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Centre for Economic Policy Research
33 Great Sutton Street, London EC1V 0DX, UK
Tel: +44 (0)20 7183 8801
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Abstract

Our study explores the impact of selection criteria on the costs and benefits of early child care for mothers' employment, child development, and municipalities' revenues by exploiting the selection criteria of different Italian municipalities in assigning child care slots. In Italy, only around 13% of the demand for public child care coverage is met, and the number of applications exceeds the number of places in child care services in all regions. In conditions of excess demand, municipalities introduce selection criteria to give priority to families for whom access to public child care appears to be more valuable. We analyse through simulations the consequences of introducing different selection criteria, using a representative Italian sample of households with children under three years of age (EU-SILC), and the selection criteria employed by six representative Italian municipalities. Our results have interesting policy implications. The benefits for child outcomes and mothers' employment are stronger in municipalities where the selection criteria give priority to more disadvantaged households. However, in these contexts selected households are less able to contribute to the financial sustainability of the service.

JEL Classification: N/A

Keywords: N/A

Daniela Del Boca - dani.delboca@unito.it
University of Turin and CEPR

Chiara Pronzato - chiaradaniela.pronzato@unito.it
University of Turin and Collegio Carlo Alberto

Giuseppe Sorrenti - giuseppe.sorrenti@econ.uzh.ch
University of Zurich

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When rationing plays a role: Selection criteria in the Italian early child care system*

Daniela Del Boca† Chiara Pronzato‡ Giuseppe Sorrenti§

October 9, 2016

Abstract

Our study explores the impact of selection criteria on the costs and benefits of early child care for mothers' employment, child development, and municipalities' revenues by exploiting the selection criteria of different Italian municipalities in assigning child care slots. In Italy, only around 13% of the demand for public child care coverage is met, and the number of applications exceeds the number of places in child care services in all regions. In conditions of excess demand, municipalities introduce selection criteria to give priority to families for whom access to public child care appears to be more valuable. We analyse through simulations the consequences of introducing different selection criteria, using a representative Italian sample of households with children under three years of age (EU-SILC), and the selection criteria employed by six representative Italian municipalities. Our results have interesting policy implications. The benefits for child outcomes and mothers' employment are stronger in municipalities where the selection criteria give priority to more disadvantaged households. However, in these contexts selected households are less able to contribute to the financial sustainability of the service.

Keywords: Child care, mothers' employment, child development.

JEL Classification Numbers: J13 I2 H75

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†University of Turin, Collegio Carlo Alberto and CEPR *Email:* dani.delboca@unito.it

‡University of Turin and Collegio Carlo Alberto, *Email:* chiaradaniela.pronzato@unito.it

§University of Zurich, *Email:* giuseppe.sorrenti@econ.uzh.ch

1 Introduction

Over the last few years, economic studies have given greater attention to the role of early child care for children under age three, and its potential impact on mothers' employment and child development. Most of these studies have focused on Europe, where public child care services are more prevalent than private services. In most European countries, governments are directly involved in the provision of child care services, while the supply from the private sector is very limited. However, there are still pronounced differences in child care provision between countries. While northern European countries, such as Denmark and Norway, have universal public child care, southern European countries have a mixed child care supply provided by both the private and the public sectors. In these countries, public child care availability is very limited, and is still far below the target of 33% set by the Barcelona European Council (European Union, 2002).

The existing literature on this issue has focused on two important characteristics of child care: availability and costs. Our research extends the analysis to include another important characteristic of child care that has been less explored: the selection criteria used by local governments in assigning slots. In this study, we consider the case of Italy, where only around 13% of children under age three attend public child care, and the number of applications exceeds the number of slots in child care services in all regions (ISTAT, 2010). Given this excess demand, the municipality sets eligibility criteria for selecting the families for whom public child care access appears to be more valuable.[1]

While the selection criteria appear to be similar from one municipality to another, the importance (and therefore the points) each municipality gives to each family characteristic varies. Thus, different types of households would ideally have access to child care services in different municipalities. The main selection criteria include family composition (whether the household is led by a single parent and the number of siblings), parents' working status (whether they are employed or unemployed), and the social conditions of the families (whether they suffer from health problems or social exclusion). The selection criteria adopted by the municipalities and the different types of families selected may have significant consequences for households, children, and the municipalities themselves. On the one hand, the use of certain criteria can support maternal employment and promote early childhood education, especially among children from more disadvantaged family backgrounds. On the other hand, the use of these criteria can lead to a reduction in monetary revenues for the municipality, as households vary in their financial ability to pay fees.[2] The aim of our paper

[1] We will refer to the selection process that operates through the eligibility criteria set by each municipality as *rationing*.

