Household Childcare Choices and Women's Work Behavior in Russia

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A B S T R A C T

The paper models household demand for childcare, mothers' labor force participation and mothers' working hours in Russia. The model estimates the effects of the price of childcare, mother's wage, and household income on household behavior and well-being. Reduced-form models of the discrete and continuous household choices are estimated jointly using the Semi-Parametric Full Information Maximum Likelihood method. This method controls for the error term correlations across outcomes, and the correlation of the error terms that can result when panel data are used. The estimations indicate that mothers' labor force participation and working hours are responsive to changes in the price of childcare and hourly wages. The simulations presented in this paper show that family allowance transfers—intended as a means of reducing poverty—do not have a significant effect on a household's choice of childcare arrangements. Replacing family allowances with childcare subsidies may have a strong positive effect on women's labor force participation and thus can be effective in reducing poverty.

I. Introduction

This paper examines the interdependence of women's labor force activity and household childcare choices in Russia. In the days of the Soviet Union, more women participated in the labor force than in almost any other country in the industrialized world. In the 1980s about 90 percent of prime-age women were either employed or

went to school (Lapidus 1985). Women in the Soviet Union worked full-time the whole year round. Less than 1 percent of the female work force was employed part-time.

Soviet women could not have been involved in the economy to such an extent without the existence of a wide range of government-subsidized childcare programs, such as nurseries and preschool, kindergarten, and after-school programs. The number and variety of state-provided childcare facilities increased steadily throughout the Soviet era. By the mid-1980s some 15 million children between one and seven years of age (70 percent of children from that age group) were registered in public childcare institutions (Matthews 1986).

Reforms launched by the Russian government in early 1992 led to a dramatic change in the socioeconomic environment and put a great strain on the existing system of social protection and state-subsidized institutions. A drop in GNP in the 1990s resulted in an ever-widening budget deficit, shrinking government-funded programs, and a dramatic decline in the number of state-run childcare organizations. According to the Russian government's national statistics agency (GosComStat 1998), the proportion of children in kindergarten and nurseries dropped by 55.1 percent and the number of preschool facilities declined by 35.6 percent between 1989 and 1997.

The sharp decline in the number of kindergartens and nurseries was accompanied by an increase in the cost of government-provided care. In the days of the Soviet Union, childcare costs were partly or totally covered by subsidies from the federal and local governments and/or from employers. But in present-day Russia, virtually all government child support programs have been eliminated and only a handful of companies can afford to provide daycare services for their employees' children. The number of enterprise preschools fell by three-quarters between 1990 and 1996 (Micklewright 2000). A system of private childcare providers has not yet developed to a degree sufficient enough to have a meaningful impact on the total supply of childcare. This affects all families with young children, but low-income families in particular.

The complexity of the problems faced by families with children in a transitional economy and the significant impact that reform of the childcare system can have on the political and economic environment in Russia prompted the research described in this paper. To shed light on the problems, I model household childcare choices, the decisions that Russian mothers make about whether to participate in the labor force, and the number of hours that they work. Using a model of consumer demand for state-provided childcare, I am able to estimate how the price of childcare, mothers' wages, and household income all affect household behavior and welfare.

The econometric model I use is derived from a theory described in the literature on household decision-making about childcare and women's participation in the labor market. The theory has several testable predictions. To test these hypotheses, I jointly estimate a reduced-form model of discrete household choices about childcare arrangements and the labor supply of its members and continuous choices about the number of hours the mother works and the children stay in formal care using the method of Semi-Parametric Full Information Maximum Likelihood (SPFIML). This method takes into account the error term correlations across outcomes, and the correlation of the error terms that can result when panel data are used.

The estimations reveal that the decision that mothers make about participating in the labor force and about the number of hours they work are sensitive to changes in hourly wages and to changes in the costs of childcare. A decrease in childcare cost

has a strong positive effect on the labor activity of women with children and on the use of formal childcare. At the same time, family allowance transfers to households with young children do not have a significant effect on whether or how much they use formal (paid, state-provided) childcare or whether and how much the mothers work.

Until recently, little research had been conducted on the economics of childcare outside of the United States. In the last decade, several studies on childcare were carried out in Western Europe and Canada, where (as in the United States) growing numbers of women with young children have been entering the work force (see, for example, Gustafsson and Stafford 1992 in Sweden; Cleveland, Gunderson and Hyatt 1996 in Canada; Van Den Brink and Groot 1997 in the Netherlands). Research on childcare and women's labor market activity in the developing countries lags far behind. Little exists apart from a paper by Wong and Levine (1992) that focuses on childcare and mothers' employment in Mexico, and a paper by Connelly, DeGraff, and Levison (1996) that examines the effect of childcare arrangements on the rate of women's participation in the labor force in Brazil.

This is the first study to analyze the relationships among mother's employment, choice of childcare, and demand for formal childcare in Russia in a unified framework. The paper is based on recent progress in the theory of demand for childcare and women's labor supply in the United States. Methodologically, the paper follows the work of Blau and Robins (1988), Blau and Hagy (1998), Ribar (1992 and 1995), Connelly (1992), Michalopoulos, Robins, and Garfinkel (1992), Kimmel (1995, 1998), and Averett, Peters, and Waldman (1997), all of whom jointly model household decisions about childcare and mothers' decisions about entering the work force.

The paper is organized as follows. The next section describes the data. Section III discusses the recent trends in female rates of labor force participation, unemployment and wage dynamics in Russia. Section IV develops the theoretical model and gives details about the empirical model. Estimation results and simulations are presented in Section V. Section VI discusses the policy implications. The paper concludes with summary of the findings and suggestions for future research.

