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ABSTRACT

This paper investigates how expansion of the supply of childcare is likely to change the use of childcare services and especially the extent to which the social imbalance in its use is corrected. The empirical case at hand is Flanders, the largest region of Belgium, which has a comparatively speaking large offer of formal childcare slots, but continues to struggle with excess demand and uneven access. The latter is crucial for policy makers. Is rationing to be blamed for the underrepresentation of certain social groups in formal childcare or is an explanation to be found in other circumstances such as poor employment prospects or more traditional family values?

In this paper we simulate a simple expansion of the number of formal childcare slots and investigate its consequences, in terms of how this expansion affects the use of both formal and informal childcare, keeping all other circumstances constant. We show that a large increase in use can be expected for those groups that are currently underrepresented in the formal childcare sector, even without a change in the mix of subsidised and non-subsidised service providers and without other contextual changes (e.g. maintaining the small monetary gain from paid employment for low-skilled mothers when making use of formal childcare at its current prices). Yet, we also show that while the social gap is narrowed, the childcare sector cannot be expected to close the gap entirely by itself. Furthermore our estimates suggest that the expansion of formal childcare is likely to result in part-time combinations of formal and informal care, rather than in complete crowding-out of informal care.

Keywords:
Formal childcare services, rationing, social distribution, crowding-out

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1. Introduction

This paper addresses how expansion of the supply of childcare is likely to change the use of childcare services and especially the extent to which the social imbalance in its use is corrected. The empirical case at hand is Flanders, the largest region of Belgium, which has a comparatively large offer of formal childcare slots, but continues to struggle with excess demand. This excess demand leads to two unsurprising consequences. On the one hand, the role of private initiative in the form of non-subsidised childcare services is growing, i.e. the market solution is gaining ground, which raises concern about rising average prices. On the other hand, childcare service use is subject to social cleavage: socially deprived groups are overrepresented among those willing to use childcare, but not able to secure a slot and among those not entering the childcare market at all.

The latter distinction is crucial for policy makers. Is rationing to be blamed for the underrepresentation of certain social groups in formal childcare or is an explanation to be found in other circumstances such as poor employment prospects or more traditional family values? In this paper we simulate a simple expansion of the number of formal childcare slots and investigate its consequences, in terms of how this expansion affects the use of both formal and informal childcare, keeping all other circumstances constant. We will show below that a large increase in formal use can be expected for those groups that are currently underrepresented in the formal childcare sector, even without a change in the mix of subsidised and non-subsidised service providers and without other contextual changes (e.g. maintaining the small monetary gain from paid employment for low-skilled mothers when making use of formal childcare at its current prices). Furthermore, we demonstrate that a less extensive use of informal childcare in general can be expected as well. Finally, we will also show that while the social gap is narrowed, the childcare sector cannot be expected to close the gap entirely by itself.

Currently, a significant expansion of affordable childcare slots is an issue on top of the political agenda in numerous countries as research has proven abundant and affordable childcare to facilitate the combination of family and work, especially for women, and hence serving the desired EU2020 targeted employment rates. This paper contributes to the existing literature not only providing an elaborated Flemish case at hand, but introducing an often overlooked perspective of unequal distribution as well.

The paper starts below with a section describing the current childcare landscape in Flanders. Next follows a section on the simulation technique used to estimate the full demand for formal childcare (partial observability probit) and a description of its general outcomes. Thereafter, a third section takes a closer look at the social distribution of actual and 'new'

demand for childcare. A final section summarises and concludes this paper.

2. The Flemish childcare landscape

2.1. Formal childcare

In Belgium the organisation of the provision of formal childcare is the responsibility of the language communities. In the Dutch speaking region Flanders, the public institute Child and Family ("Kind en Gezin") supervises the organisation of formal childcare and certifies childcare facilities which measure up to the legal requirements. At the onset, we should clarify that in Flanders childcare services largely focus on the age group of 3 to 30 months, because maternity leave ends three months after birth and (publicly financed) nursery school starts at the age of 30 months. When we refer to childcare services hereafter we exclude part-time childcare for school-going children.

The Flemish childcare landscape is a highly fragmented one with formal childcare being organised in a variety of ways. A first distinction stems from subvention and accreditation. A large part of childcare providers receives cost covering subsidies from Child and Family, for which they need to be accredited. Yet, the public budget is not sufficient to subsidise all childcare services in this way and hence there also exists a non-subsidised sector. However, to guarantee the quality of childcare Child and Family stimulates non-subsidised providers to solicit official accreditation, which implies supervision of the service by Child and Family. If non-subsidised providers do not apply for accreditation, they are legally required to register. According to Child and Family almost no childcare provider is in the latter category (Kind en Gezin, 2009), which may be explained by client pressure, because only accredited childcare gives parents the opportunity to apply for tax deduction of the childcare fees they pay.

Secondly, within these several types of formal care, childcare is being organised by either child-minders at their private home for relatively small groups of children or by centres (day nurseries) for larger groups. In addition to the day nurseries, there are local services for neighbourhood-oriented care. These are small childcare initiatives aiming at diverse and easily accessible childcare especially for more vulnerable families. Child and Family partly subsidises these initiatives working towards equal opportunities.

Resulting from both of these distinctions, parents' diversity of choice is large. Moreover, their choice has price implications, because subsidised providers are obliged to apply a legally determined means-tested tariff structure, while non-subsidised providers are principally free to determine

the price they charge.[1] However, reacting upon concern about the growing market share of the non-subsidised sector and expected private cost increases for low-income families, the Flemish government introduced in February 2009 the means-tested tariff system for the non-subsidised sector. Accredited but non-subsidised facilities may opt to join this system wherein the same means-tested contribution of the subsidised sector is applied to the non-subsidised sector. In case facilities have joined, the Flemish government complements the parents' means-tested contribution up to a guaranteed daily price (17 euro for child-minder families and 25,18 euro for child-minding centres).

The Flemish means-tested tariff structure[2] is illustrated in Figure 1. Using the Flemish subsample of EU-SILC 2006 data, we reconstructed the income base on which parents' contribution is calculated (taxable household income for the year 2005). Afterwards, these income bases were divided into deciles and we adapted them to the price-index in order to apply the tariff structure of the governmental decree of the 17th of March 2008. Figure 1 clearly shows the quasi-linearly increasing relation between the taxable household income and parents' contribution for different usages of childcare (in terms of hours per day) in subsidised childcare facilities.