[2] Fees are assessed based on the financial situation of the family.

is to explore the costs and benefits of introducing different selection criteria for a given society using a sample of households with children under age three, and the selection criteria applied by six municipalities (Turin, Milan, Bologna, Reggio Emilia, Rome, and Naples).

The paper is organised as follows. In Section 2, we summarise the literature that has analysed the impact of early child care on child development and maternal labour market participation. In Section 3, we describe the main characteristics of the Italian child care system. In Section 4, we present the data used and the simulation methods. We simulate how the selection criteria used by six large Italian municipalities in assigning the available child care slots lead to different groups of children having access to care. We then explore the different levels of benefits for a given society. We summarise our conclusions in Section 5.

2 Previous studies on the role of early child care

A large number of studies have analysed the impacts of child care access on mothers' labour supply and on child outcomes. The most important characteristics of child care considered in these studies are availability and cost. In countries where the child care services are provided at the private level, like in the US and the UK, the focus is on the cost of the services; while in countries where the provision is mostly public, like in Sweden, Norway, Germany, and Italy, the focus is on the availability of services rather than on the cost.

A first stream of research has focused on the impact of child care characteristics on mothers' labour supply.[3] Gustafsson and Stafford (1992) analysed the case of Sweden, investigating the impact of child care costs and availability on maternal employment. They found that in regions where child care is more widespread, child care costs affect the probability that mothers will participate in the labour market; whereas in areas where child care is "rationed", there is little evidence of significant price effects. Del Boca and Vuri (2007) analysed the effect of child care costs on mothers' employment in the Italian context, taking into account the effect of rationing in the provision of care. Their results also indicated that availability has a greater impact than costs. Other studies from Germany reached similar conclusions, Wrohlich (2006)). In an analysis of the impact of child care availability across European countries, Del Boca et al. (2009) found that child care availability has a positive effect on the probability of employment among women at all levels of education, but that the effect is stronger for less educated women. Another stream of literature has extended the

[3]See Del Boca (2015a) and Pronzato and Sorrenti (2015) for surveys of recent studies on the relationship between child care and maternal employment.

analysis of the impact of child care on child outcomes.[4] Many of these studies have found positive implications of attending child care for child development, especially among children from disadvantaged backgrounds. Felfe and Lalive (2014) estimated the impact of having attended child care between ages zero to two in West Germany, and found that children with less educated mothers and children of immigrants benefited more in terms of the development of both language and social skills. The benefits were found to be large enough to close the scholastic achievement gap between children of high and low socio-economic status, and of native-born and immigrant parents.

Felfe et al. (2015) evaluated the long-run effects of a policy (implemented in the late 1990s) that introduced universal child care for three-year-old children in Spain. They compared the later cognitive outcomes of children who attended child care with those of previous cohorts, and found a sizable increase in reading and math test scores, and a sizable decrease in the likelihood of falling behind a grade. The results were even more pronounced for children from disadvantaged households. Havnes and Mogstad (2011, 2015) evaluated the impact of child care expansion policies in Norway. They found that the policies had been most effective in boosting the scholastic achievement levels of children in the lower and median parts of the income distribution. These findings suggest that child care policies have effects across the population, but that the impact of child care attendance is strongest among children from disadvantaged backgrounds, who tend to receive lower levels of human capital investment from their parents than their more advantaged peers.