II. Data

This research is based on data from the three rounds (December 1994, October 1995, October 1996) of the Russian Longitudinal Monitoring Survey (RLMS). The data are representative at the national level.[1] There are 1,262 households with children younger than the age of seven in the pooled sample, and these households are represented by 2,169 household-wave observations. The data set includes information about the individual members of these households, about the households themselves, and about the community. It also contains information on the childcare arrangements made for each child in the household, the amount of time each child spent in formal and informal childcare, and the amount of money paid for formal childcare during the week of the survey. A part of the survey questionnaire

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1. Lokshin and Popkin (1999), and Lokshin, Popkin, and Harris (2000) give additional information on the sample and data set.

administered to groups of respondents who represented their local communities yields data about the different forms of childcare available locally.

III. Changes in the Russian Labor and Childcare Markets in the 1990s

A contracting GNP in Russia during the 1990s caused employment to shrink, but not as much as in the countries of Central and Eastern Europe (CEE). In CEE countries, a 25–30 percent contraction in GNP caused employment to fall by 10–30 percent. In Russia, between 1992 and 1998, GNP dropped by almost 40 percent, causing employment to decrease by 14 percent (Kapeliouchnikov 1999). The rate of unemployment has been increasing slowly, from 4.7 percent in 1992 to 9.3 percent in 1996. In the early stages of economic transition, women made up a disproportionate share of unemployment (Fong 1993). The gap between male and female unemployment rates closed by 1994, and in 1996, 9 percent of women were unemployed, compared with 9.6 percent of men (Commander and Yemtsov 1997). However, more women than men dropped out of formal employment between 1992 and 1996. In 1992, 89 percent of prime-age men, and 82 percent of prime-age women worked. In 1996 the rates fell to 81 percent and 72 percent (Glinskaya and Mroz 2000). By comparison, 59.1 percent of women in Germany worked in 1996, 60.1 percent in France, and 75.6 percent in Sweden (ILO 1999).

The proportion of working women with preschool aged children was lower; the majority of children enter school at the age of seven (OECD 1998). Table 1 shows employment rates for mothers grouped by the age of the youngest child. Only about 20 percent of infants (children younger than 18 months old) have mothers who are working. Employment rates for mothers increases sharply with the age of the youngest child. More than one-third of the women with the youngest child aged 1.5–3 years are working; this share increases to two-thirds for mothers whose youngest children are 3–7 years old, which is higher than the rate for women without children.

Table 2 presents statistics on the use of different forms of childcare grouped by the age of the child.[2] The demand for different forms of childcare depends on the age of a child. Parents of infants tend to rely on home care. No infants attend state nurseries and most of the mothers with young children stay home. In-home childcare is also the primary type of childcare in households with children 1.5–3 years old. About 13–19 percent of 1.5–3 year-old children attend state kindergartens or nurseries, and a small proportion of toddlers receive their care from nonrelatives. The picture changes for preschool children. Roughly 37 percent of children in this age group attend state-provided childcare facilities, while the proportion of preschoolers in the care of nonrelatives is small.

Table 3 shows the employment rates for mothers in different household structures. Approximately 70 percent of the married women who live with only their husbands and children work. Employment rates for mothers in two-parent families that live in

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2. A household may use different forms of childcare simultaneously. When multiple types of childcare are used by a household, one child may be tabulated in several places in the tables that follow.

Table 1
Employment Rates for Mothers by Age of the Youngest Child

Children's Age	December 1994	October 1995	October 1996
< 1.5 years	22.9	20.5	19.6
1.5–3 years	43.3	37.6	34.2
3–7 years	71.5	73.3	72.7
7–12 years	83.9	82.3	80.2
12–18 years	85.3	87.6	86.9
All	71.1	71.3	70.3
Women with no children	80.3	80.9	79.8
Sample size	1,475	1,395	1,364

Note: Sample of households with children younger than 18 years old.

extended households is lower. In families with a single parent, the mother's involvement in the labor market is much higher than the average for all families. For single-mother families living with no other relatives, the level of labor force participation is close to 83 percent. More than half of all Russian children live in extended households, in which several families live together. The share of extended households in Russia is rising (Lokshin, Harris, and Popkin 2000). The living arrangements of households with children could be endogenous to the price and availability of formal childcare. Families with small children may choose to move into extended households where other household members could care for the small children when parents are at work.

Table 2
Percentage of Children in Different Forms of Care by Child's Age

	Type of Care								
	Home Care			Nursery, Kindergarten or Afterschool			Nonrelatives		
Children's Age	1994	1995	1996	1994	1995	1996	1994	1995	1996
< 1.5 years old	99.9	97.3	93.4	0.0	0.0	0.0	2.6	4.8	6.4
1.5–3 years old	92.9	87.8	85.8	12.5	12.8	19.1	5.9	4.6	7.0
3–7 years old	69.4	73.9	71.6	37.3	36.9	38.2	7.0	5.5	6.2

Note: Sample of households with children 0–7 years old (790 households in 1994, 701 households in 1995 and 678 households in 1996)

Table 3
Employment Rates for Mothers in Households with Different Structures

	December 1994	October 1995	October 1996
Married couple with children			
With no others	69.8	69.6	71.5
With grandparents	62.9	67.1	66.3
With other relatives	63.3	56.2	62.1
Single-mother family			
With no others	82.2	82.9	82.7
With grandparents	77.9	79.8	72.5
With other relatives	69.4	73.1	67.4
Extended families with children	61.7	62.8	56.7
Total families with children	71.1	71.3	70.3
Sample size	790	701	678

Note: Sample of households with children 0–7 years old.