For each intensity of usage the same means-tested tariff structure applies, but the payment rate differs in 'blocks' rather than hourly proportions. One whole day of childcare use is defined as making use of childcare for five to twelve hours. For one whole day of childcare, parents pay 100% of the contribution determined by the Flemish means-tested tariff structure. In case parents use less than three hours of childcare per day, they pay 40% of the daily price according to the tariff structure. For three to five hours of childcare per day, parents' contribution is set at 60% of the price of one whole day of childcare. Finally, for an extensive use of childcare of twelve to twenty-four hours per day, 160% of the daily price according to the means-tested tariff structure is charged.

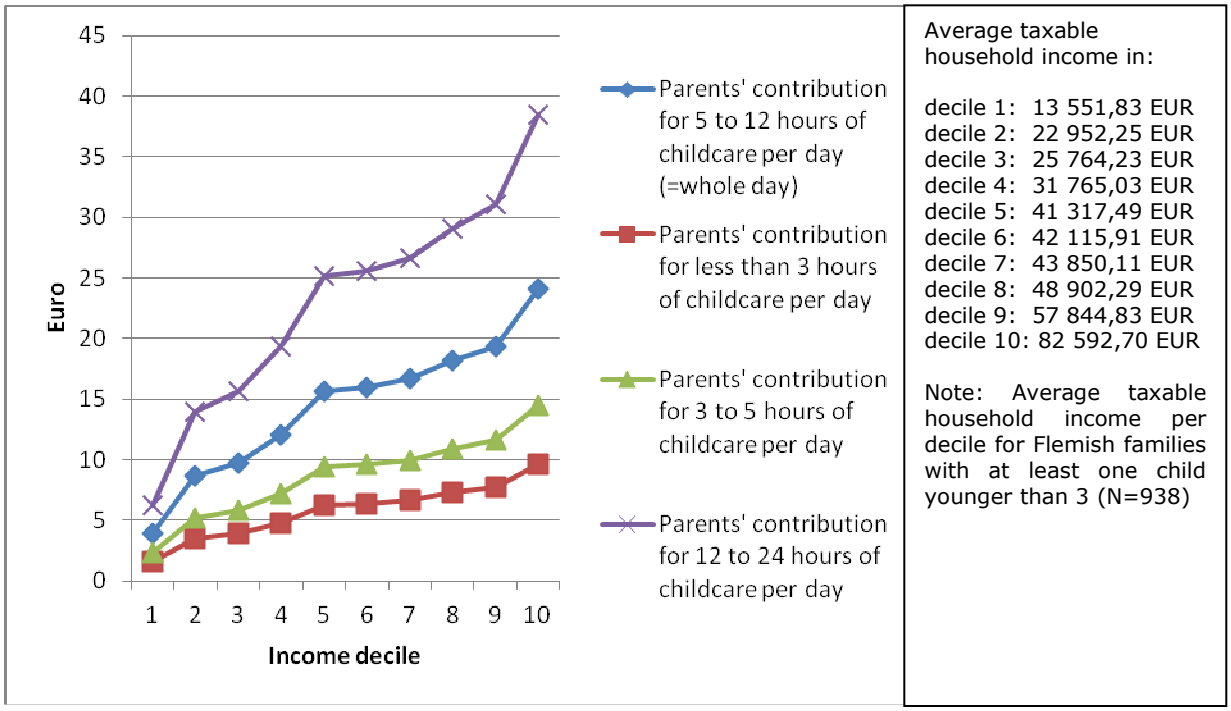
Since 2008, the childcare tariff structure has been modified slightly annually (thresholds and coefficients are slightly different, the minimum and maximum contribution differ and the regulation for multiple children changes), although, its basic principles remain the same. In 2008 the minimum and maximum contribution for parents was 1,35 EUR and 24,07 EUR, whereas since October 2011 these minimum and maximum contributions are 1,50 EUR and 26,68 EUR. The regulation for multiple children used to grant a rebate of 2,72 EUR for each additional dependent child in 2008, while since October 2011 this discount is 3,02 EUR for the presence of each additional dependent child (Kind en Gezin, 2011). Furthermore, after introducing the means-tested contribution system in

1 Childcare facilities can charge a social tariff or can provide childcare for free whenever they deem this necessary.

2 Governmental decree of the 17th of March 2008 (Ministerie van Welzijn Volksgezondheid en Gezin, 2008)

2009, the variable means-tested tariff structure applies to subsidised child-minders and childcare centres as well as to non-subsidised facilities that participate in the means-tested contribution system for the non-subsidised sector.

Figure 1. Parents' contributions for subsidised childcare by income deciles, 2008.



Source: Own calculation based on SILC-2006 data on incomes and governmental decree of the 17th of March 2008.

In recent years, the supply of childcare slots for children aged up to three in Flanders (Table 1) as well as its coverage rate (Table 2) have expanded gradually. The relatively large growth of childcare slots in non-subsidised child-minding centres is mainly responsible for the increasing number of childcare slots and the expanding coverage rate. The number of accredited and subsidised childcare slots tends to increase slightly, although their coverage rate diminishes when the growing number of children born in recent years is accounted for. Within non-subsidised childcare facilities, the number of childcare slots in child-minding families remains fairly stable, however, their relative weight in coverage rate decreases when accounting for the rise in number of births. As to the distinction between family day care and childcare organised in centres, there clearly is a tendency towards more centre-based childcare.

Table 1. Recent evolution in number of childcare slots (growth rate) for children aged up to three, 2002-2009.

Number of childcare slots for children 0-3								
	2002 =100%	2003	2004	2005	2006	2007	2008	2009
Accredited and subsidised								
Day nurseries	14 007	101.05%	104.96%	105.77%	108.26%	110.22%	114.10%	118.95%
Child-minding families affiliated to a service	29 776	99.81%	102.45%	102.63%	103.48%	103.15%	104.34%	106.25%
Total	43 783	100.21%	103.25%	103.64%	105.01%	105.41%	107.46%	110.86%
With a certificate of supervision								
Child-minding centres	13 738	105.94%	120.37%	136.29%	152.26%	175.70%	204.19%	200.02%
Child-minding families	7238	98.36%	96.45%	94.58%	96.84%	97.65%	99.82%	96.68%
Total	20976	103.32%	112.12%	121.90%	133.13%	148.77%	168.17%	164.36%
Total	64 759	101.22%	106.12%	109.55%	114.12%	119.45%	127.13%	128.19%

Source: Kind en Gezin. (2002-2009). Jaarverslag Kinderopvang. Brussels.

Table 2. Recent evolution in coverage rate (growth rate) of childcare for children aged up to three, 2002-2009.

