.918 (standard error = .050), indicating that approximately 92 percent of these individuals are "motivated" as expected when the emphasis is on re-employment. The estimated value for π in the exit to out-of- the-labor-force model is 0.632 (standard error = 0.154), indicating more strongly the presence of

[20] Note that exhaustion of unemployment insurance is not considered a formal exit category from unemployment.
[21] Descriptive statistics are reported in Table 6, following the main text.

two types of individuals.[22] As expected, a smaller proportion of individuals who eventually exit the labor force are "motivated" compared to those who eventually regain employment.

A comparison of the exit to employment models in Tables 3 and 4 demonstrates that unobserved heterogeneity does not substantially alter the estimated coefficients. The log likelihood increases by only 0.3 under model (4), for a likelihood ratio test statistic of 0.6, considerably smaller than reasonable critical values for $\chi^2(1)$.[23] Figure 4 shows graphically that the pattern of duration dependence for exits to employment is not appreciably affected by unobserved heterogeneity. In addition, Table 5 presents comparisons of the difference in expected duration for the models with and without unobserved heterogeneity. Although the magnitude differs depending on the particular comparison, the introduction of unobserved heterogeneity has a limited effect on the re-employment results.[24]

This stands in contrast to the pattern for unemployed individuals who eventually leave the labor force. A comparison of the exit to out-of-the-labor-force models in Tables 3 and 4 reveals that unobserved heterogeneity substantially changes the estimated coefficients, generally increasing (in absolute value) the magnitude of significant coefficients, in particular those for age, education, and fertility, and decreasing (in absolute value) the duration terms. The log likelihood rises by 206.5 under model (4), yielding a test statistic of 413, much greater than traditional critical levels. Figure 5 reveals that unobserved heterogeneity lowers the hazard for exiting the labor force in the early stages of a spell, although the probabilities are small compared to the re-employment hazard. Finally, Table 5 confirms the statistical test

[22] Each of these refers to model number (4) in Table 4.
[23] The critical value of $\chi^2(1)$ at the 5 percent level is 3.84.
[24] The overall difference in expected duration at the means of the independent variables is -1.2 months, 25.1 less 23.9, unobserved heterogeneity producing a slightly lower expected duration.

and visual plot by showing, for relevant comparisons, that unobserved heterogeneity significantly affects the expected duration of unemployment before exiting the labor force. The *percentage* change in expected duration is greater for labor force exits relative to employment exits.

Given the relative unimportance of unobserved heterogeneity in the re-employment hazard, discussion of the determinants of unemployment duration before re-employment focuses on Table 4. The first column excludes the gender/marital status interaction, fertility indicators, and variables indicating the reason for job separation, because these are arguably endogenous. They are included in the second, third, and fourth columns, respectively.[25] Women are found to experience significantly longer unemployment spells before exiting to a job. A comparison of models (1) and (2) indicates that this effect is primarily among married women. As Table 5 shows, a married woman can expect to remain unemployed over 10 months longer before finding a job, compared to a married man.[26] This raises concern over the potential for married women to become disproportionately represented among the long-term unemployed in coming years. The age coefficients imply that older workers are at a disadvantage. A person in their fifties can expect to be unemployed 2.4 months longer than a comparable worker in his or her thirties. The education coefficients imply that persons with higher education, the omitted category, do not have significantly longer unemployment spells than those with secondary or even primary education. This suggests that the types of higher education inherited from the Soviet period are not better suited to the emerging market

[25] A likelihood ratio test rejected the null hypothesis that the condition of job separation variables are zero. Test statistic = 16.8. Critical value $\chi^2(2) = 5.99$ at the 5 percent level.

[26] Note that this and the following comparisons are conditional on individuals being "motivated" to find employment due to the mover-stayer simplification.

economy, which has become more service and financial-oriented, than secondary or primary education. Similar patterns have been found in other transition countries, namely among Czech and Slovak men (Ham, Svenjar, and Terrel, 1994). A potential explanation is that education raises reservation wages or search returns proportionately with search costs. Lastly, children have no effect on the duration of unemployment when exiting to a job.

In terms of economic variables, the regional unemployment rate proxies local demand conditions and household expenditure proxies additional resources upon which unemployed individuals may draw in order to extend their job search.[27] There is no significant effect of alternative income. However, the stronger the local labor market, the less time individuals spend unemployed. This suggests that unemployment duration might be lower if housing markets were more fully developed, allowing more workers to migrate to regions where unemployment was relatively low.[28] Improved information on vacancies across regions might also help reduce regional unemployment differentials.[29] Lastly, the five percent of individuals receiving unemployment insurance do not have significantly different durations, so the existing modest safety net is not contributing to longer spells of unemployment or search.