IV. Theoretical Issues and the Econometric Model

Having discussed the nature of labor force participation, employment of women with children, and types of childcare used in Russia, the next step is to formulate a model of the optimal behavior of households with children of preschool age. Russian households have to choose from three forms of childcare: care provided by the mother, informal childcare (at home, free) provided by other household members, and formal childcare.[3] The theoretical model is based on the assumption that the choices household members make about childcare, market goods, and leisure are subject to budget and time constraints. A household's decisions about the quality of childcare it wishes to obtain and the amount of time each member of the household can work are motivated by the desire to achieve the highest level of household welfare. The demand for childcare, hours of care, and amount of time the mother works can be derived as a function of the exogenous variables by solving the first-order conditions of household utility maximization. As the longer version of this paper shows, there exist several possible corner solutions (the combinations of the work status of the household members and the type of childcare used) of the household utility maximization problem (Lokshin 2000). Assuming a given corner solution, the household optimizes the labor supply of its members and chooses the optimal quality of childcare. Subsequently the household chooses the corner solution with the highest utility. The analysis in this paper focuses on five corner solutions (shown in Table 4) that are empirically observed in the data.

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3. About 6 percent of the households in the sample used nonrelatives as childcare providers for their children. I classified these households as the household that use paid childcare.

The utility that the ith household derives from the choice of the jth discrete alternative at time t can be expressed in linear form as:

(1) $\Omega_{ijt} = \Omega_{ijt} + \varepsilon_{ijt} = X_{it}\beta_j + Z_{ijt}\gamma_j + \varepsilon_{ijt}$ $j = 0, \ldots, 4$

where Ω_{ijt} is the utility for household i choosing state j at time t, X_{it} is the vector of the household characteristics that affect the choice of the ith household at time t and that do not vary by state, Z_{ijt} is the vector of outcome-specific variables, β and γ are vectors of unknown parameters, and ε_{ijt} is a random disturbance that reflects, among other things, unobservable attributes of the alternatives. The probability that household i chooses state j at time t is then:

(2) $\Pr_{it}(j) = \Pr[\Omega_{jit} > \Omega_{qit}]$

$$= \Pr[\varepsilon_{jit} - \varepsilon_{qit} > X_{it}(\beta_{qit} - \beta_{jit}) + Z_{ijt}(\gamma_{qit} - \gamma_{jit})] \quad \text{for any } j \neq q$$

For the 23 percent of households in the sample with no access to formal childcare facilities the conditional contribution of the discrete outcome equation to the likelihood function is calculated based on a restricted set of possible forms of care, that is, that there are no formal care arrangements available in the choice set of these households ($j = 0, \ldots, 2$).

The equations for the supply function for mother's hours at work and for the demand function for hours spent by children in formal care can be specified in linear form as:

(3) $H_{it}^k = \alpha^k X_{it} + \varphi^k Z_{it} + \xi_{it}^k$, where $k = \begin{cases} 1 \Rightarrow \text{hours mother works} \\ 2 \Rightarrow \text{hours children spend in paid care} \end{cases}$

Here, H_{it}^k is the continuous dependent variable associated with household i in state j at time t. In the first continuous outcome equation, H_{it}^1 is the number of hours that a mother supplies to the labor market, and H_{it}^2 is the number of hours spent by children in formal childcare facilities. φ^k and α^k are vectors of unknown parameters, and ξ_{it}^k is an error term with mean zero.

The error terms in the discrete (ε) and continuous (ξ^k) equations may be correlated across states and among each other. If, for instance, a mother's participation in the labor force is determined, among other factors, by some unobservable taste for work, this unobserved factor will be part of ε_{ijt} for states in which the mother is employed ($j = 1, \ldots, 4$). In the continuous outcomes, the number of hours that the mother supplies to the labor market depends, among other things, on her taste for work. Women with a high preference for work can be expected to work longer hours and are more likely to be employed. In addition, because panel data are used in the model, there exists the possibility of a correlation in the error terms among the multiple observations of the same family (correlation between ε_{ijt2} and ε_{ijt1}, $t_1 \neq t_2$ and correlations between ξ_{it1}^k and ξ_{it2}^k, $t_1 \neq t_2$).

To account for possible error correlations I impose a factor structure on the disturbances in Equations 1 and 3:

$$\varepsilon_{ijt} = \mu_{ijt} + \rho_{j1}V_{1i} + \rho_{jt2}V_{2it}$$

(4) $\xi_{it}^1 = \lambda_{it} + \tau_1 V_{1i} + \tau_{t2}V_{2it}$

$$\xi_{it}^2 = \gamma_{it} + \varsigma_1 V_{1i} + \varsigma_{t2}V_{2it}$$

Table 4

Distribution of Households with Children 0–7 years old by the Choice of Childcare Arrangements and Mother's Employment Status

Childcare Mode	December 1994	October 1995	October 1996
Mother does not work (State 0)	45.0	46.2	47.3
Mother works			
Others work, informal care only (State 1)	8.0	8.6	8.8
Others do not work, informal care only (State 2)	22.7	23.2	18.5
Others work, formal care only (State 3)	19.7	15.8	18.8
Others do not work, formal and informal care (State 4)	4.5	6.2	6.6
Total number of households	790	701	678

where μ_{ijt} is an independent extreme value error, and λ_{it}, and γ_{it} are independent normal random variables. V_1 is a permanent factor (a factor that remains the same for the household at any time point, that is, a household-specific effect) while V_2 is a transitory factor (within a single household, the factor will be different at any two different points in time). The system of Equations 1–3 is estimated by the Semi-Parametric Full Information Maximum Likelihood (SPFIML) method developed by Liard (1978), Heckman and Singer (1984), and Mroz (1999).

A. Dependent Variables

The dependent variable for the discrete outcome equation is defined according to the possible combinations of employment status of household members and the type of childcare chosen. The distribution of households by the mothers' labor force participation and by the mode of childcare chosen is presented in Table 4. More than 45 percent of households with young children have nonworking mothers. The percentage of mothers who stayed at home with their children increased slightly from 1994 to 1996. Among the households that use other types of care, the largest single group is formed by families using household members other than the child's mother as childcare providers. A third of the households with a working mother use this type of care. About 18 percent of households used only formal facilities for childcare. And a small minority of Russian households used both formal and informal childcare.