Childcare slots per 1000 pre-school children 0-3								
	2002 =100%	2003	2004	2005	2006	2007	2008	2009
Accredited and subsidised								
Day nurseries	*65,6*	102.13%	107.32%	106.71%	106.25%	105.03%	101.52%	103.66%
Child-minding families affiliated to a service	*160,3*	101.12%	104.68%	103.37%	101.56%	98.13%	93.20%	93.32%
Total	*225,9*	101.42%	105.40%	104.34%	102.92%	100.13%	95.62%	96.77%
With a certificate of supervision								
Child-minding centres	*57,0*	106.84%	117.02%	127.19%	130.35%	129.47%	166.67%	188.42%
Child-minding families	*38,3*	99.22%	96.61%	93.21%	92.95%	90.34%	87.47%	83.81%
Total	*95,3*	103.78%	108.81%	113.64%	115.32%	124.34%	134.84%	146.38%
Total	*321,3*	102.05%	106.41%	107.07%	106.57%	107.28%	107.22%	111.45%

Source: Kind en Gezin. (2002-2009). Jaarverslag Kinderopvang. Brussels.

According to the 2002 Barcelona targets, Flanders does quite well in providing sufficient childcare slots for children aged up to three. The goal was to provide childcare slots for at least 33% of all children up to three years old by 2010 in full time equivalents. Table 2 shows that these

Barcelona objectives were already met by 2004. Leira and Saraceno (2008, pp. 34-38) demonstrate that by 2004 five European member states (Denmark, France, The Netherlands, Sweden and the Flemish part of Belgium) reached a coverage rate of 33% and beyond, whereas in several countries the availability of childcare to children aged up to three was below 10% at that time. At the end of the year 2009 full time equivalent slots[3] are provided to 35,8% of children 0-3 in Flanders. However, this figure should be read with caution. According to the 2002 Barcelona targets, sufficient childcare slots are provided for in Flanders at a general level, but at the level of municipalities major shortages still exist.

Regarding the proportion of use, the percentage of children aged up to three in formal childcare has increased slightly in the past four years (Table 3). In 2009, approximately 27% of Flemish children 0-3 is being cared for in an accredited and subsidised childcare facility. The majority of them is enrolled in child-minding families affiliated to a service. About 16% of children is being cared for in the non-subsidised sector. Most of them make use of centre-based care. In addition, because of the possibility of children being enrolled in nursery school from two years and six months, 20,5% of the children aged up to three are cared for in the educational system or complementary out-of-school care initiatives.

Table 3. Recent evolution of the proportion of use of formal childcare by children aged up to three, 2006-2009.

Proportion of use by children aged 0-3				
	2006	2007	2008	2009
Accredited and subsidised				
Day nurseries	9,8%	9,8%	9,9%	9,1%
Child-minding families affiliated to a service	17,3%	17,6%	17,9%	17,8%
Local services for neighbourhood-oriented care	-	-	-	0,2%
Total	27,1%	27,4%	28,8%	27,1%
With a certificate of supervision				
Child-minding centres	10,5%	10,6%	12,1%	12,0%
Child-minding families	3,6%	3,6%	3,5%	3,7%
Total	14,1%	14,2%	15,6%	15,7%
Education or out-of-school care initiatives	19,2%	19,3%	19,4%	20,5%
Total	60,4%	60,9%	62,8%	63,3%

Source: Kind en Gezin. (2006-2009). Jaarverslag Kinderopvang. Brussels.

[3] Note that in reality more than 35,8% of children aged up to three make use of formal childcare. In Flanders it is common for a child to use formal childcare on a part-time basis, which means that full time equivalent slots for 35,8% of children 0-3 are filled by a larger proportion of children 0-3, many of them being part-time users.

2.2. Informal childcare

At the other side of the childcare spectrum, many young children are cared for by family and friends instead of making use of formal services. The latter is in part due to the preference of a fairly large part of parents for informal care, mainly being childcare provided by the grandparents. However, in a recent survey (Flemish Families and Care Survey, 2004-2005)(FFCS) only 19% of parents with a child below 3 declared having been able to engage the grandparents as primary non-parental carer. The latter is a typical finding, because of the gradual erosion of the role of grandparents in childcare in Flanders. An earlier childcare survey in 1997, for example, still identified grandparents as the prime childcare providers to 38% of the young children in Flanders (Ghysels & Van Vlasselaer, 2007).[4] Often, the erosion of the role of grandparents in childcare is explained by the decline in the availability of grandparents for childcare tasks, which is directly linked to the increased labour force participation of cohorts of women that are currently reaching the grandparent stage of life (Uhlenberg & Bradley, 1998). Moreover, the increased attention to active aging is seen as an important explanation for a decreasing care role of grandparents, hypothesising that "new" grandparents would have life ambitions that cannot easily be reconciled with a regular childcare responsibility.

Yet, the decreasing part of grandparental care needs not to follow from restrictions on the side of grandparents only. Substitution of informal by formal care may also play part in the evolution. Havnes and Mogstad (2009), for example, report on a dramatic decline of informal care for three to six year olds in Norway, following the expansion of publicly funded preschool in the country in the nineteen seventies. In the Norwegian case, new slots in preschool replaced informal care in 96% of the cases (Havnes & Mogstad, 2009:31).

In the case of Flanders in the first decade of this century, it is not immediately clear whether parents would react similarly to the Norwegian parents in the nineteen seventies. On the one hand, many parents stated in the FFCS that they would have preferred grandparental care if it were available. For example, 35% would have preferred grandparental care, but had to look for another solution because the grandparents would/could not be the prime childcare providers. On the other hand, however, the investigation of Market analysis and Synthesis (2007) (hereafter MAS) suggests that grandparental care is sometimes used to cover for a lack of formal childcare. MAS studied the search process for formal childcare and revealed that 34% of parents was able to convince the grandparents to step in for a while, when the parents were not able to secure a place in

[4] Note, however, that these percentages refer to the group of children that is effectively using childcare services and, hence, excludes children that are not regular users of any kind of childcare services. Between 1997 and 2004 the overall use of childcare services expanded considerably, which leads Ghysels and Van Vlasselaer (2007) to conclude that, when referring to the total proportion of children being cared for by the grandparents, the role of grandparents has hardly changed over the last decade.

formal childcare. In other words, formal childcare is not every parents' preference, but at the same time informal care is sometimes used as a patch for the lack of formal childcare slots.

3. Simulation of non-rationed demand

Although Flanders has already met the 2002 Barcelona targets in a general perspective, it needs to be emphasized that at a lower level severe shortages of childcare slots exist in many cities or municipalities. Therefore the aim of this paper is to simulate the non-rationed demand for formal childcare of Flemish children aged up to three in order to estimate the magnitude of the excess demand. We provide an answer to the question on how many parents would demand formal childcare if supply was not restricted, in order to clarify to what extent this demand is not sufficiently met by the current supply. Although the literature on the demand for childcare is extensive and the problem of excess demand is widely recognised, few studies focus on access restrictions and the resulting excess demand. For Flanders in particular, there are no inquiries into the magnitude of excess demand.

