

Estimating Demand for Preschools in Russia

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Extended abstract

Numerous studies suggest that visiting preschools facilitates children's socialization and accumulation of human capital and exerts a long-term positive influence on children that shows up even after finishing school (Duncan and Magnuson, 2013). Preschools also help to reconcile policy measures aimed to encourage fertility with high labor force participation of women (Del Boca et al., 2009). Therefore, measuring demand for preschools, in particular unsatisfied demand is of high importance for public policy. However, often it is a challenging task.

The general problem with the estimation of demand for any goods or services is that only a joint outcome of demand and supply is observed. When supply is rationed this outcome is a poor measure of total demand as it does not take account of an unsatisfied part of demand. In the case of preschool child care, households' surveys typically provide information only about the fact of (not) using a preschool by the family and do not allow to infer why the preschool is not used, either because parents do not want to send their children to a preschool or there are no available preschools around or no free places in existing preschools.

International literature suggests that situations when the supply of preschool child care is rationed are not rare. While most US studies assume that a shortage of preschools may exist only in the short-run (Blau&Hagy, 1998; Kimmel, 1999), this assumption is questionable for other Anglo-Saxon countries, e.g. Great Britain (Chevalier&Viitanen, 2002a,b) and Australia (Breunig et al., 2011). In many European countries the supply of preschool child care is explicitly modeled as rationed (Italy - Chiuri, 2000; Del Boca, 2002; Del Boca & Vuri, 2005; Germany - Wrohlich, 2008; Sweden - Gustaffson & Stafford, 1992; Norway – Kornstad & Thoresen, 2007). Therefore, the problem with the estimation of demand for preschools is relevant for many countries.

In this study, using RLMS-HSE data of 2000-2013 we estimate demand for preschools in Russia. At present, Russia is a prominent example of country with a shortage of preschools, which is an acute social problem officially acknowledged by government and extensively discussed both in Russian media and academic literature (e.g., Savitskaya, 2004; Seliverstova, 2008; Abankina et al., 2011).

Yet in 1980s Russia possessed the developed state system of preschools that helped to reconcile growing fertility (e.g., Zakharov, 2011) with traditionally high labor force participation of Russian women. At that time, about 70% of children of preschool age were enrolled in preschools (see Lokshin, 2004 with reference to Matthews, 1986). During transition, due to severe state budget deficit and financial problems in large state enterprises which supported many preschools the number of preschools declined from 1990 to 1999 by 30%. At first, this

drop did not provoke the shortage because demand for preschools weakened as well, due to decline both in fertility and labor force participation. However, in 2000s the supply side continued shortening against a background of recovering fertility rates and women labor force participation. As a result, preschools capacity utilization rate substantially increased and reached 105% in 2007. In 2011, according to official figures, utilization rate exceeded 120% in more than 40% of all Russian preschools (in 27% of preschools it was more than 130%).

In order to estimate demand for preschools in Russia, we employ approach first proposed by Poirier (1980) and estimate a partial observability model which allows to infer to what extent the non-usage of preschools by households results from the lack of demand and to what extent it results from the limited supply. In particular, this model is able to provide estimates for unsatisfied demand for preschools which is an important policy indicator.

The interplay between demand and supply of preschool child care and its possible outcomes are concisely presented in Table 1.

Table 1. The interplay between demand and supply of preschool child care.

Demand by parents	D=1 (parents want to use a preschool)	D=0 (parents do not want to use preschools)
Supply by state		
S=1 (there are free slots)	Child attends a preschool	Child does not attend a preschool
S=0 (no free slots)	Child does not attend a preschool	Child does not attend a preschool

A child goes to a preschool if her parents want him to go and, simultaneously, there is a free slot in this preschool. She does not attend a preschool in all other cases. The problem is that we observe only the fact of using or not-using the preschool and cannot distinguish three different cases that hide behind non-using. Therefore, we do not observe cases when parents want to use preschools but slots are absent which means that we do not know unsatisfied demand as well as total demand for preschools. More formally, we observe only $P(C=1) = P(D=1 \& S=1)$ and $P(C=0) = P(D=0 \cup S=0)$, where D and S are demand and supply of preschools, respectively.