Model (4) incorporates variables indicating how a person's last job ended; that is, whether the person was a job leaver or job loser. "Quit" and "layoff" are meant to be general terms, "quit" meaning the person left voluntarily for personal reasons and "layoff" meaning he or she stopped working due to staff reductions, shutdown, or reorganization, that is to say, left

[27] This assumes income-pooling within a household. Expenditures are chosen over household income since income is consistently under-reported in the RLMS, on the order of 25 percent.
[28] As of July 1994, 29 percent of the total housing stock had been privatized (Russian Economic Trends, 1994). A cumbersome administrative process, property taxes, and responsibility for general maintenance expenses (previously covered by the enterprise or local authority) are deterrents to privatization.
[29] The vast majority of vacancies listing with the Federal Employment Service are for manual jobs (Russian Economic Trends, 1995).

involuntarily. Consequently, the residual group left their previous job for a variety of reasons including health condition, child care, and returning to school, or they were new labor market entrants. Layoffs, the excluded category, find jobs, on average, 3.7 months *before* quitters.

Table 5
The Effect of Changes in Demographic and Economic Variables on Expected Duration

	Difference in Expected Duration (months) to Employment		to Out of the Labor Force	
Comparison	No Heterogeneity	Unobserved Heterogeneity	No Heterogeneity	Unobserved Heterogeneity
Married Woman vs. Married Man	+7.9	+10.4	-2.2	-3.6
Age 50-59 vs. Age 30-39	+2.0	+2.4	-4.1	-6.7
Married vs. Single	-1.9	-2.7	-0.7	+0.5
Child vs. No children	+0.5	+0.7	-1.5	-3.8
Layoff vs. Quit	-3.8	-3.7	-0.0	-1.4

Notes: Independent variables, other than the comparison variable, are entered at their mean values with one exception, the child vs. no children comparison is for a married woman. Note that not all comparisons are from significant coefficients (Tables 3 and 4), in particular the fertility comparison in the re-employment model, and the marital status and condition of job separation comparisons for exits to out-of-the-labor-force.

When the focus turns to the probability of exiting the labor force, three primary results emerge. First, there is no significant difference by gender, alone or conditional on marital status; however, women with children exit the labor force nearly 4 months sooner than those without children, suggesting that they have a higher shadow value of time in home production activities related to child-rearing. Second, individuals with ordinary or unfinished secondary education experience shorter durations before exiting the labor force. Thus, higher educated individuals appear to search longer before becoming discouraged or deciding to focus on non-market activities. Third, as with exits to employment, the higher the regional unemployment rate, the more time individuals spend unemployed before leaving the labor force, although the magnitude of the effect is notably less than when exiting to a job.

The pattern of duration dependence was determined by including the highest order polynomial in duration which the data could support.[30] The duration dependence terms are difficult to interpret so Figure 4 plots the re-employment hazard, which, as mentioned, is similar with and without unobserved heterogeneity.[31] The hazard rises initially until about 7 months and then falls with duration until approximately 18 months.[32] There is a second peak at 28 months, however there are relatively few observations with durations beyond two years. The initial period of positive duration dependence may result from greater search activity soon after becoming unemployed, from individuals being recalled to their previous job after a short spell, or from individuals with the worst employment prospects entering retraining programs or becoming discouraged, thereby postponing the decrease in the re-employment hazard among job searchers.[33]

Finally, Table 7 contains estimates for a proportional hazards model with a nonparametric baseline hazard. The same distinctions were made according to exit state. In terms of significance, signs, and relative magnitudes (by exit state and among sets of dummy variables), the results are consistent with the above specifications. Two departures are the significant negative impact of household expenditures on the probability of exiting unemployment to out-of-the-labor-force and slight differences in the age and education effects for persons leaving the labor force. Both discrepancies are in the model of exits to out-of-the-

[30] The final specification incorporates a fourth-order polynomial. The maximization gradients of higher order terms could not be estimated within a 0.00001 tolerance.
[31] Plots are at the mean values of the independent variables.
[32] In Hungary, the hazard for exiting *insured* unemployment to a job in 1993 exhibited a humped (or arched) pattern (Micklewright and Nagy, 1996). In Sweden, extensive employment and training programs produced non-negative duration dependence in the re-employment probability (Korpi, 1995).
[33] In 1993, an average of 25,000 workers were in government-sponsored retraining programs. This was less than 3 percent of the number of unemployed registered with the Federal Employment Service, which was only 1.4 percent of the labor force, well below the unemployment rate according to an ILO definition. The number of workers in retraining more than doubled in 1994 (Russian Economic Trends, 1995).