The estimations of the excess demand for childcare of children up to three years old will be based on data from the 2004-2005 Flemish Families and Care Survey (FFCS). The FFCS is a representative sample of 1275 Flemish families with a youngest child aged up to three. In this survey detailed information on childcare utilisation and child and household characteristics is provided.

In this paper we explicitly model the possibility of access restrictions to either accredited and subsidised childcare slots or non-subsidised childcare slots with a certificate of supervision in the estimation of childcare demand for Flanders. Similar to Wrohlich (2008) and Chevalier and Viitanen (2004) we make use of a partial observability model separating demand and supply for childcare slots. This partial observability model allows to estimate the demand and supply for childcare, even if only the joint outcome (the current use of childcare facilities or childcare status) can be observed. This childcare status, whether a child is in formal childcare or not, is the only observable variable as non-rationed demand and the supply of childcare slots cannot be observed. In other words, a child is observed in childcare, conditional on the parents effectively demanding it and a childcare slot being offered to them at or below their reservation price. The magnitude of excess demand becomes computable when we separately predict the probability that a child currently is in formal childcare and the probability that a child would be cared for in a formal childcare facility if access to these facilities would not be constrained. In order to estimate both of these probabilities, we use the method designed and introduced by Poirier (1980) and Abowd and Farber (1982). Instead of the sequential approach introduced by

Abowd and Farber (1982), we make use of the simultaneous approach as designed by Poirier (1980) and implemented in STATA 11.

The partial observability model can be stated as follows (Chevalier & Viitanen, 2004; Wrohlich, 2008). The latent variable demand for childcare D* depends on child and household characteristics X_D and a stochastic part ε_D also known as the residual:

$$D^* = x_D\beta_D + \varepsilon_D$$

where β_D is the vector of coefficients. For convenience we assume that parents will have observed demand if D* is above zero:

$$D = 1 \text{ if } D^* > 0$$

Therefore the probability that parents demand formal childcare is

$$Pr(D = 1) = Pr(\varepsilon_D > - x_D\beta_D)$$

Furthermore, we assume that parents who demand a childcare slot in an accredited and subsidised facility or supervised non-subsidised facility are selected from some kind of queue and that this selection is based on certain child, household and regional characteristics X_S, a vector of coefficients β_S and a stochastic error term ε_S:

$$S^* = x_S\beta_S + \varepsilon_S$$

Similar to observed demand, we assume that supply of a childcare slot will be observed if S* is above zero:

$$S = 1 \text{ if } S^* > 0$$

Therefore, the probability of being offered a childcare slot is

$$Pr(S = 1) = Pr(\varepsilon_S > - x_S\beta_S)$$

Furthermore, the probability of the use of childcare C, which is the only observable variable, is expressed as the joint outcome of both latent variables demand D and supply S. If we assume that the error terms are independently and normally distributed, the probability of childcare use can be expressed as:

$$Pr(C = 1) = Pr(S = 1 \,\&\, D = 1) = Pr(D = 1) * Pr(S = 1 \mid D = 1)$$

The probability of the use of childcare can be simplified because independency of the error terms is assumed. The probability of childcare use then becomes

$$Pr(C = 1)=Pr(S = 1 \,\&\, D = 1)=Pr(D = 1)*Pr(S = 1)$$

$$=$$

$$Pr(\varepsilon_D > - x_D\beta_D)*Pr(\varepsilon_S > - x_S\beta_S)$$

In addition, also the probability that no childcare use is observed can be written as a joint outcome of demand and supply. The probability of childcare use being zero is the sum of the probability that parents did not demand childcare and the probability that they were not offered a childcare slot when they demanded one:

$$Pr(C = 0)=1 - Pr(C = 1)$$

$$=$$

$$\{1 - Pr(D = 1)\} + Pr(D = 1)*\{1 - Pr(S = 1 \mid D = 1)\}$$

$$=$$

$$\{Pr(\varepsilon_D < - x_D\beta_D)\} + Pr(\varepsilon_D > - x_D\beta_D)*\{1- Pr(\varepsilon_S > - x_S\beta_S)* Pr(\varepsilon_D > - x_D\beta_D)\}$$

Consequently, the likelihood function to be maximised has the following form:

$$L = \Pi_{D=1}[\Phi (x_D\beta_D) \Phi (x_S\beta_S)] * \Pi_{D=0} [1 - \Phi (x_D\beta_D) \Phi (x_S\beta_S)]$$

As already mentioned above, an offer for childcare is made only to parents that were in the queue of parents demanding childcare. However, not all parents demanding for formal childcare are confronted with a restricted supply. In several municipalities there is an abundant supply of formal childcare slots.[5] Our probit model procedure therefore compares current childcare use in municipalities with a (relatively) sufficient supply and current childcare use in municipalities where the number of childcare slots offered is relatively low. Therefore, we identified a number of municipalities where childcare supply is relatively abundant, being the coverage rate of the top 10% of Flemish municipalities (by the end of 2004)[6]. This correspond to coverage rates of 46% to 80%. In other words, a coverage rate of 46% to 80% demarcates a group of municipalities with the largest childcare supply where 10% of Flemish children aged up to three lives in. For these children, we assume that the childcare utilisation can be explained by demand-side variables only.

Descriptive statistics confirm the significance of the threshold. In FFCS we observe that 67% of children living in the "abundant supply"-municipalities use formal childcare, while this is true for only 54% in the remaining municipalities.[7]

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5 Although supply never covers for 100% of the children aged up to three, in several municipalities childcare slots can be evaluated as abundant, because not every parent is demanding formal childcare for his/her child.

6 Following Chevalier and Viitanen (2004) we first defined an abundant supply as the top 20% of municipalities in coverage rate. However, when estimating the probit model with the top 20% and top 10% providing municipalities, we found few differences in resulting demand and supply. Subsequently, we decided to compare with the top 10% as this provides a more credible goal for the expansion program of the Flemish government.

7 This difference proved statistically significant at a level of above 98% (Anova-test).

Annex 1 presents the coefficient estimates of the model as stated above. In both of the equations individual characteristics of the children, the mother, childcare facilities and parents' employment patterns are used as explanatory variables. In the supply equation an array of child and household characteristics at the municipal level is added. These explanatory variables are selected on the basis of their significance as stated in the international literature concerning childcare use (and expansion) and our knowledge of the particular Flemish context.