Recent research focusing on Italy investigated the heterogeneity of local municipalities' decisions regarding the supply of child care. Using INVALSI data, Brilli et al. (2013) analysed the impact of child care availability on both mothers' labour supply and the cognitive outcomes of children in elementary school. They found that the availability of public child care had a positive impact on both. However, their analysis of heterogeneous effects indicated that the child care availability coefficients were greater in areas with high levels of rationing.

In our work, we extend previous analyses by focusing on the selection criteria used by local governments in assigning slots to children. We consider the impact of selection criteria on the society (in terms of mothers' employment and child development), and find that, as expected, the benefits are larger for municipalities that give priority to disadvantaged households. However, since in Italy fees are typically based on household income, municipalities that give priority to disadvantaged households face higher costs, as their revenues are significantly lower.

[4]See Del Boca (2015b) for a survey on the impacts of child care on child outcomes.

3 The characteristics of the Italian child care system

In Italy, the decision-making authority for policies related to child care for children ages 0-3 is decentralised: the municipality is the main decision-maker, while the regions define the general management criteria. The central government is only responsible for defining common objective standards and allocating resources among the regions. This structure may explain why the availability of public child care for children under age three varies greatly across regions, from around 25% in some areas in the north to under 5% in most of the south (ISTAT, 2013).

From a national perspective, Italy is ranked quite high in the European context for child care availability for children ages 3-6, but quite low for child care availability for children under age three: the utilisation rate of public child care among children ages three and older is 95%, whereas the utilisation rate among children under age three is just 13%. The demand for child care is higher than the supply everywhere in Italy. However, in regions where public child care has a longer tradition and is more widespread, the demand is greater. In general, the northern regions have higher numbers of applicants and more slots, while the southern regions have fewer slots and lower numbers of applicants (Istituto degli Innocenti, 2006).

In past decades, the role of public child care was primarily seen as providing care for children while their parents are at work. Indeed, the main explicit objective of public child care has long been to support the labour market participation of mothers. Recently, however, supporting child development (especially among children from low-income households) was added as an important objective. This objective has been implemented through the introduction of quality standards, especially in areas with greater experience with and longer traditions of child care provision (such as Emilia Romagna and Tuscany).[5]

Over the years, there has been some evidence that different "models" of child care that give priority to one of the two objectives have evolved. With an emphasis on the supply side, a municipality's decision about the number of child care slots they will offer depends on their preferences (i.e., regarding which types of household they wish to target) and on their budget constraints. Each municipality establishes eligibility requirements with the goal of ensuring that the available slots are given to the households who are likely to benefit the most. While absolute priority is given to the applications of children with disabilities, the other criteria can be assigned to one of two main categories. The first category is related to the parents' employment status: for example, whether one or both parents work, and

[5]Budget Law 2002, Law 448/2001 (Budget Law 2002) defined formal child care as "structures aimed at granting the development and socialization of girls and boys aged between 3 months and 3 years and to support families and parents with young children". Therefore "one of the most important aims of public child care is educational".

whether they work part time or full time. The second category is related to the family's structure and socio-economic conditions: for example, whether the child is an orphan or a foster child, lives with a single parent, or has siblings. Thus, according to these access criteria, public child care can be viewed as a service that supports families in reconciling work and parenthood during the childbearing years, and as a service that supports early education and promotes the social inclusion of children from low-income families.

Both outcomes are particularly important for Italy. On the one hand, nearly 30% of mothers stop working after the birth of their first child, and the probability of leaving the labour market after childbirth is higher for less educated mothers and in areas with limited child care (Bratti et al., 2005; Pronzato, 2009). In Italy, the employment rate is only 47.3% among mothers whose youngest child is under age two, and 50.6% among mothers whose youngest child is aged 3-5. Thus, having young children appears to play a crucial role in women's employment. On the other hand, comparative data indicate that Italian children have long had lower levels of scholastic performance than their peers in other countries, and, in spite of recent improvements, continue to perform below the OECD average (PISA-OECD, 2014).