The distribution of the dependent variables for continuous outcome equations, that is, the time that mothers spent working and the time that children spent in formal care is shown in Table 5. Continuous outcomes are observed only among the sample of working mothers or among the sample of children in formal care. Employed mothers work on average 146.6 hours a month. It is lower than the 160 hours per month that constitutes full-time employment in Russia.

Table 5

Summary Statistics for the Explanatory Variables, the Means and Standard Deviations

	Mean	Standard Deviation
Dependent variables of continuous outcome equations		
Mother's work hours per month (conditional on working)	146.68	33.87
Hours per month children spend in formal childcare facilities (conditional on having a child in the formal care)	164.36	42.28
Explanatory variables		
Log of the average cost of childcare	1.31 (3.67)	1.08
Wage measures log (actual)		
Mother's imputed hourly wage	2.43 (11.35)	0.42
Other household members' imputed hourly average wage	2.43 (11.36)	0.83
Other household members' imputed hourly minimum wage	2.34 (10.38)	0.85
Household nonwage income	3300.88	855.1
Characteristics of the mother		
Mother's age in months (years)	367.6 (30.6)	94.7 (7.9)
Mother's years of education	12.3	3.6
Household composition		
Presence of children younger than 18 months	0.19	binary
Presence of children 18 months–3 years old	0.22	binary
Presence of children 3–7 years old	0.67	binary
Presence of children 7–12 years old	0.26	binary
Presence of children 12–18 years old	0.17	binary
Household size	4.08	1.43
Number of children 18 years old and younger	1.68	0.89
Number of pensioners in the household	0.17	0.42
Household living arrangements		
Single parent household	15.82	binary
Household with two parents	84.18	binary
Type of locality		
Metropolitan areas indicator	0.09	binary
Other urban areas indicator	0.66	binary
Rural areas indicator	0.25	binary
Sample size	2169	

a) All monetary variables are in 1992 rubles.

B. Explanatory Variables

The definitions and descriptive statistics for the explanatory variables in the system of Equations 1.1–1.2 are presented in Table 5. Several key variables of interest are discussed in detail below.

1. Price Per Quality Unit of Childcare (P_q)

I identify the effect of childcare prices on household behavior through district-level differences in these prices. Fees charged by kindergartens depend on the local budgets and vary considerably by locality. Most of the preschool facilities are funded from the local budgets and from the limited contributions of local enterprises. Although some nationally established regulations about the quality of care exists, the educational and developmental programs, children-to-teacher ratios, and group sizes differ by locality. Salaries of the childcare workers are determined at the local level and are related to average wage rates in the locality.

In the RLMS, households reported their weekly expenditures on childcare and the time that their children spent in a formal childcare facility during the week of the survey. There is no direct way to relate such information to the quality of childcare provided, because no data were collected on the regional characteristics of childcare facilities (such as the sizes of groups in pre-school establishments, quality of personnel, etc.). Like Blau and Robins (1988), I assume that the quality of formal childcare is uniform within a locality (that includes about 40 households with young children) and I use the average per hour price of care as a proxy for the price per unit of childcare quality in 30 localities in Russia.

2. Offered Wage of the Mother (W_m) and Other Household Members (W_o)

The wage rates available to each mother have been imputed using a Mincer (1974) type earnings function regression with a control for selectivity bias (Heckman 1979), estimated on a sub-sample of working women for whom hourly wage data were available.[4] The hourly wage has been calculated as a ratio of the monthly earnings and the total number of hours individuals worked during the month the survey was administered.

In the wage regression, the following explanatory variables have been used to predict mothers' hourly earning—the mother's educational level, her age, details on the region and the type of settlement where she lives (urban-rural), the number of children she has (as a proxy for work experience), and the amount of time she had been in her current main job. Imputations are made based on women's predicted hourly wages, with the job tenure of nonworking mothers being equal to zero. Here the

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4. Regression coefficients for the wage equations are available from the author. For identification in the selection equation I use the set of household characteristics that can influence the mother's labor force participation decision, but are uncorrelated with the potential wage rate. Among themse characteristics are: mother's marital status, size of the household where she lives, average level of unemployment in the locality, and average level of labor force participation in the locality. While the last two variables could, theoretically, influence the wage rates in the locality, the rigidities in the wage-setting mechanism in Russia in the mid-1990s would make this correlation small.

offered wage is assumed to be a wage that a mother could earn if she were to start a new job.

The wage rates available to other household members have been imputed in a similar way. Six separate regressions were estimated for the subsamples of youth (males and females 18–25 years of age), prime aged individuals (males 26–59 and females 26–54), and individuals of retirement age (male 60+ and females 54+). Wage rates for other household members of particular ages and gender were then imputed from the corresponding regressions. To integrate individual wages of other household members into one indicator I use two alternative measures: the average and the minimum level of wages available to household members other than the mother.

3. Other Explanatory Variables

Other explanatory variables for estimation of the system of Equations 1.1–1.2 include some individual characteristics of the mother such as her age and level of education, household demographics and size, the number of children in the household and their ages, the number of pensioners in the household, the household's geographical characteristics, and the household nonwage income that may have included social security transfers, private transfers, in-kind income, and income from home production.