Firstly, it needs to be stressed that the aim of the bivariate probit estimation is not the theoretical interpretation of the importance of certain indicators, but its purpose is the best possible prediction of current childcare use and what this childcare use would be like if supply were not rationed. Resulting from this specific purpose, the coefficients presented in annex 1 are not that easily interpretable at the level of individual effects unlike the studies mentioned earlier. For example, in the parents' employment characteristics children are compared with each other for all kinds of family compositions and employment patterns. Furthermore, data on the parents' hours of work is incorporated which results in a highly truthful reproduction of reality. However, variables often tend to be interconnected (interaction and multicollinearity) and are therefore less appropriate for coefficient-wise interpretation.

Secondly, when looking at the coefficients in annex 1, it is important to keep in mind the logic of the probit model. In fact, the current use of childcare is estimated by a twofold process where parents first have to get access to the childcare supply and then have to decide whether the offer is acceptable or not. Parents who have access to childcare supply and have accepted the offer currently make use of formal childcare. Significant effects in the second process (whether to make use of the offered slot or not) are therefore only seen for parents who previously already secured access to a childcare slot. Hence, these effects do not apply to the entire population. For example, mothers older than the age of 25 more easily have access to childcare supply (significantly positive estimate), however, once they are offered a childcare slot they make less use of it in comparison with mothers less than 26 years old (significantly negative estimate). The total effect of age of the mother on the currently observed childcare use is therefore not immediately observable in annex 1.

Finally, as already stated before and as mathematically required, we did not model the two distinct processes in a similar manner. In order to identify the model, the demand and supply equation need to differ in at least one variable (Poirier, 1980). In addition, we assumed that in terms of finding a childcare slot, the municipal characteristics are of greater importance in this stage than for deciding whether to make use of the offered childcare slot or not once the offer is made. Hence, we added the municipal characteristics to the supply equation. In specifying the demand

equation we incorporated almost exclusively individual and household characteristics.

In Table 4 the actual and predicted values of child care utilisation are presented in order to illustrate the predictive quality of the estimated model. The predicted outcome is coded as 'formal childcare' if the predicted probability is higher than 0.55.[8] The model succeeds in predicting correctly 78% of all children aged up to three in FFCS.

Table 4. Predicted current use of formal childcare with predicted probability of 55% as threshold.

	Predicted		
Actual	No formal childcare	No formal childcare	Total
No formal childcare in FFCS	33.4	11.1	44.6
Formal childcare in FFCS	11.1	44.4	55.4
Total	44.5	55.5	100.0

Source: FFCS 2004-2005.

If restrictions in supply are removed, we find a large increase in demand for formal childcare slots. Table 5 presents this final result of the estimated model. Removing restrictions in the supply of formal childcare for children aged up to three in Flanders would lead new demand equivalent to 29% of Flemish children or, put differently, to an increase in demand of more than 50%.

Table 5. Predicted non-restricted use of formal childcare with predicted probability of 55% as threshold.

	Percentage of children 0-3
Current users	55,5%
Future (non-rationed) users	29,2%
Children not in formal childcare	15,3%

Source: FFCS 2004-2005

4. Characteristics of new versus existing demand

In the previous section we explained our estimation procedure and discussed the overall outcome of the process. Yet, for policy makers the

[8] In theory, the predicted outcome should be coded as 'formal childcare' if the predicted probability is higher than 0.50. In that case 60,2% of Flemish children aged up to three would be predicted to make use of formal childcare. However, the observed use of formal childcare for the whole of Flanders is slightly different: 55,4% of children aged up to three makes use of formal childcare in FFCS, not 60,2%. Therefore we slightly adjust the threshold of 0,50 of predicted probability to 0,55. As a result of increasing this threshold of predicted probability the model predicts 55,5% to make use of formal childcare while the predictive quality of the model is about the same as when we use the 0.50 threshold and type I and type II errors are distributed more evenly. For the predicted non-restricted use of formal childcare the consequences of adjusting the threshold of predicted probability are minor: predicted non-restricted use when using the 0.55 threshold is 85%, while it is 86% when using the 0.50 threshold.

total outcome provides only a start of the discussion. Indeed a non-rationed supply of childcare is argued for on the basis of arguments of equal opportunities to all and the observation that the use of childcare services is far from evenly distributed in Flanders (Ghysels & Van Lancker, 2009; Market Analysis and Synthesis, 2007). Consequently, it is important to determine to what extent an indiscriminate removal of rationing can be expected to close the current social gaps in childcare use.

4.1. Expansion of formal childcare use

The following tables detail the previously discussed expansion of demand to various social groups. Table 6 compares the situation of children according to the labour market status of their mother. It reveals that the largest expansion of childcare services use can be expected among children from currently unemployed mothers. According to the predictions only 1% of these children is currently a regular user of formal childcare, while without rationing 75% will be using the services. In the last column the table also shows that the removal of rationing is also likely to multiply the use of formal childcare among children of mothers who are currently not active in the labour market. However, the expansion is proportionally smaller.

Furthermore, it should also be noted that expansions among children of unemployed or inactive mothers are sizeable, but do not close the gap in childcare use completely. Even without limitations in the supply of childcare, a quarter of the children of currently unemployed mothers are predicted not to be in formal childcare and a similar observation applies to approximately half of the children of currently inactive mothers. The latter is not a surprising result, because it can hardly be expected that childcare rationing would be the only reason for these mothers not to be using childcare services. If we assume that also in the future, childcare use will be tightly linked to paid employment, the estimates suggest that rationing does indeed imply an important barrier to work for some mothers. Yet, childcare services are obviously not the only barrier and, hence, full supply of childcare services does not automatically translate in full employment, nor, consequently, a proportion of childcare services that is comparable to the level of currently employed mothers.

Note, finally, that also among children of employed mothers the use of childcare services will not rise to 100% when supply is "non-rationed"; 9% is predicted to remain outside of the childcare services market. This may have to do with our specification of non-rationed supply (see previous section), but is also likely to reflect the fact that informal care arrangements are preferred by many parents (Ghysels & Debacker, 2007) and, hence, can be expected to remain an important option in childcare, when available as we will see below.

Table 6. Predicted demand for childcare services, according to the labour market status of the mother.

Column Percentages Child:	Mother : In paid employment	Unemployed	Not active in the labour market
Currently a user of childcare services	71%	1%	6%
Predicted user of childcare services if non-rationed	21%	74%	47%
Predicted non-user (non-rationed non-demand)	9%	25%	47%
Proportion of the category in the total population of children 0-3	76%	8%	14%
Notes: All figures reflect percentages in the sample of 1065 children younger than 3 (FFCS 2004-2005), 2% of children living only with their father are not included, All figures are predicted outcomes of the partial observability model			

Table 7 continues the analysis of target groups of social policy with lone parent families and families living in poverty (multidimensional indicator). For both groups similar observations apply as in the case of non-employed mothers: the expansion of childcare supply is predicted to enlarge the use of childcare services considerably and the resulting proportion of childcare service use remains clearly below the proportion of employed mothers (Table 6).