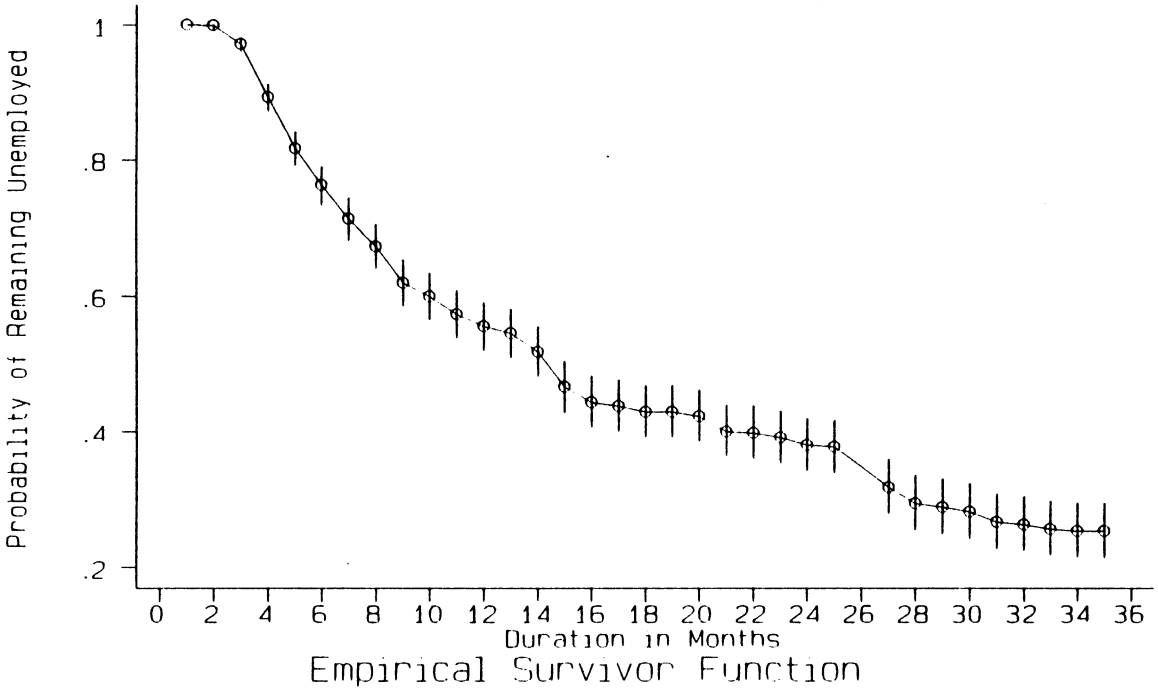
labor-force. If the hazard rate is allowed to be nonparametric, explicitly modeling unobserved heterogeneity in a Cox framework has been found not to substantially affect estimated coefficients (Meyer, 1990). However, in the discrete-time duration models estimated in this paper, the coefficients on the covariates for exits to out-of-the-labor-force did substantially change after the introduction of unobserved heterogeneity, unlike the re-employment model which agreed fully with the Cox specification.

VIII. Conclusion

Given the absence of an effective system of unemployment compensation in Russia, this study identified other significant factors which affect the length of unemployment spells in Russia. Estimates from a competing-risks, discrete-time duration model show that married women are experiencing significantly longer durations than married men before finding jobs. This raises concern over the potential for married women to become disproportionately represented among the long-term unemployed in Russia. Better-educated individuals do not appear to find jobs more quickly than the less-educated, although higher educated persons remain unemployed considerably longer before exiting the labor force. Local labor market demand conditions have a significant effect on unemployment duration. Residents of regions with higher unemployment rates, all else equal, have longer unemployment spells suggesting that increased regional labor mobility, currently mitigated by limited housing markets and circumscribed by existing housing benefits, could curtail jobless spells. Those entering unemployment involuntarily, according to their response of being laid off, have shorter durations relative to those quitting their last job. Finally, there is evidence of duration dependence in unemployment in Russia, but it is not monotonic. The re-employment hazard exhibits positive duration dependence in the first 7 months, and then declines until