V. Results

Table 6 presents the estimated coefficients for the discrete and continuous outcome equations. According to the likelihood-ratio test criterion, the specification that assumes an independence of the error terms in Equations 1.1–1.2 is rejected in favor of the SPFIML estimation.[5]

The estimations confirm the main predictions of the theoretical model. For the discrete outcome equation, positive and significant coefficients on the mother's wage variable indicate that higher potential wages of the mother encourage her to work, increasing the opportunity cost of the mother's time at home. Higher wages of other household members have a positive impact on the probability that households will choose states where other household members work and a significant negative impact on the probability that other household members do not work. Costs of childcare negatively and significantly affect the probability that households will choose states where the mother works. Estimation does not reveal any significant effect of household nonwage income on the behavior of households with children. More highly educated women with children are more likely to be in the labor force and to use formal care. Households with children younger than three years of age are less likely to have working mothers than households with older children, because the custodial needs of young children place a competitive demand on the use of the mother's time. Such households are less likely to use formal childcare arrangements. Presence of older siblings (12–16 years of age) has a positive and, for two states, significant effect on the probability that the mother works. This result may support the hypothesis that older

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5. The log-likelihood value for the independent estimate is −9650.50 based on 164 parameters. The log-likelihood value for the SPFIML estimate is −9362.65 based on 182 parameters. This is an increase of 287.85 in the log-likelihood value for 18 additional parameters.

Table 6
SPFIML Estimation of System of Equations (1.1–1.2)

| | Discrete Mode of Childcare and Household Labor Supply Case when the Mother Does Not Work is a Reference | | | | | | | | Continuous Outcome Equations | | | |
| | Others Work Informal Care | | Others Do Not Work Informal Care | | Others Work Formal Care | | Others Do Not Work Informal and Formal | | Hours of Work | | Hours in Formal Care | |
	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error	Coeffi-cient	Standard Error
Household composition												
Younger than 18 months	−3.12**	0.49	−3.64**	0.70	−5.38**	1.00	−5.80**	1.00	−6.57	4.60	−13.90**	2.44
18 months–3 years old	−1.45**	0.45	−1.89**	0.62	−4.13**	0.91	−4.73**	1.22	−14.03**	4.06	1.93	2.31
3–7 years old	0.55	0.45	0.73	0.64	−0.80	0.93	−0.90	1.30	−8.15	4.27	0.61	2.44
7–12 years old	0.97*	0.40	0.81	0.54	0.32	0.54	−0.16	0.67	−4.50	3.04	−13.83**	1.59
12–18 years old	1.27**	0.47	0.43	0.64	2.43	0.62	1.95**	0.76	−7.31	2.21	−11.71**	1.70
Household size	7.45**	1.44	−0.40	1.90	2.31	2.04	−3.57	2.34	40.86**	3.26	−3.59	4.72
Number of children ⩽18	−8.87**	2.41	1.43	3.29	−10.98**	3.77	−0.05	4.50	14.58**	4.16	13.13**	1.67
Number of pensioners	−3.84	2.23	1.70	3.07	−12.01**	2.88	−10.54**	3.84	10.99**	2.11	−0.42	5.69
Single mother household	−0.33	0.50	1.36*	0.62	0.64	0.53	1.92**	0.62	22.27**	2.53	−0.54	1.54
Households with two parents					Reference							
Household incomes												
Household nonwage income	−0.15	1.94	2.50	2.43	−0.96	2.10	−0.06	2.56	−32.06**	4.97	−4.10	6.27
Log wage rate of others	0.25	2.21	−8.09**	2.66	7.26*	3.26	−6.36*	3.09	25.12**	3.20	2.33	5.45
Log cost of childcare	−3.19**	1.16	−3.39*	1.52	−2.93*	1.36	−4.45**	1.73	−19.56**	1.44	−3.53	3.95
Household regional dummies												
Other urban areas of Russia	−0.36	0.36	−0.04	0.47	−2.23**	0.50	−1.70**	0.56	0.85	2.48	0.29	1.19
Moscow and St. Petersburg	−1.54	0.67	−1.52	0.88	−1.15	0.87	0.24	1.19	−22.44**	1.70	−0.43	2.51
North and North-West	−1.29	0.63	−2.12**	0.80	2.54**	0.71	3.38**	0.94	−21.13**	1.91	1.72	1.97
Centra	0.65	0.53	−0.10	0.70	2.83**	0.73	3.17**	0.90	−16.08**	3.32	−0.28	2.03

Table 6 (*continued*)

| | Discrete Mode of Childcare and Household Labor Supply Case when the Mother Does Not Work is a Reference | | | | | | | | Continuous Outcome Equations | | | |
| | Others Work Informal Care | | Others Do Not Work Informal Care | | Others Work Formal Care | | Others Do Not Work Informal and Formal | | Hours of Work | | Hours in Formal Care | |
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Volgo-Vyatskiy	−0.44	0.56	−1.51*	0.72	2.34**	0.70	2.29**	0.91	−2.19	2.35	−3.71**	2.07
North Caucasis	0.40	0.52	−0.30	0.71	1.78*	0.79	1.80	1.00	−7.20**	2.68	−2.93	2.23
Ural	−0.12	0.57	−1.13	0.73	3.05**	0.72	3.49**	0.90	−19.72**	2.06	0.11	1.94
Western Siberia	−0.14	0.55	−1.10	0.73	1.30	0.75	2.11*	0.96	−20.24**	2.38	−1.62	2.01
Eastern Siberia					Reference							
Time dummies												
Round 5	0.03	0.29	−0.06	0.39	−0.81*	0.37	−1.19*	0.50	−11.66**	2.14	−0.08	1.18
Round 6	0.35	0.30	0.21	0.39	−0.63	0.37	−0.66	0.46	3.24	2.05	−2.03	1.24
Round 7					Reference							
Characteristics of the mother												
Mother's age in years	1.60	1.35	1.05	1.86	−0.70	1.83	−1.49	2.10	10.31**	2.31	1.99	4.51
High school completed	−0.46	0.42	−0.28	0.55	−1.31*	0.57	−1.08	0.69	13.93**	1.50	−0.91	1.42
Technical/vocational school	0.26	0.38	−0.19	0.50	−0.17	0.51	−0.17	0.63	17.91**	1.44	−1.87	1.30
University					Reference							
Log of mother's hourly wage	14.18**	4.37	13.24*	6.11	17.98**	6.15	19.67**	6.02	33.18**	3.20	11.89	8.97
Constant	−6.82**	1.44	−3.65*	1.82	−14.86***	2.40	−11.05**	2.41	121.55**	4.32	−2.22	4.00