Table 7. Predicted demand for childcare services, according to the living situation of the family.

Column Percentages Child:	Mother : Lone parent	Family: Lives in poverty
Currently a user of childcare services	58%	15%
Predicted user of childcare services if non-rationed	21%	36%
Predicted non-user (non-rationed non-demand)	21%	49%
Proportion of the category in the total population of children 0-3	6%	7%
Notes: All figures reflect percentages in the sample of 1065 children younger than 3 (FFCS 2004-2005), Living in poverty refers to a combination of at least two of the following conditions: a low-skilled parent, a jobless household, an income below the poverty line and bad quality housing (sample reproduction of the multidimensional indicator used by the Flemish Child and Family Authority, "Kind en Gezin"). All figures are predicted outcomes of the partial observability model		

Summarizing, the above tables are in line with previous analyses indicating that the current lack of childcare places hits some groups of society harder than others and reveal that the elimination of rationing can be expected to favour these groups more than the average family in Flanders. Concurrently, the tables indicate that in none of the differentiated population categories childcare service is expected to reach 100%.

4.2. From grandparents towards formal childcare services

In addition to the predicted effects in terms of more equal usage between socio-economic groups above, we predict a shift from making use of

informal childcare towards formal childcare services as well when rationing is lifted, which is revealed in Table 8. A quarter (25%) of children who were being taken care of by their grandparents and were no users of formal childcare services at the time of the observation of FFCS, are predicted to become users of formal childcare.

Table 8. Predicted demand for childcare services for current users of informal care.

Column Percentages Child:	At the time of the observation: Cared for by grandparent	Other informal care (neighbour, other family member)
Currently a user of childcare services	66%	68%
Predicted user of childcare services if non-rationed	25%	25%
Predicted non-user (non-rationed non-demand)	9%	7%
Proportion of the category in the total population of children 0-3	38%	10%
Notes: All figures reflect percentages in the sample of 1065 children younger than 3 (FFCS 2004-2005), All figures are predicted outcomes of the partial observability model		

The table complements this prediction of a significant increase, however, with a warning against an easy crowding out interpretation of the former result. Indeed, Table 8 also shows that informal care is often combined with formal care, with for example two thirds (66%) of children in grandparental care in a regular week also being predicted to use formal care in the same week. Consequently, the prediction of a rise in formal care does not necessarily imply that grandparents will no longer play part in childcare. It seems more likely to mean that the intensity of involvement of grandparents will decline with a further expansion of the formal childcare sector.

4.3. The social distribution of an expanded service

Table 9 reflects the distribution of the various predicted categories of demand for childcare services, according to the educational level of the mother of the child. The first line basically confirms earlier observations on the socially unequal use of childcare services. Children of low-skilled mothers are currently largely absent from formal childcare (21%), while more than two out of three (71%) of children with a high skilled mother are in formal childcare in a regular week. The second line indicates, however, that excess demand is considerable and especially so among those currently underrepresented. Among children of low-skilled mothers excess demand is even larger than the demand that is currently served by formal childcare (34 versus 21 percent of children). Finally, the third line confirms our earlier observation that a supply expansion that meets full demand at current prices and market mix conditions, is not likely to suffice to close the social gap. In fact, expansion has the largest effect on children of medium skilled mothers. Within this group the gap of currently 16 percentage points (71% versus 45%) would be halved to 8 percentage points (93% versus 85%).

Table 9. The educational distribution of predicted demand for formal childcare services.

Vertical percentages	Educational level of the mother		
	Low	Medium	High
Predicted category of child			
Served demand (current use)	21	45	71
Excess demand	34	40	23
No demand	45	15	7
	100	100	100
Percentual size of the category	11	32	58

Notes: Results stem from a subsample of FFCS (2004-2005) with 1031 observations. Educational levels are delineated in the conventional way (low=up to lower secondary school, medium=higher secondary education, high=higher education). Bonferroni tests indicate that, within groups of the same educational level, all percentages differ in a statistically significant way (>95%) except for the medium educated 40 and 45%

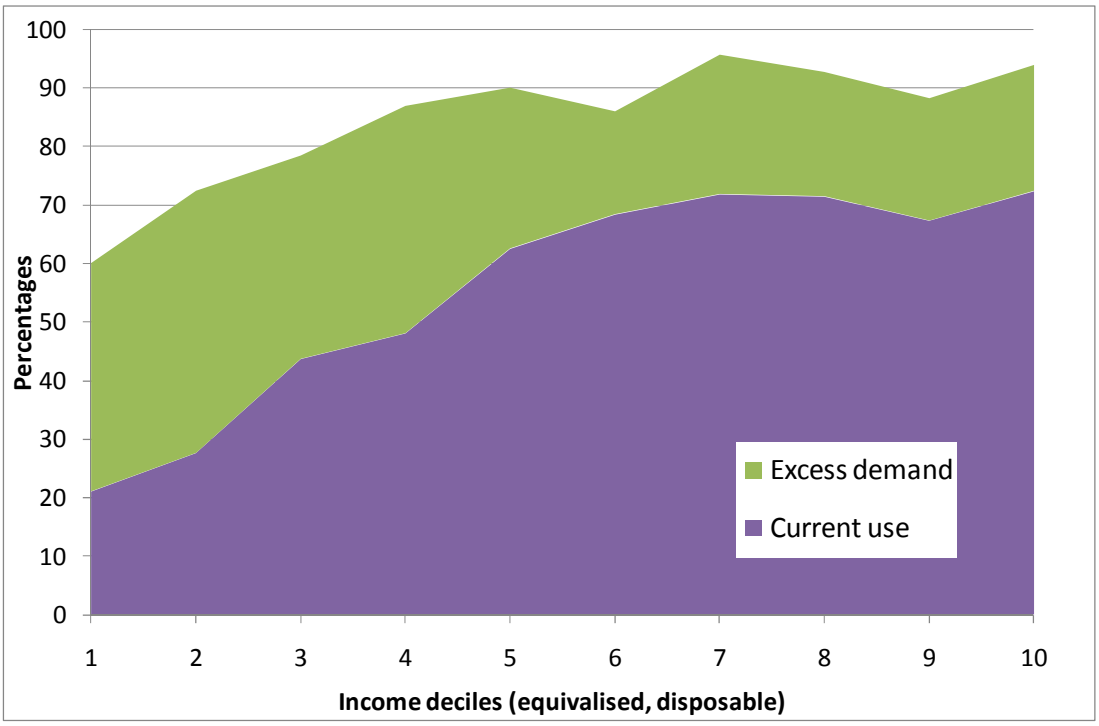
Figure 2 depicts the social distribution using another indicator of social position, the income decile of the household. We calculated net disposable income, adopted the standard Eurostat equivalence scale to adjust for family composition and delineated income deciles within the sample of (families of) children younger than three years of age. The income indicator largely replicates part of the above story: children of low income families are no heavy users of formal childcare in the current state and service expansion is not likely to close the gap completely. Contrary to the former analysis, it are not middle groups who reveal the largest proportion of excess demand. In the income distribution, excess demand gradually decreases with rising income categories and we predict the largest excess demand proportion in decile 2 (44%).[9]