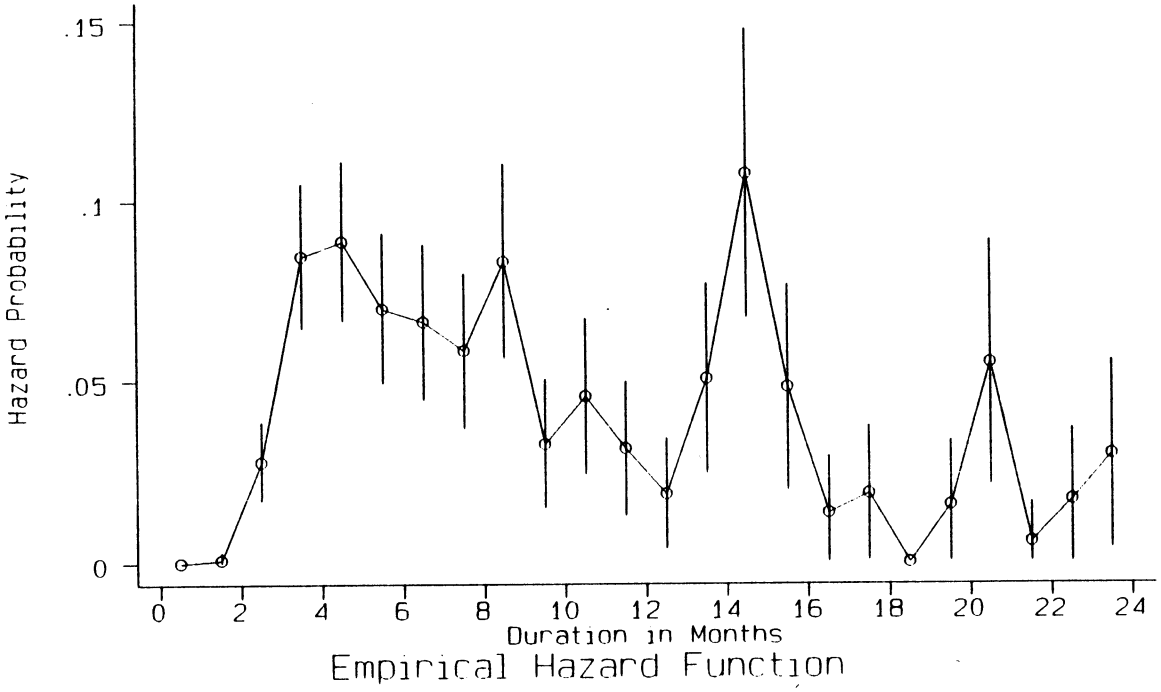
approximately eighteen months, a pattern unfamiliar in the US labor market. These results are robust to the introduction of unobserved heterogeneity.