Note: Sample of 2,162 households with children 0–7 years old; (*) means the coefficient is significant at 5 percent level, (**) means the coefficient is significant at 1 percent level

children act as substitutes for the mother in home production and, particularly, in childcare. Or, similar to Connelly, DeGraff, and Levison's (1996) findings in Brazil, the greater need for income when the teenagers are present in the household may be increasing the probability that mothers will work. The household's structure does appear to be an important determinant of its choice of childcare. The availability of grandparents and other family members encourages households to use informal types of childcare and minimizes their propensity to use formal care. Estimated coefficients also indicate that there are significant regional differences in household preferences for types of childcare and the extent of labor mothers will supply. Households in the rural areas of Russia are more likely to have working mothers than the families in the urban or metropolitan areas.

Estimates in the hours of work equation show that the mother's wage rate has a positive and significant effect on the number of hours the mother works. Higher costs of childcare decrease the number of hours mothers work. Controlling for the wage rates, lower educated and older mothers work more. The presence of children younger than three years of age has a negative and significant effect on the hours worked. Relative to women with children in households with both parents, single mothers work more. There are significant regional differences in the number of hours mothers work.

Coefficients of the hours in the formal care equation indicate that the presence of children younger than 18 months significantly decreases the number of hours children aged 3–7 spend in formal care. Once the mother or the relative is watching the infant, she might as well watch older children. If there are older siblings in the household, the number of hours in formal care is also lower. Older siblings could be used in the household as free childcare providers, thus decreasing the time the younger children stay in formal care. Maternal wage rates and costs of care have no significant effects on the hours children spend in formal care.

The Russian results confirm those found in other countries. The elasticity of the mother's labor force participation with respect to increases in the price of childcare, −0.12 in Russia, is similar to the elasticity of −0.17 found in the transitional economy of Romania (Lokshin and Fong 2000) and in the United States, where Blau and Hagy (1998), also using the SPFIML approach, report that the elasticity of women's labor force participation is −0.20. Anderson and Levine (1999) found that the elasticities for women with children younger than 13 range between −0.055 and −0.358 in the United States. The elasticity of the household's use of formal childcare with respect to the costs of care is −0.11 for Russia and −0.41 for Romania.

VI. Welfare Impact of Three Government Programs

Poverty rates among families with children were increasing in the first half of the 1990s, and by 1996, 44.5 percent of children under age seven were living in poverty.[6] The proportion of poor nuclear families reached 38 percent, and half of the single parent households were poor. The social protection of households with children became a priority for the Russian government. But when allocating limited

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6. For the description of the methodology of calculating the poverty line in Russia see for example Lokshin and Popkin (1999).

budget funds, policymakers need to decide which policies are most likely to improve the well-being of Russian families. Currently, the main policies that target households with children in Russia involve child and family allowances (Lokshin, Harris, and Popkin 2000). Other possible policies in this area include wage-rate subsidies and childcare subsidies.

The effectiveness and distributional impact of these policies can be determined through simulations. In a given simulation, the value of the variable of interest is assigned to all the households in the sample. The simulated probabilities for the model outcomes are generated for each household at every time point by integrating over the estimated heterogeneity distribution and averaging the probabilities across the sample. Next, the value of the variable of interest is changed, and a new set of simulated probabilities is generated. The effect of changes in a particular variable on the model outcomes is calculated as the difference between the two simulated probabilities.

A significant proportion of Russian households do not have access to formal childcare facilities. One could argue that the effectiveness of various policy measures could depend on the sample of affected households. To discern the sensitivity of the policy simulations I present two set of results. The first set of simulations, shown on the top panel of Table 7 is based on the estimations results for the total sample of household with children. The simulations at the bottom part of Table 7 are derived from the estimates based on the restricted sample of those households that have access to formal care (Shown in Table A1 in the appendix).

Suppose the government introduced childcare subsidies that made childcare free. These subsidies are available only to the families that use formal childcare. The total government expenditure on subsidized care would consist of subsidies to those households that were using formal care before the new subsidy was introduced plus subsidies to those households switching from informal care to formal care because of the lower price.

Focusing on the simulations based on the total sample, a decrease in the costs of care would encourage households to choose formal childcare arrangements (State *3* and *4*), and also encourage mothers to work. If formal childcare were fully subsidized (in other words, the price was zero), as opposed to the current situation in which the average childcare price is 5.6 rubles per hour, the rate of mothers' labor force participation would increase by 11.4 percent from 50.0 percent to 55.7 percent. That number is comparable to the pretransition levels of maternal employment in Russia, when the costs of childcare were small. The proportion of households that use of formal care facilities would increase by 10.3 percent, from 21.4 percent to 23.6 percent of households (this number is a weighted sum of the changes in States 3 and 4). This share is three times lower than the proportion of children in kindergarten in pretransition Russia, when almost 70 percent of children 3–6 years of age were in formal care (GosComStat 1998).