4 Methods and empirical analysis

In our paper we assume that the two mains objectives of local governments in regulating the provision of and access to child care are to support the labour market participation of women with very young children, and to improve the educational outcomes of the children who attend public child care. The social planner seeks to maximise her objective by using the policy variables at her disposal, which in this case include the price of a slot relative to the socio-economic conditions of the family applying for the place, and the criteria used to assign slots to children if the demand for slots exceeds the supply at the price charged. If the social planner wants to increase maternal employment, she could do so by limiting access and making maternal employment a more important criterion for access to child care. If, however, the social planner's main goal is to improve the educational outcomes of the children in this population, she will make the households' socio-economic conditions a more important criterion. Viewed in this way, rationing and selective access are outcomes of a mechanism design implemented by the social planner. By lowering the price and creating excess demand, the social planner can choose the individual children who are eligible for the slots, instead of having the "market" select the children strictly through the price mechanism. Since the eligibility requirements vary across local areas, they produce mixed types of eligible households, with different effects on mothers' labour supply, child outcomes,

and the monetary contributions of families to the cost of child care services.

We now present an empirical exercise in which we weight the benefits and the costs of different selection criteria, and provide a tool for policy-makers to help them determine the "right" selection criteria, given the preferences and the budget constraints of a certain municipality. In Section 4.1 we describe the characteristics of the sample, the variables used, and the selection criteria adopted in the six Italian municipalities. We also describe the differences between the potential users selected by different selection criteria. In Section 4.2 we estimate the impact of different sets of selection criteria on the financial contributions of families to the cost of child care. In Section 4.3, we simulate the gains in maternal employment and child development that result from offering child care slots to different potential users. In Section 4.4, we repeat the exercise with two different scenarios: with an acceptance rate of 25% (when rationing is stricter), and with an acceptance rate of 75% (when rationing is weaker). Finally, in Section 4.5 we show how this simulation framework can be used by policy-makers to determine which selection criteria can help them reach their objectives, given their financial constraints.

4.1 Selection criteria and users' characteristics

For our empirical analysis, we use data from the Italian part of the European Survey on Living and Income Conditions (EU-SILC) for the year 2010. The EU-SILC is a European harmonised survey conducted by Eurostat that allows for the comparison of numerous social and economic dimensions across several European countries. Information is collected at both the household and the individual levels. At the household level, we have information on the number of family members and their relationships to each other, their main demographic characteristics, their sources of income, their levels of deprivation, and their household conditions. At the individual level, we have detailed information about each person's employment, income, education, and access to child care.

We select 1210 households with at least one child younger than three years old. Table 1 displays the average characteristics of the sample, while details on how the variables are constructed from the original information in EU-SILC are reported in Appendix 2. Among the families in the sample, 52% of the mothers and 82% of the fathers are employed (with 34-43 average weekly hours). Both parents are employed in only 45% of the families. The average number of siblings under age 18 in each family is 0.7, and 12% of children are living in a single-parent household. In almost 2% of the households at least one family member has serious health limitations; while in almost 4% of the households the family had been in arrears on utility bills in the last 12 months, did not have adequate home heating, or faced

Table 1: EU-SILC sample

Variable	
Single-headed family household (%)	12.1
Siblings (0-18)	0.7
Mother employed (%)	52.2
Mother's weekly hours of work	33.7
Mother unemployed (%)	10.7
Father employed (%)	82.1
Father's weekly hours of work	42.7
Father unemployed (%)	5.6
Both parents employed (%)	45.0
Only one parent employed (%)	44.1
Social exclusion (%)	3.5
Observations	1,210