Figure 2



Empirical Survivor Function

Figure 3



Empirical Hazard Function

Figure 4
Exit to Employment

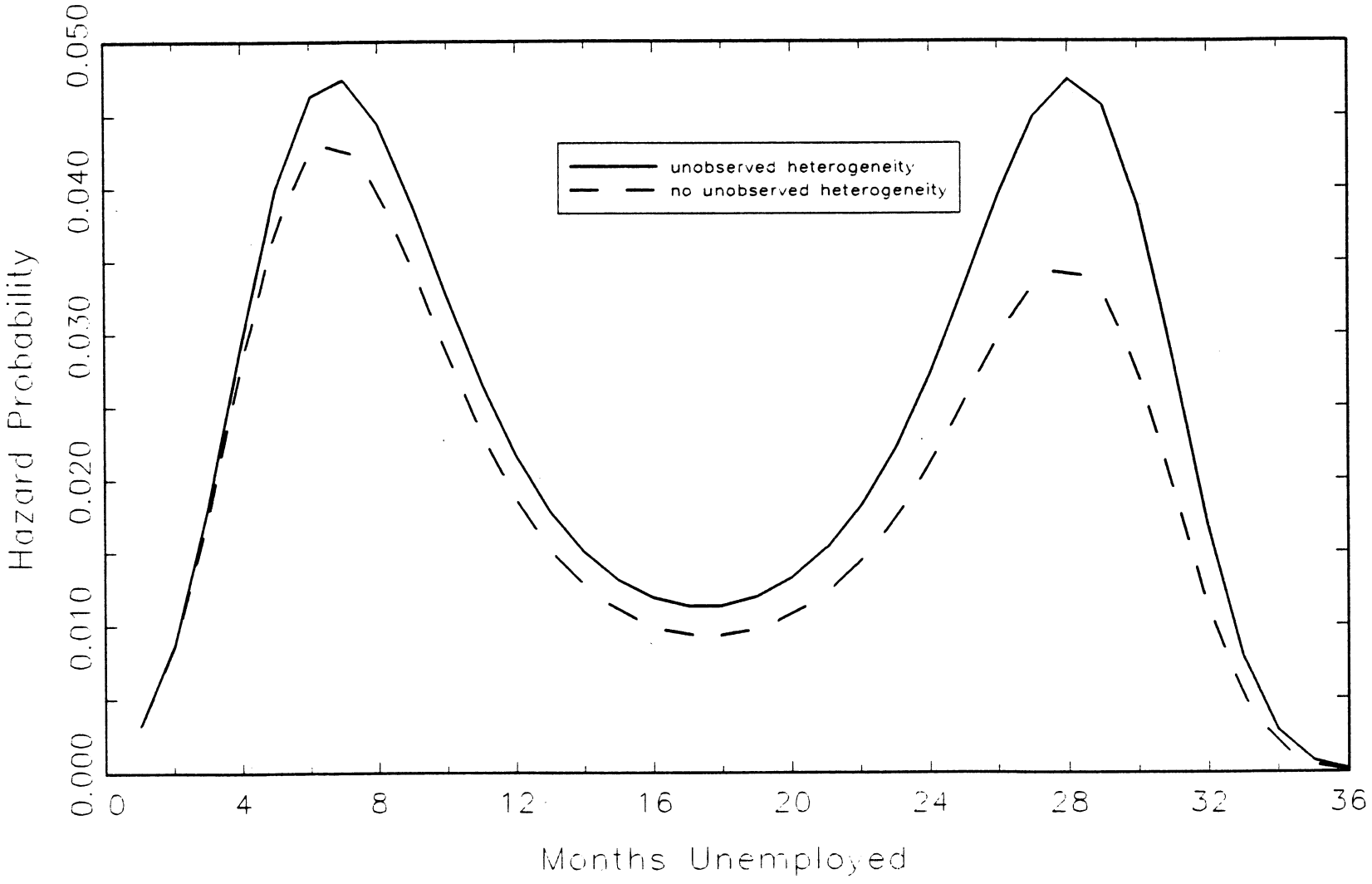


Figure 5
Exit to Out of the Labor Force

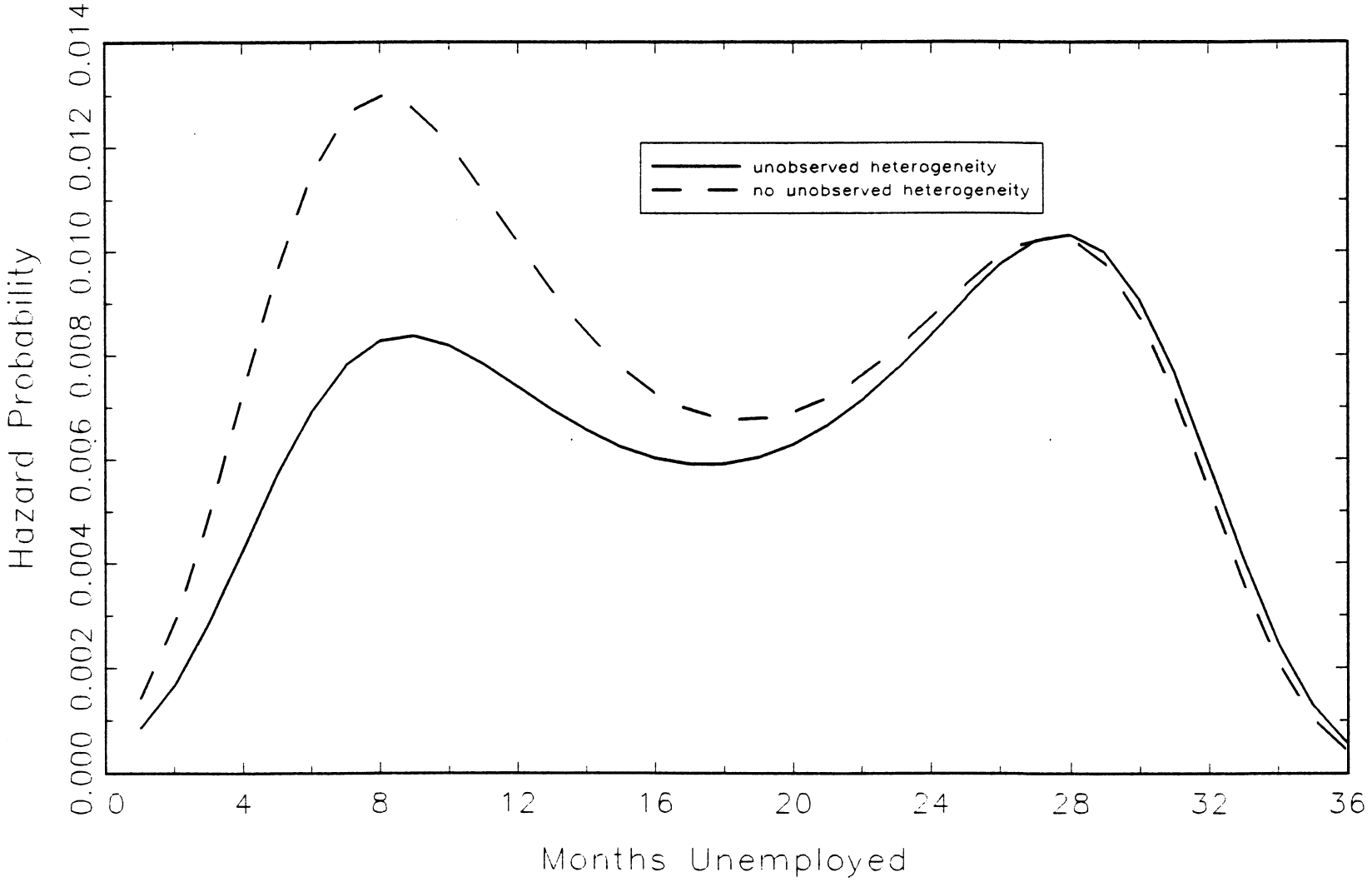


Table 3 **Duration Analysis of Exits from Unemployment**

	Exits to Employment				Exits to OLF			
Independent Variable	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Female	-.552**	-.154	-.089	-.118	.124	-.037	-.301	-.315
	(.116)	(.191)	(.199)	(.198)	(.203)	(.313)	(.331)	(1.00)
Age 21-29	.177	.137	.149	.124	-.264	-.248	-.351	-.404
(*age <21 omitted*)	(.237)	(.241)	(.241)	(.246)	(.334)	(.335)	(.343)	(.347)
Age 30-39	.378	.315	.348	.316	-.508	-.476	-.639*	-.700*
	(.256)	(.261)	(.267)	(.269)	(.375)	(.375)	(.389)	(.394)
Age 40-49	.360	.313	.280	.272	-.315	-.292	-.285	-.319
	(.254)	(.259)	(.257)	(.262)	(.365)	(.366)	(.375)	(.378)
Age 50-59	-.339	-.472*	-.522*	-.522*	.512	.570	.590	.551
	(.279)	(.283)	(.282)	(.286)	(.349)	(.360)	(.374)	(.378)
Special secondary education	.214	.251	.264	.300	-.421	-.442	-.414	-.389
(*higher education omitted*)	(.189)	(.188)	(.188)	(.188)	(.275)	(.279)	(.279)	(.279)
Ordinary secondary	.213	.226	.236	.281	-.797**	-.814**	-.808**	-.776**
	(.187)	(.184)	(.184)	(.184)	(.292)	(.315)	(.318)	(.321)
Unfinished secondary	.232	.236	.274	.273	-.465	-.464	-.556	-.584
	(.259)	(.263)	(.264)	(.272)	(.399)	(.406)	(.402)	(.401)
Primary or less	.141	.140	.141	.242	-.780*	-.779*	-.794*	-.767*
	(.218)	(.216)	(.216)	(.222)	(.409)	(.409)	(.414)	(.413)
Married	.150	.452**	.510**	.433**	.233	.061	.098	.066
	(.132)	(.179)	(.188)	(.188)	(.222)	(.352)	(.387)	(.387)
Married*Female	...	-.639**	-.676**	-.731**	...	.272	.240	.192
		(.239)	(.250)	(.250)		(.437)	(.464)	(.464)
Number of children	...	...	-.061	-.051	...	...	-.105	-.116
			(.092)	(.092)			(.223)	(.221)
Children*Female	...	...	-.046	-.027	...	...	.359	.393
			(.122)	(.127)			(.228)	(.227)