Alternatively, suppose the Russian government allocated the money it spent on childcare subsidies to wage subsidies for women with children. All households with working mothers would be eligible for such subsidies. The potential wage that a mother could earn if she worked will increase the opportunity cost of her staying at home and, therefore, will increase the mother's propensity to work. The increase in the wage rate of 2.06 rubles per hour would induce some mothers who previously did

Table 7

Simulation of the Three Possible Scenarios of Government Support for Households with Children

	Percentage Change					
Policy Instrument	Mother's Labor Supply	Mother's Hours of Work	Formal Care use	Formal Care Hours	Percent Change in Eligible Households' Income	Who is Eligible, (Percent of All Households)
Sample 2,169 of household with children 0–7 years old						
Childcare subsidy from 5.6–0.0 rubles/hour	11.4	2.6	10.3	2.2	19.8	Formal childcare users (23.6)
Wage subsidy from 10–12.06 rubles/hour	5.9	1.3	6.4	1.1	7.9	Working mothers (52.4)
Family allowance transfer	−0.2	−0.01	−0.01	−0.01	3.4	All households (100)
Sample of 1,746 households with access to childcare facilities						
Childcare subsidy from 5.6–0.0 rubles/hour	17.4	6.1	15.4	7.1	18.6	Formal care users (28.4)
Wage subsidy from 10–14.1 rubles/hour	5.6	3.0	6.7	4.3	11.0	Working mothers (56.8)
Family allowance transfer	0.3	0.0	0.6	0.7	4.1	All households (100)

not work to enter the labor market. Mothers who were employed before the policy was implemented would work longer hours. The number of households that used formal care would also go up by 6.4 percent. The rate of women's labor force participation would grow by 5.9 percent and 52.4 percent of households would benefit from this policy.

Childcare subsidies would increase maternal employment by almost twice as much as wage subsidies. Both measures would increase the total income of eligible households. In the case of households using formal childcare before the childcare subsidies were introduced, the increase in income would come from a decrease in the amount of money spent on childcare and an increase in the mother's wage income because she would be working longer hours. In the case of households that started using formal care because of the lower prices, household income would increase because mothers would be entering the labor market.

The wage subsidies would increase total household income because mothers already in the labor force would spend more time at work and because mothers who had been outside the labor force would bring in income after they became employed.

A third policy alternative is a family allowance transfer. Assume again that the

government wants to spend the same amount of money on family transfers as it spent on each of the first two policies. According to the model, the level of labor force participation of mothers would drop slightly, but total household income would increase because of higher nonwage income. All households with children would benefit from this policy.

These simulations indicate that childcare subsidies are substantially more effective than wage subsidies at increasing employment per ruble of government expenditure. They would also be more effective in inducing households to use formal childcare.

Comparing the effects of the above three policies on the income levels of Russian households with children reveals that childcare subsidies would produce the largest increase in family income, both for the beneficiaries and, if averaged out, for the whole sample. Wage subsidies would produce the next biggest increase, followed by family allowance transfers. Households that use formal care would experience on average a 19.8 percent increase in their incomes as a result of fully subsidized childcare. The effect of wage subsidies would be significantly smaller (yielding a 7.9 percent increase in total household income), but it would affect more families. The uniform family allowances would increase the income level of all households with children by only 3.4 percent.

The relatively greater effectiveness of childcare subsidies under a revenue-neutral experiment stems from the fact that childcare subsidies go to the smallest proportion of households with children, in comparison with other policies. Thus, households with children in formal childcare facilities experience a significantly larger impact on their total income with childcare subsidies (an increase of 1,261 rubles per month) than with wage subsidies (an increase of 472 rubles per month) or with family allowance transfers (198 rubles per month). Larger changes in household income allow more households with children to change the type of childcare they use (to formal childcare) and to free their mothers for work. Other policies do not change total household income enough to induce households to switch to a new state. For many households the additional income results only in intra-state adjustments and thus fails to produce a significant impact on household behavior.

The simulations using the restricted sample of the households with access to childcare facilities show a stronger effect on the way childcare prices impact maternal employment and use of formal care than do simulations conducted on the whole sample (bottom panel of Table 7). Fully subsidized childcare would lead, for households with access to formal care, to a 17.4 percent increase in the number of working mothers and a 15.4 percent increase in the number of households using formal childcare arrangements. This is an expected outcome, as every household in the restricted sample could switch from in-home to formal care, while changes in the price of care would have no effect on the behavior of households without access to formal care facilities. The effects of other policies on household behavior are similar for simulations based on the whole and on the restricted sample.

These simulations indicate that family allowances—intended as a means of reducing poverty—do not significantly affect choice of childcare arrangements. Substituting childcare subsidies for family allowances would have a strong positive effect on the level of labor force participation of women with children and thus may reduce poverty. The reduction in poverty may be even more profound for single-parent households.

VII. Conclusion

Estimating the joint model of household childcare choices, mothers' labor supply decisions, and household demand for formal childcare confirms the predictions of the theoretical model used in this paper. The economic incentives are shown to have a powerful effect on the work behavior of women with children in Russia. The level of wages available to them and the costs of childcare can both be expected to affect women's labor force participation and labor supply decisions. Childcare costs affect which childcare arrangement households choose. When the costs of care are high, this discourages households from using formal childcare and increases the number of households that rely only on informal care.

Government subsidies for childcare may increase the number of mothers who work, thus increasing the incomes of poor households and lifting some families out of poverty. The simulations in this paper have shown that measures such as subsidies aimed at reducing the costs of market childcare are more effective than measures that raise women's wages in increasing the number of employed mothers and the number of hours that they work.

A significant proportion of Russian households with children use a network of family members to provide most of their childcare. Those families in which some members do not work are unlikely to use paid care as informal care is available from the nonworking family members. It would appear that in Russia this kind of informal care has substituted for the care that used to be provided by the Soviet government, which would explain the fact that there is still a relatively high level of participation by women in the labor force despite the sharp drop in the number of kindergarten schools and nurseries in the last 10 years.