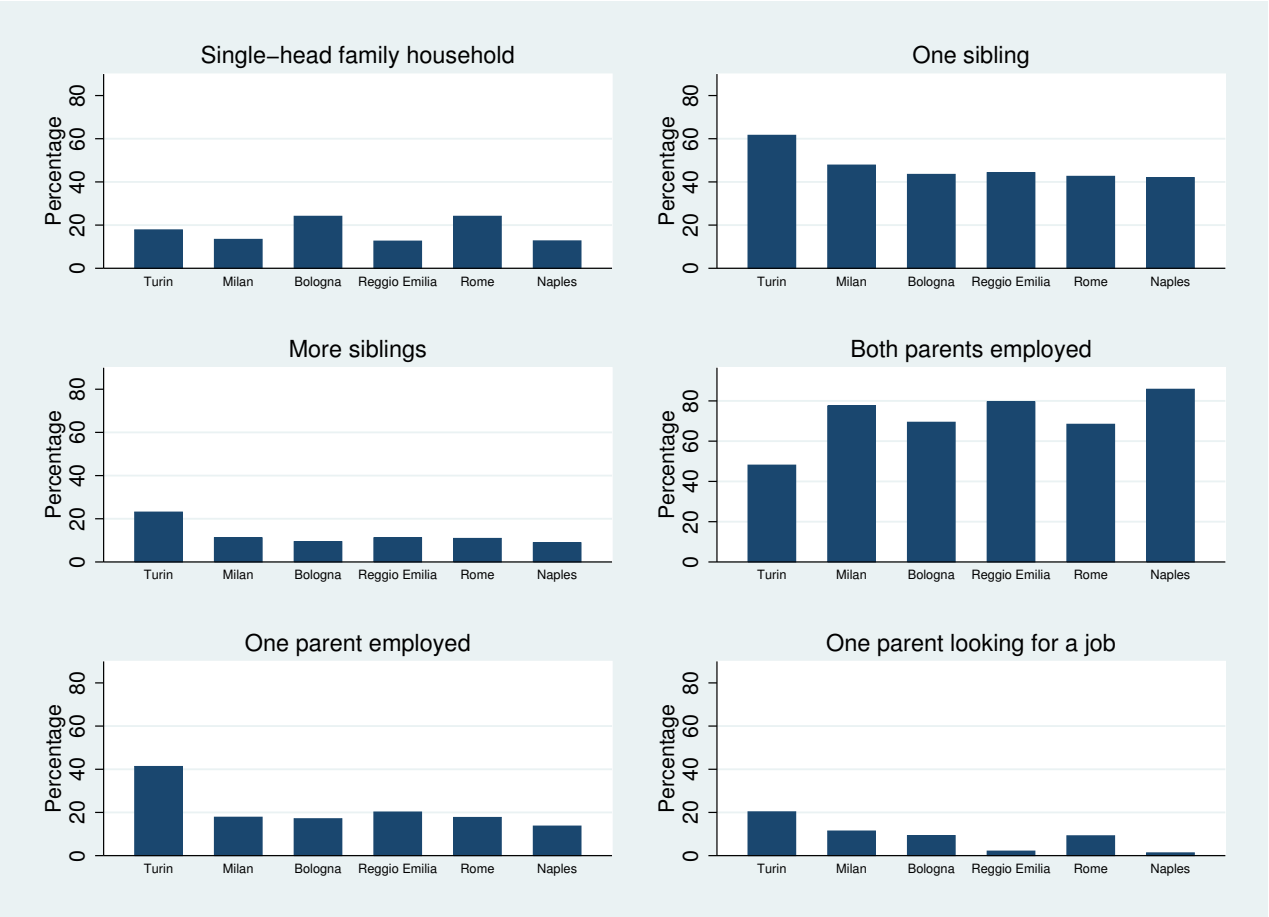
structural problems. From this point onwards we will refer to these families as "households at risk of social exclusion". Using the information available in the EU SILC, we calculate for the same sample of families the points each family would be assigned according to different selection criteria adopted in six Italian municipalities - Turin, Milan, Bologna, Reggio Emilia, Rome, and Naples (see Appendix 1). For each set of selection criteria, we then rank the families from the highest number of points (highest priority) to the lowest number of points (lowest priority), and assign a slot to the first 605 children, based on an acceptance rate of 50%. This process allows us to distinguish between six potentially different populations of users. Table 2 describes the characteristics of the families selected according to the different selection criteria: namely, parental employment, family circumstances, members' health, and social disadvantages. Figure 1 graphically represents some of the more relevant areas of heterogeneity.