Moscow & St. Petersburg	.243	.228	.203	.253	.034	.055	.072	.055
	(.197)	(.194)	(.196)	(.196)	(.322)	(.326)	(.328)	(.327)
Received UI	.292	.284	.274	.031	-.642	-.620	-.644	-.729
	(.237)	(.235)	(.234)	(.240)	(.630)	(.630)	(.634)	(.630)
Regional unemployment rate	-.437**	-.439**	-.440**	-.450**	-.253**	-.252**	-.262**	-.272**
	(.053)	(.053)	(.053)	(.053)	(.068)	(.069)	(.073)	(.072)
Household Expenditures ($\div 10^4$)	-.017	-.018	-.018	-.018	.029	.030	.031	.030
	(.059)	(.049)	(.050)	(.050)	(.058)	(.058)	(.060)	(.061)
Quit last job	...	...	...	-.423**	...	...	...	-.108
(*layoff omitted*)				(.147)				(.260)
Left for other reason	...	...	...	-.642**	...	...	...	-.374
				(.157)				(.262)
Duration	1.464**	1.470**	1.473**	1.471**	.977**	.977**	.984**	992**
	(.196)	(.196)	(.197)	(.197)	(.305)	(.307)	(.307)	(.308)
Duration^2 ($\div 10^2$)	-1.795**	-1.797**	-1.800**	-1.793**	-1.050**	-1.051**	-1.057**	-1.063**
	(.230)	(.231)	(.231)	(.232)	(.341)	(.345)	(.344)	(.346)
Duration^3 ($\div 10^4$)	7.877**	7.872**	7.877**	7.860**	4.294**	4.302**	4.322**	4.345**
	(1.031)	(1.035)	(1.036)	(1.039)	(1.460)	(1.482)	(1.479)	(1.482)
Duration^4 ($\div 10^6$)	-11.32**	-11.30**	-11.29**	-11.30**	-5.94**	-5.96**	-5.98**	-6.02**
	(1.55)	(1.56)	(1.56)	(1.56)	(2.10)	(2.14)	(2.14)	(2.14)
constant	-5.573**	-5.725**	-5.727**	-5.296**	-5.863**	-5.789**	-5.686**	-5.464**
	(.599)	(.607)	(.609)	(.624)	(.956)	(.958)	(.960)	(1.002)
log likelihood	-1378.0	-1374.4	-1373.5	-1364.6	-622.2	-622.0	-618.9	-617.7

Notes: Standard errors in parentheses. ** and * indicate significance at the .05 and .10 levels, respectively
Variables are dummy variables except for regional unemployment rate, number of children, and household expenditure.
Household expenditure values are real September 1992 rubles, deflated using national CPI from Goskomstat.
Exits to out of the labor force are considered censored when estimating exits to employment, and vice versa.