However, this predicted rise of usage does coincide completely with the focus of gap closing. The joint prediction of total demand for childcare again indicates that the lower levels of the distribution continue with the lowest demand (current+excess) for formal childcare. The first and second income deciles are predicted to demand childcare at a significantly lower level than the other income categories.[10] All other income groups are predicted to have largely similar levels of total demand for formal childcare. Consequently, supply expansion is likely to close the gap in current use between children of the fourth to eighth income decile and the higher income groups.

[9] In fact, the proportions of excess demand are not very precisely estimated. Bonferroni tests indicate that only the proportion of the second decile differs from the other deciles in a statistically significant way (>95%). The estimate of excess demand in the first decile is not statistically to be differentiated from the other deciles. Estimates of the proportions of current use are more precise. Similar tests differentiate the proportion of the first and second decile from the proportion of the third onwards, while the third and fourth differ from any higher income group. From the fifth decile onwards, the differences between group proportions are no longer statistically significant.

[10] Again the point estimates are not very precise. No statistically significant difference is predicted between the third and higher income categories.

Figure 2. The income distribution of predicted demand for formal childcare services.



Source: FFCS 2004-2005

5. Discussion and conclusion

This paper addresses the distributional consequences of the expansion of childcare supply starting from a situation characterised by excess demand for childcare slots, notwithstanding the comparatively speaking abundant supply. On the basis of a partial observability probit model we show that non-rationed demand can be estimated to account for 29% of young children in Flanders, compared with a current proportion of use of 55%. Hence, the non-rationed demand is estimated to be more than 50% higher than the currently observable, rationed demand.

Of particular interest for this paper are socially vulnerable families, such as single earner families, families living in poverty or single parent families. It can be feared that they will be particularly hit by rationing, as the search strategies of some socially vulnerable groups (low-skilled mothers and single mother families) are less effective in securing a childcare slot than those of other groups (Market Analysis and Synthesis, 2007). Moreover, in the case of Flanders, for-profit providers of childcare services entered the market in considerable numbers in the recent past. Yet, they are not bound by the official tariff structure of the subsidised childcare sector and, hence, socially vulnerable families using their services pay standard prices instead of the preferential prices in the official tariff structure. Therefore, it is not surprising that our simulations indicate that those groups who are currently vastly underrepresented in formal childcare have the largest proportion of excess demand. This is

especially true for children of unemployed mothers who were looking for a job (74% of excess demand) and children living in poor families (36%).

The latter results should not obviate however that even without rationing, variation in childcare use is likely to persist. Dual earner families are predicted to have a non-rationed demand regarding 91% of their young children, while the corresponding figure for currently unemployed mothers amounts to 75% and of mothers not active in the labour market to 53%. We showed in section 4 that the gap in demand is currently much larger, but obviously a mere expansion of formal childcare will not close the gap completely.

First, we remind the reader that we modelled expansion along the lines of the current mix of subsidised and non-subsidised and hence, means-tested and free market pricing. To the extent that expansion happens in the non-subsidised sector, this may shy away families with low expected market earnings, because they are likely to incur childcare costs that account for a large part of their net income. Twenty days of full-time childcare at 25€ a day (i.e. 500€ a month) is larger than the difference between the unemployment benefit and the net wage of a job for a low skilled person. The current efforts of the Flemish government to secure access to subsidised childcare for socially vulnerable groups (through expansion and priority rules) are a direct consequence of this observation.

Secondly, we do not observe non-rationed demand for formal childcare corresponding to 100% of young children in any of the social categories. This has to do with other means to secure the care for infants and toddlers (e.g. parental leave) and with preferences of parents regarding the optimal care arrangement. In Flanders, grandparents are for instance the preferential non-parental carers for a large proportion of parents.

Interestingly, our simulations do not suggest a simple crowding-out effect regarding informal childcare arrangement. In Flanders, informal childcare mostly refers to care by grandparents. Generally, the role of grandparents in the care of their grandchildren is expected to decline, because of rises in the employment rate of grandmothers and because of reconciliation problems of grandparents who have active ageing aspirations. Indeed, we documented earlier that in Flanders the role of grandparents is eroding (Ghysels & Van Vlasselaer, 2007). Yet, this erosion refers to a partial rather than a full retreat from childcare. Nowadays many grandparents are part-time providers of childcare, complementing part-time care in the formal sector. As such, an expansion of the formal childcare sector may relieve those who are temporarily stepping in because of rationing in the formal sector, rather than drive them completely away. In any case, our simulation results indicate that 25% of those currently in informal care are rationed, i.e. they can be expected to become users of formal childcare services when rationing is lifted.

Finally, we want to signal some limitations of our behavioural simulations. We simulate the response of parents to a potential expansion of the supply of childcare services. However, the reference for this expansion is not supply corresponding to 100% of the children, but rather the best performing municipalities at the time of the interview. There is no way to determine to what extent this best performers are already meeting all demand or whether there is still room for improvement. The fact that a delineation of 20 or 10% resulted in comparable predictions may suggest that the current levels of abundance come close to non-rationed demand, but it is equally likely that norms on parenting will evolve in the future and, hence, non-rationed demand may shift further in the direction of 100%. Furthermore, it may be interesting to couple our predictions of non-rationed demand to shifts in labour supply. However, this is more complex than it may seem. Currently, childcare services mainly serve employed parents, but not exclusively, because children of non-employed parents are also accepted, irrespective of the future employment plans of the parents. Moreover, effective access to formal childcare is likely to be beneficial to employment of the parents, but is by no means a prerequisite for it. Parents may use parental leave, informal care or flexible work arrangements to reconcile work and family life without recurring to formal childcare. Hence, in both directions there is no complete link between employment and access to formal childcare.

Anyhow, we predict that expansion of formal childcare along the lines of current regulations will benefit all kinds of families, but especially those who are currently underrepresented in the sector, the socially vulnerable.