All of the sets of selection criteria used by the Italian municipalities give additional weight to families in which both parents work: the share of these families who are assigned a slot is 69% in Bologna, 68% in Rome, 78% in Milan, 80% in Reggio Emilia, and 89% in Naples. In Turin, however the weight assigned is relatively small, leading only to only 48% of selected families with both parents working. Instead, Turin assigns greater weight to families headed by a single parent, and to families in which one parent is looking for a job. Turin also gives priority to larger families: in 60% of the families selected the child attending child care has at least one sibling (compared with 40% in the other municipalities), and in 20% of the families selected the child attending child care has more than one sibling (compared with 10% in the other municipalities). The percentage of families selected who are headed by a single parent

Table 2: Users according to different selection criteria

Acceptance rate 50%	Turin	Milan	Bologna	Reggio Emilia	Rome	Naples
Single-headed family household (%)	17.8	13.4	24.1	12.6	24.1	12.7
Siblings (0-18)	1.1	0.7	0.6	0.7	0.7	0.6
Both parents employed (%)	48.1	77.5	69.4	79.5	68.4	85.8
One parent employed (%)	41.3	17.8	17.1	20.2	17.7	13.7
At least one parent employed (%)	89.4	97.5	86.6	99.7	86.1	99.5
At least one parent unemployed (%)	7.9	2.5	2.0	0.5	2.0	0.5
At least one parent looking for a job (%)	20.3	11.4	9.3	2.1	9.2	1.3
At least one parent student (%)	0.5	0.2	1.0	0.0	1.0	0.0
Social exclusion (%)	6.9	2.1	6.9	3.8	6.9	1.8
Disposable income (€)	35,784	41,343	33,056	41,489	38,894	39,300
Below poverty threshold (%)	22.3	11.24	18.51	9.42	17.52	7.93
Monthly fee (€)	264	222	196	322	128	177
Observations	605	605	605	605	605	605

Figure 1: Household characteristics in different municipalities



The characteristics of the users are simulated according to different selection criteria

is particularly high in Bologna and in Rome (24%). However, no difference is observed across the municipalities in terms of the percentage of families selected who have members with serious health limitations (the most important criterion in all of the municipalities). Finally, the criteria applied in Turin, Bologna, and Rome seem to select more families at risk of social exclusion (around 7%) than the criteria applied in Milan, Reggio Emilia, and Naples (around 2%-4%).

Generally, we can observe that municipalities such as Turin, Bologna, and Rome give priority to more disadvantaged families than cities such as Milan, Reggio Emilia, and Naples. When we look at Table 2, we can also see that the percentage of poor families who are selected is higher in the first three cities (18%-22%) than in the last three cities (8%-11%).

To ensure the reliability of our simulation setting, we test our model by comparing our simulations with real data provided by the municipality of Turin. We have information about all of the families who applied for public child care, and about the families who were assigned a slot in the school year 2010/11. Table 3 provides a descriptive analysis of the two samples of interest: the whole population (our EU-SILC sample and the real applicants in the municipality of Turin), and the potential/real users of the service (the potential users based on EU-SILC data with Turin's selection criteria, and the real users in the municipality of Turin). The top panel of the table shows that the two populations are very similar: all of their characteristics are roughly the same with the exception of the proportion of parents employed, which is higher in the case of Turin. This may be reasonable given the fact that working parents are more likely to apply for child care, as for them reconciling family and work duties is crucial. The comparison between the simulated and the real users is reported in the bottom part of Table 3. The two samples appear to be very similar. As expected, we find that there are still more working parents in the Turin sample than in the EU-SILC data. There are also more siblings in Turin, which could be due to a different distribution of children in Turin than in the rest of the country. Interestingly, the real monthly fee is not statistically different from the simulated fee.

4.2 Selection criteria and financial contribution to the service

In the Italian childcare system, families pay a fee according to their score on the Indicator of the Equivalent Economic Situation (ISEE). This indicator, which is obtained using information available in the EU-SILC data, measures the economic wellbeing of families based on their income, property, assets, and family composition. While we need to make approximations when using the ISEE (see Appendix 3 for details), the measure seems to be quite reliable, at least for our purposes. Indeed, at the bottom of Table 3, in which