The partial observability model that fits a setting described above is a bivariate probit model that consists of two equations:

$$D^* = X_D \beta_D + \varepsilon_D \text{ (demand equation),}$$

$$S^* = X_S \beta_S + \varepsilon_S \text{ (supply equation),}$$

where D^* and S^* are some latent variables; X_D and X_S are matrices of demand and supply factors; β_D and β_S are vectors of unknown parameters of demand and supply functions to estimate; ε_D and ε_S are normally distributed errors. Parents present demand for preschool when $D^* > 0$, while state provides a slot in the preschool when $S^* > 0$. This implies that $P(D=1) = P(\varepsilon_D > -X_D \beta_D)$ and $P(S=1) = P(\varepsilon_S > -X_S \beta_S)$. As $P(C=1) = P(D=1 \& S=1) = P(D=1) * P(S=1|D=1)$, the likelihood function for this model is:

$$L = \Pi \{ [F_2(X_D \beta_D, X_S \beta_S)]^C \times [1 - F_2(X_D \beta_D, X_S \beta_S)]^{1-C} \},$$

where $F_2(\cdot)$ is the bivariate normal cumulative distribution function.

Estimating this model gives estimates for the parameters of demand and supply functions β_D and β_S as well as a set of predicted probabilities. We are particularly interested in $P(D=1 \& S=0)$ which is an estimate for the amount of unsatisfied demand for preschools.

The demand equation includes different mother's characteristics (age and age squared, education level, marital status, employment status, health status, etc), household's characteristics (average household income, dummies indicating the usage of child care alternative to preschools –

relatives living in households, relatives or friends living outside the household, non-relatives), the type of the settlement (urban/rural), region dummies (Federal Districts, Moscow and Saint-Petersburg), and year dummies.

Our supply equation includes a dummy indicating the (non)usage of a preschool last year, a set of dummy variables indicating mother's and household's eligibility for different social benefits (single mothers status, mother's employment in public sector, mother's disability status, families having many children, poor families), the type of the settlement, and year dummies. We also include several variables that characterize the public system of preschools in the settlement. Some information – e.g., the presence/absence of a preschool in the locality (at the secondary sample unit level, *ssu* in RLMS-HSE) – is taken from RLMS-HSE community data. Other indicators – e.g., preschool enrollment and capacity utilization rates - are taken from Russian statistical agency (Rosstat) at the regional level (primary sample unit level, *psu* in RLMS-HSE). We also employ some interactions of these variables.

In general, the identification of bivariate probit model is based on exogenous variables that appear exclusively in one or in the other equation (e.g., Wilde, 2000). In our case, the identification is achieved mainly due to *psu*-level and *ssu*-level exogenous variables that describe public system of preschools in the settlement.

We do not include prices neither in demand nor in supply equation due to many reasons. Concerning supply, the market of child care services is virtually absent in Russia. The overwhelming majority of preschools are public and the number of private preschools is negligible (in 2012, less than 1% of all children enrolled in preschools visited private preschools). Therefore, admission fees are strictly regulated by state and they do not play a market clearing role and are not sensitive to changes in demand. Concerning demand, direct information on costs of using preschool child care is not available in RLMS-HSE data. Potentially, we may reconstruct only total household expenditures on all types of child care including private baby-sitters and informal care by friends and distant relatives which, however, substantially complicates the estimation of cost of preschool usage (Kazakova, 2012). Moreover, as indicated by Levin and Oshchepkov (2013), costs of using public preschools are relatively low (in 2009, these costs constituted about 5% of average income level) and almost do not restrict demand in Russia, in contrast to physical unavailability of slots.

Our main empirical findings may be summarized as follows. First of all, we confirm a widespread view that there is a strong deficit of slots in preschools in Russia. According to our estimates, roughly a two thirds of all mothers with children of age 0-7 are willing to send their children to a preschool, but almost half of them (that is about a third of all mothers) cannot do it due to the limited supply. These estimates are larger than the number of children registered in the official queue for a slot in a preschool.

At the same time, we find that there is a non-negligible group of households which potentially might use preschools but do not do that. This indicates that not only the creation of new preschools or enlargement of the existing ones, but also a more effective redistribution of resources within the public preschool system could lead to higher preschool enrollment. We also find that the amount of unsatisfied demand among non-employed mothers is higher than among the employed ones. Assuming that there is a causal link between the utilization of preschool child care and mothers' participation the labor force in Russia (Levin & Oshchepkov, 2013), this result indicates that a rise in the availability of preschools could stimulate labor force participation of Russian women.

Key words: preschools, partial observability model, RLMS, Russia

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