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Annex: Bivariate probit estimates

Current Use Of Formal Childcare (Demand Equation)		Estimated Probit	Coefficient
Child's Age in months		-0.039	
Parental employment characteristics			
Father works, spouse in search of a job		-1.333	*
Father works, spouse inactive		-2.035	**
Mother works, spouse in search of a job or inactive		-1.692	**
Both spouses work full-time		2.204	**
One spouse works full-time, the other one part-time		1.984	**
One spouse works full-time, the other one irregular hours		3.095	**
One partner works full-time, the other one is jobless		3.105	**
Both spouses work part-time		3.570	
One spouse works part-time, the other one irregular hours		1.769	**
One partner works part-time, the other one is jobless		1.832	*
Both spouses work irregular hours		1.662	**
One partner works irregular hours, the other one is jobless		3.131	**
Single parent works full-time		2.345	**
Single parent works part-time or irregular hours		6.127	
Single parent is inactive		0.953	
Single parent is jobless (reference category)			
Family characteristics			
Child less than 1 year old	Without brothers or sisters (ref. category)		
	1 brother or sister	-1.237	**
	2 brothers or sisters	-0.404	
	3 brothers or sisters	-2.151	**
Child 1 year old	Without brothers or sisters	-0.089	
	1 brother or sister	-0.131	
	2 brothers or sisters	-0.281	
	3 brothers or sisters	-0.788	
Child 2 years old	Without brothers or sisters	0.409	
	1 brother or sister	1.154	
	2 brothers or sisters	0.769	
	3 brothers or sisters	-0.214	
Age of the mother	Less than 26 (reference category)		
	26-28	-1.998	**
	29-30	-0.378	
	31-33	-0.938	**
	34 and beyond	-1.329	**
Nationality of the mother	Belgian (reference category)		
	EU, not Belgian	-1.003	**
	Moroccan or Turkish	1.094	*
	Other	0.228	
Level of education of the mother	Unknown (reference category)		
	Lower secundary	0.577	
	Higher secundary	1.443	**
	Higher education	1.916	**
Municipality characteristics			
Proportion of means-tested care in municipality		1.026	*
Proportion of family based care in municipality		0.581	
Constant		-1.459	*
Access To Formal Childcare (Supply Equation)			
Parental employment characteristics			
Father works, spouse in search of a job		-0.282	
Father works, spouse inactive		-0.175	
Mother works, spouse in search of a job or inactive		4.028	**
Both spouses work full-time		0.858	
One spouse works full-time, the other one part-time		0.909	*
One spouse works full-time, the other one irregular hours		0.108	
One partner works full-time, the other one is jobless		-1.347	*
Both spouses work part-time		0.270	
One spouse works part-time, the other one irregular hours		2.004	**
One partner works part-time, the other one is jobless		-0.360	
Both spouses work irregular hours		0.644	
One partner works irregular hours, the other one is jobless		-0.950	
Single parent works full-time		5.205	
Single parent works part-time or irregular hours		-0.095	
Single parent is inactive		1.271	
Single parent is jobless (reference category)			
Family characteristics			
Family is deprived		0.003	
Child less than 1 year old	Without brothers or sisters (reference category)		
	1 brother or sister	-0.407	
	2 brothers or sisters	-0.263	
	3 brothers or sisters	1.376	*
Child 1 year old	Without brothers or sisters	-0.020	
	1 brother or sister	-0.156	
	2 brothers or sisters	-0.732	
	3 brothers or sisters	1.917	*
Child 2 years old	Without brothers or sisters	-0.163	

	1 brother or sister	-1.056	**
	2 brothers or sisters	-0.961	**
	3 brothers or sisters	-1.625	**
Age of the mother	Less than 26 (reference category)		
	26-28	1.044	**
	29-30	0.674	*
	31-33	0.431	
	34 and beyond	1.431	**
Nationality of the mother	Belgian (reference category)		
	EU, not Belgian	0.701	**
	Moroccan or Turkish	-0.307	
	Other	0.545	*
Municipal characteristics			
Typology of municipalities (Dexia)			
	Residential municipality (reference category)		
	Rural municipality	0.037	
	Municipality with concentration of economic activity	0.766	**
	Semi-urban municipality	-0.252	
	Municipality with centre function	0.903	**
	Tourist municipality	2.011	**
Coverage rate in municipality		1.582	*
Proportion of childcare slots by child-minding families affiliated to a service (reference category)			
Proportion of childcare slots by subsidised child-minding centres		-0.097	
Proportion of childcare slots by non-subsidised child-minding centres		2.000	**
Proportion of childcare slots by non-subsidised child-minding families		1.969	**
Number of employed women between 50 and 64 years old		0.049	*
Proportion of children less than 1 year old	Without brothers or sisters (reference category)		
	1 brother or sister	10.173	
	2 brothers or sisters	16.764	*
	3 brothers or sisters	8.295	
Proportion of children of 1 year old	Without brothers or sisters (reference category)	0.360	
	1 brother or sister	8.758	
	2 brothers or sisters	4.556	
	3 brothers or sisters	-8.330	
Proportion of children of 2 years old	Without brothers or sisters (reference category)	6.517	
	1 brother or sister	8.477	
	2 brothers or sisters	4.433	
	3 brothers or sisters	12.329	
Proportion of children less than 4 months old		9.783	
Proportion of children between 4 and 6 months old		5.665	
Proportion of children between 7 and 12 months old		8.053	
Proportion of children between 13 and 30 months old (reference category)			
Proportion of children between 31 and 35 months old		-1.722	
Proportion of families where: Father works, spouse is in search of a job		36.779	*
Proportion of families where: Father works, spouse inactive		22.395	
Proportion of families where: Mother works, spouse in search of a job or inactive		23.016	
Proportion of families where: Both spouses work full-time		-0.377	
Proportion of families where: One spouse works full-time, the other one part-time		-0.499	
Proportion of families where: One spouse works full-time, the other one irregular hours		-4.430	
Proportion of families where: One partner works full-time, the other one is jobless		-23.995	
Proportion of families where: Both spouses work part-time		-12.636	
Proportion of families where: One spouse works part-time, the other one irregular hours		1.307	
Proportion of families where: One spouse works part-time, the other one is jobless		-11.097	
Proportion of families where: Both spouses work irregular hours		4.509	
Proportion of families where: One spouse works irregular hours, the other one is jobless		-7.382	
Proportion of families where: Single parent works full-time		-31.620	**
Proportion of families where: Single parent works part-time or irregular hours		4.767	
Proportion of families where: Single parent is inactive		9.159	
Proportion of families where: Single parent is jobless (reference category)			
Natural logarithm of median income per tax declaration		3.412	*
Constant		-46.330	**
Atrho (association between error terms)		14.060	**

Notes:
Bivariate probit estimation of type 'partial observability model' (Poirier, 1980)
N = 1065
Standard errors corrected for clustering at the level of families (935 clusters)
Levels of significance: * > 95% ** > 99%