Further research is needed in several areas. First, this paper has assumed perfectly elastic demand for labor with respect to an increase in women's labor supply. However, given Russia's shrinking economy, it seems unlikely that the market could actually accept a significant influx of women without any wage adjustments. An increase in the women's labor supply might lead to a drop in real wages, which would mean that the actual effects of the policies simulated in this paper would be quite different. This may also be true of the childcare market where an increase in the demand for formal care might cause the market prices of childcare to increase.

The next question that needs further research is the distributional impact of the various potential government policies. Even if childcare subsidies produce, on average, the largest increase in household income (compared with subsidizing wage rates or having a system of family allowances), it is unclear which households would benefit most from these subsidies. The poorest households with children in Russia may not benefit from this kind of subsidy, which means that other policy measures would be needed to improve the well-being of such families.

The serious limitation in the present analysis is the lack of direct information on the quality attributes of care provided under different arrangements and at different facilities. While the data used in this paper are averaged by population point, center-specific information would be more appropriate. Further work should also consider marriage and fertility decisions of households as factors that may influence household choice of childcare arrangements and their members' labor supply decisions.

Appendix 1

Table 6(a)

SPFIML Estimation of System of Equations (1.1–1.2)

| | Discrete mode of childcare and household labor supply Case when the mother does not work is a reference | | | | | | | | Continuous outcome equations | | | |
| | Others Work Informal Care | | Others Do Not Work Informal Care | | Others Work Formal Care | | Others Do Not Work Informal And Formal | | Hours of Work | | Hours in Formal Care | |
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Household composition												
1.5–3 years old	−1.40***	0.38	−1.38**	0.50	−2.16***	0.52	−2.18**	0.87	−17.45	12.33	0.50	4.09
3–7 years old	−0.59	0.41	−0.01	0.57	−0.26	0.57	−0.25	0.95	−13.64	13.48	6.53	4.83
7–12 years old	0.63*	0.25	0.40	0.33	0.14	0.29	−0.14	0.45	−6.29	6.46	−17.42	3.03
12–18 years old	0.84**	0.30	0.34	0.42	1.05***	0.33	0.93*	0.51	−6.03	7.60	−12.21	3.39
Household size	0.35***	0.10	−0.26*	0.13	0.18*	0.11	−0.32*	0.17	3.22	2.80	−0.25	1.33
Number of children≤18	−0.43*	0.19	0.27	0.26	−0.52**	0.22	0.28	0.35	4.78	5.11	12.63	2.26
Number of pensioners	−0.10	0.16	0.35*	0.20	−0.46*	0.19	−0.29	0.32	4.61	4.37	1.54	2.15
Single-mother household	−0.44	0.34	1.13***	0.31	0.18	0.32	1.46***	0.40	17.94**	7.36	1.15	3.49
Households with two parents					Reference							

Household incomes												
Household nonwage income	0.19	1.22	1.18	1.52	−0.32	1.33	0.40	2.39	−19.93**	7.70	−24.26**	13.79
Log wage rate of others	2.96	2.07	−3.86**	1.44	6.98**	2.25	−3.56**	1.84	4.61**	2.77	3.81	15.73
Log of cost of childcare	−1.79**	0.77	−2.17**	1.04	−1.70**	0.80	−3.60**	1.44	−10.81	8.98	−19.07**	8.96
Household regional dummies												
Other urban areas of Russia	−0.23	0.22	−0.24	0.28	−0.82***	0.22	−0.41	0.36	−0.40	4.92	1.97	2.36
Moscow and St. Petersburg	−1.32**	0.44	−0.60	0.52	−1.08**	0.48	0.09	0.78	−28.48**	10.73	5.65	4.91
North and North-West	−0.30	0.38	−0.47	0.49	0.81**	0.40	1.25*	0.63	−16.27*	8.67	4.75	4.04
Centra	0.03	0.33	−0.37	0.43	0.84**	0.38	0.65	0.65	−9.51	8.26	5.49	4.05
Volgo-Vyatskiy	−0.31	0.35	−0.46	0.44	0.85**	0.40	0.18	0.65	3.02	8.85	4.49	4.33
North Caucasis	−0.35	0.35	−0.38	0.43	0.24	0.42	−0.04	0.69	−0.05	9.11	2.04	4.49
Ural	0.01	0.35	0.03	0.43	1.39***	0.38	1.37**	0.62	−14.66**	8.29	8.20**	4.03
Western Siberia	−0.56*	0.33	−0.75*	0.44	0.07	0.38	0.45	0.63	−10.24	8.33	5.18	4.04
Eastern Siberia							Reference					
Time dummies												
Round 5	0.05	0.19	−0.23	0.25	−0.22	0.20	−0.46	0.33	−13.57**	4.67	0.18	2.16
Round 6	0.10	0.20	−0.11	0.24	−0.08	0.20	−0.01	0.31	0.79	4.77	0.51	2.19
Round 7							Reference					
Characteristics of the mother												
Mother's age in years	0.24	0.96	−1.98*	1.19	−0.71	1.10	−1.41	1.65	22.95	30.42	3.02	13.22
High school completed	−0.61*	0.27	−0.50	0.33	−0.63**	0.28	−0.71	0.45	7.91	6.54	2.56	3.07
Technical/vocational school	0.04	0.24	−0.40	0.31	−0.01	0.25	−0.22	0.40	15.39**	5.65	1.58	2.70
University							Reference					
Log of mother's wage	6.21**	3.55	5.32	4.13	8.84**	4.83	9.43**	5.35	56.76**	8.85	43.50	38.16
Constant	−1.28	1.11	1.30	1.45	−2.13*	1.23	0.69	1.96	119.37**	29.78	6.15	12.74

Note: Sample of 1,746 households with children 0–7 years old with access to formal childcare; (*) means the coefficient is significant at 5 percent level, (**) means the coefficient is significant at 1 percent level

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