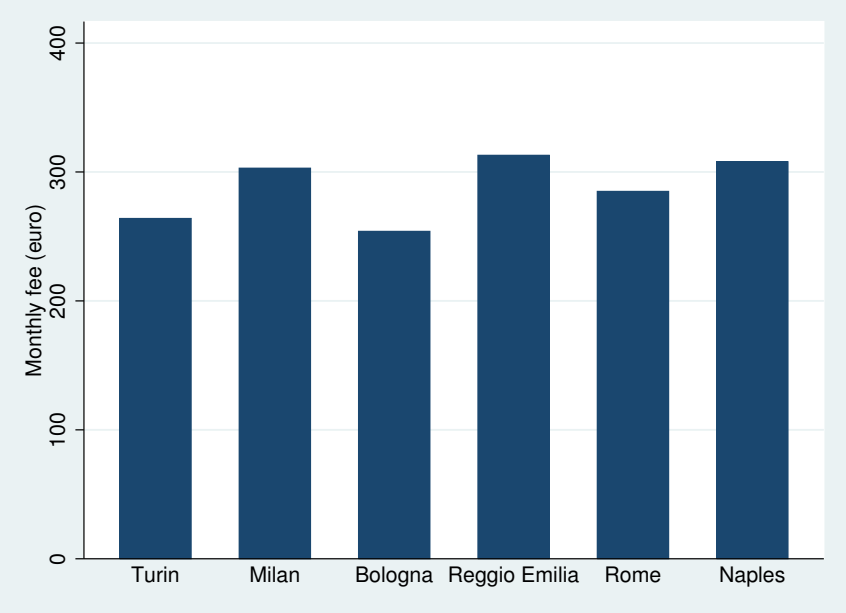
Table 3: Validation of the simulation setting - Comparison with real data

Whole population	EU-SILC	Turin	P-value for differences in means
Single-headed family household (%)	12.07	12.20	0.90
Siblings (0-18)	0.68	0.56	0.00
Both parents employed (%)	45.04	53.61	0.00
At least one parent with health lim. (%)	1.73	2.34	0.20
Social exclusion (%)	3.47	5.37	0.01
Observations	1,210	4,564	
Users	EU-SILC	Turin	P-value for differences in means
Single-headed family household (%)	14.99	14.93	0.97
Average number of siblings (0-18)	1.17	0.77	0.00
Both parents employed (%)	51.32	58.26	0.00
At least one parent with health lim. (%)	3.70	4.03	0.72
Social exclusion (%)	7.41	8.44	0.42
Monthly fee (€)	251	259	0.45
Observations	567	2,156	

Comparison between the EU-SILC sample and the population of real applicants in Turin (top part of the table); comparison between potential users in the EU-SILC sample (by adopting Turin's selection criteria and acceptance rate) and the population of real users in Turin (bottom part of the table).

we compare the population of Turin and our sample using Turin's selection criteria, we observe that the average simulated fee is 251 euros, while the real average fee paid by Turin users is 259 euros. In order to predict how much the users selected would contribute under different selection criteria, we impute the fee according to their ISEE score. We apply the fee scheme adopted by Turin, although the results are also robust when we apply the other municipalities' schemes. Given these prices, the families in our sample are assumed to be willing to pay for a slot in public child care, and therefore apply for one. Figure 2 shows the average fee per child when the children are selected according to different selection criteria.

Figure 2: Selection criteria and financial contribution to the service



Simulated monthly fees in euros per child care slot

We observe that the households with a child attending child care pay an average of 260 euros per month in Turin and Bologna, around 300 euros in Rome, and more than 300 euros per month in the three remaining municipalities.[6] The different selection criteria affect the financial contributions of the households, which may have large implications for the economic sustainability of the services.