Table 4 **Duration Analysis of Exits from Unemployment: Unobserved Heterogeneity**

	Exits to Employment				Exits to OLF			
Independent Variable	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Female	-.576**	-.147	-.087	-.101	.278	.024	-.250	-.305
	(.116)	(.202)	(.205)	(.213)	(.239)	(.345)	(.524)	(.535)
Age 21-29	.218	.186	.178	.178	-.389	-.437	-.560	-.541
(*age <21 omitted*)	(.245)	(.254)	(.248)	(.261)	(.374)	(.369)	(.564)	(.587)
Age 30-39	.410	.344	.364	.367	-.530	-.652	-.971	-.973
	(.265)	(.275)	(.275)	(.285)	(.425)	(.418)	(.636)	(.646)
Age 40-49	.414	.401	.328	.344	-.246	-.460	-.109	-.068
	(.266)	(.276)	(.268)	(.282)	(.408)	(.403)	(.559)	(.569)
Age 50-59	-.304	-.458	-.542*	-.527*	.700*	.587	1.067*	1.147*
	(.286)	(.296)	(.290)	(.300)	(.425)	(.433)	(.587)	(.596)
Special secondary education	.163	.179	.231	.204	-.509	-.350	-.571	-.531
(*higher education omitted*)	(.196)	(.202)	(.196)	(.207)	(.351)	(.345)	(.439)	(.439)
Ordinary secondary	.165	.173	.206	.192	-1.178**	-.923**	-1.48**	-1.435**
	(.194)	(.199)	(.193)	(.204)	(.394)	(.385)	(.516)	(.529)
Unfinished secondary	.197	.191	.249	.178	-1.063**	-.562	-1.35**	-1.329**
	(.267)	(.277)	(.272)	(.287)	(.476)	(.469)	(.681)	(.671)
Primary or less	.158	.224	.204	.279	-1.142**	-.908*	-.998	-1.000
	(.232)	(.241)	(.232)	(.250)	(.504)	(.492)	(.615)	(.638)
Married	.165	.534**	.610**	.542**	.251	.088	-.200	-.261
	(.138)	(.197)	(.207)	(.210)	(.259)	(.391)	(.653)	(.666)
Married*Female	...	-.729**	-.787**	-.861**	...	.282	.474	.411
		(.260)	(.269)	(.274)		(.497)	(.768)	(.784)
Number of children	...	...	-.097	-.092	...	...	-.561	-.526
			(.103)	(.105)			(.679)	(.673)
Children*Female	...	...	-.007	-.000	...	...	1.252*	1.250*
			(.131)	(.139)			(.676)	(.669)
Moscow & St. Petersburg	.232	.216	.191	.232	.169	.057	.347	.282
	(.205)	(.210)	(.204)	(.213)	(.386)	(.374)	(.470)	(.489)
Received UI	.298	.365	.317	.161	-.870	-.864	-.809	-.957
	(.263)	(.284)	(.260)	(.303)	(.716)	(.714)	(.821)	(.811)
Regional unemployment rate	-.448**	-.459**	-.451**	-.473**	-.274**	-.288**	-.271**	-.292**
	(.058)	(.057)	(.056)	(.057)	(.079)	(.080)	(.108)	(.108)
Household Expenditures ($\div 10^4$)	-.020	-.027	-.025	-.024	.022	.026	.031	.031
	(.059)	(.053)	(.052)	(.053)	(.064)	(.060)	(.076)	(.063)
Quit last job	...	...	...	-.390**	...	...	...	-.364
(*layoff omitted*)				(.157)				(.386)
Left for other reason	...	...	...	-.663**	...	...	...	-.697
				(.165)				(.406)
Duration	1.478**	1.488**	1.484**	1.491**	.961**	.946**	.929**	.949**
	(.196)	(.197)	(.198)	(.198)	(.314)	(.313)	(.399)	(.403)
Duration^2 ($\div 10^2$)	-1.802**	-1.802**	-1.803**	-1.798**	-.999**	-.997**	-.974**	-.982**
	(.231)	(.232)	(.232)	(.233)	(.352)	(.351)	(.440)	(.444)
Duration^3 ($\div 10^4$)	7.888**	7.868**	7.882**	7.858**	4.049**	4.067**	3.983**	4.005**
	(1.037)	(1.041)	(1.040)	(1.046)	(1.504)	(1.504)	(1.87)	(1.886)
Duration^4 ($\div 10^6$)	-11.31**	-11.26**	-11.29**	-11.26**	-5.56**	-5.61**	-5.52**	-5.56**
	(1.56)	(1.57)	(1.56)	(1.57)	(2.17)	(2.17)	(2.66)	(2.69)
constant	-5.536**	-5.676**	-5.700**	-5.214**	-5.314**	-5.147**	-5.567**	-5.208**
	(.613)	(.621)	(.617)	(.640)	(1.085)	(1.088)	(1.230)	(1.320)
γ parameter	3.107*	2.480**	3.121**	2.420**	.653	.753	.566	.541
	(1.77)	(.774)	(1.236)	(.670)	(.565)	(.646)	(.735)	(.663)
π (proportion motivated)	.957	.923	.958	.918	.658	.680	.638	.632
(standard error by delta method)	(.073)	(.055)	(.050)	(.050)	(.127)	(.140)	(.169)	(.154)
log likelihood	-1377.9	-1373.9	-1372.8	-1364.3	-623.2	-621.6	-413.0	-411.2

Notes: Standard errors in parentheses. ** and * indicate significance at the .05 and .10 levels, respectively
Variables are dummy variables except for regional unemployment rate, number of children, and household expenditure.
Household expenditure values are real September 1992 rubles, deflated using national CPI from Goskomstat.
Exits to out of the labor force are considered censored when estimating exits to employment, and vice versa.

Table 6 **Descriptive Statistics**
(N=1,089)

Variable	Mean	Standard Deviation	Variance	Minimum	Maximum
Duration	10.32	10.12	102.35	1	36
Uncensored	0.429	0.495	0.245	0	1
Exit to Job	0.319	0.466	0.217	0	1
Exit to OLF	0.071	0.256	0.065	0	1
Exit to Discouragement	0.040	0.195	0.038	0	1
Exit state unknown	0.571	0.495	0.245	0	1
Female	0.478	0.499	0.249	0	1
Age	34.31	10.72	114.8	15.5	58.6
Age 21-29	0.264	0.441	0.194	0	1
Age 30-39	0.299	0.458	0.209	0	1
Age 40-49	0.210	0.407	0.166	0	1
Age 50-59	0.105	0.307	0.094	0	1
Higher Education	0.128	0.334	0.112	0	1
Special Secondary	0.337	0.472	0.223	0	1
Ordinary Secondary	0.328	0.470	0.220	0	1
Unfinished Secondary	0.124	0.329	0.108	0	1
Primary or less	0.081	0.274	0.075	0	1
Married	0.567	0.495	0.245	0	1
Received UI	0.051	0.221	0.048	0	1
Moscow & St. Petersburg	0.090	0.287	0.082	0	1
Household Expenditures (/10^4; September 1992 rubles)	1.367	3.383	11.44	0.001	104.89
Regional Unemp. Rate	3.685	2.426	5.886	0.76	9.69
Children	0.828	1.002	1.004	0	6
Female*Children	0.435	0.843	0.711	0	6
Married*Female	0.295	0.456	0.208	0	1
Quit	0.442	0.496	0.246	0	1
Layoff	0.264	0.441	0.194	0	1
Left for other reason	0.295	0.456	0.208	0	1

Table 7 **Duration Analysis of Exits from Unemployment**
Cox Proportional Hazard Specification

Independent Variable	Exits to Employment	Exits to Out of the Labor Force
Female	-.102	-.303
	(.189)	(.331)
Married	.390**	-.079
	(.187)	(.356)
Married*Female	-.663**	.178
	(.243)	(.429)
Number of children	-.047	-.119
	(.081)	(.188)
Children*Female	-.034	.388*
	(.115)	(.207)
Age 21-29	.136	-.400
(*age <21 omitted*)	(.207)	(.346)
Age 30-39	.316	-.689*
	(.227)	(.389)
Age 40-49	.263	-.313
	(.227)	(.382)
Age 50-59	-.490*	.527
	(.270)	(.369)
Special secondary	.280	-.380
(*higher education omitted*)	(.190)	(.267)
Ordinary secondary	.262	-.759**
	(.188)	(.292)
Unfinished secondary	.257	-.585
	(.251)	(.374)
Primary or less	.241	-.734*
	(.231)	(.379)
Moscow & St. Petersburg	.228	.044
	(.176)	(.318)
Received unemployment insurance	.037	-.669
	(.226)	(.524)
Regional unemployment rate	-.421**	-.262**
	(.044)	(.061)
Household Expenditure ($\div 10^4$)	-.019	.027**
	(.036)	(.010)
Quit last job	-.384**	-.093
(*layoff omitted*)	(.139)	(.247)
Left for other reason	-.581**	-.353
	(.147)	(.256)
Exits (N = 1,089)	347	121
Model $\chi^2(19)$	195.8**	58.5**
log likelihood	-2033.0	-685.5

Notes: Standard errors in parentheses. ** and * indicate significance at the .05 and .10 levels, respectively. Variables are dummy variables except for regional unemployment rate, number of children, children*female, and household expenditure. Household expenditure values are real September 1992 rubles, deflated using national CPI from Goskomstat. Exits to out-of-the-labor-force are considered censored when estimating exits to employment, and vice versa.

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