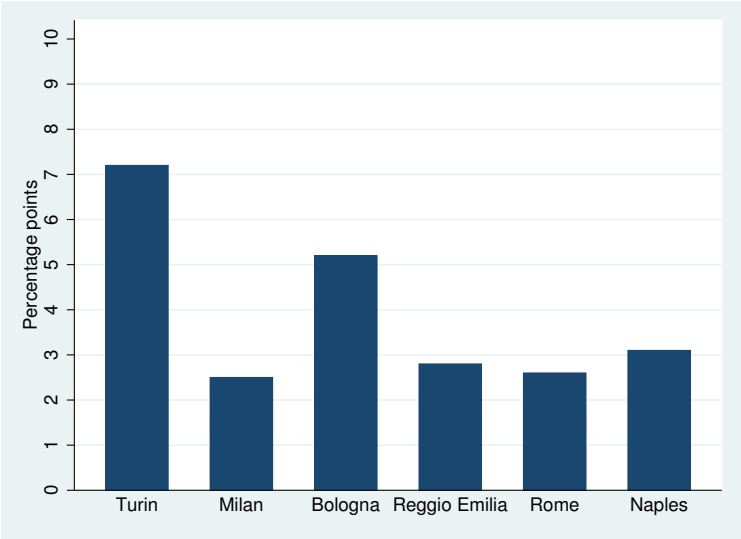
[6]The values are very close to those provided by the *Cittadinanza Attiva* observatory of prices and tariffs (2009) when considering a hypothetical family composed of three people (parents plus one child ages 0-3) with an annual gross income of around 44,000 euros; for more information, see www.cittadinanzattiva.it.

4.3 Selection criteria, maternal employment, and child development

We now turn to the simulation of the benefits of child care for maternal employment and child development levels. In order to simulate the effects of child care on maternal employment, we use the estimates reported in Appendix 4. The impact of previously available child care on maternal employment is positive and significant, but hides strong heterogeneities. Indeed, the overall positive effect is driven by mothers who were not working at the time their child first started attending child care.[7]

Figure 3 shows the gains in maternal employment that result when 50% of the demand for child care services is met, compared to when no child care services are available. Maternal employment is 7.2% higher under Turin's criteria and 5.2% higher under Bologna's criteria. The increases are much smaller under the selection criteria used by the other municipalities.

Figure 3: Selection criteria and gain in maternal employment



Shifting to child development, we consider two outcomes: the preference for reading and pro-social behaviour. Having attended child care increases the probability that the child will like to read, and has a positive impact on the child's pro-social behaviour. The benefits are again heterogeneous: the effect on expressing a preference for reading is stronger among children with non-employed parents, children living in single-parent households, and children with siblings; while the effect on pro-social behaviour is stronger for children from

[7]The results are in line with those of previous studies that found a positive impact of child care on mother's employment. Brilli et al. (2013) found that a one percentage point increase in child care availability raises the maternal employment rate by 1.3 percentage points.

single-headed family households and children without siblings.[8] Figure 4 shows that gains in the percentage of children who like to read are higher when the selection criteria of Turin, Bologna, and Rome are adopted. This result could be explained by the fact that these three cities select more single-headed family households and fewer working families.

Figure 4: Selection criteria and gains in child development - Like reading

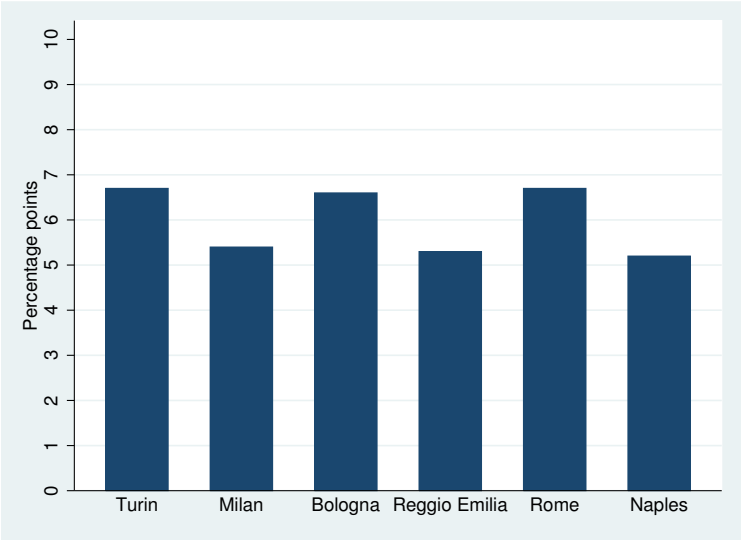


Figure 5: Selection criteria and gains in child development - Pro-social behaviour

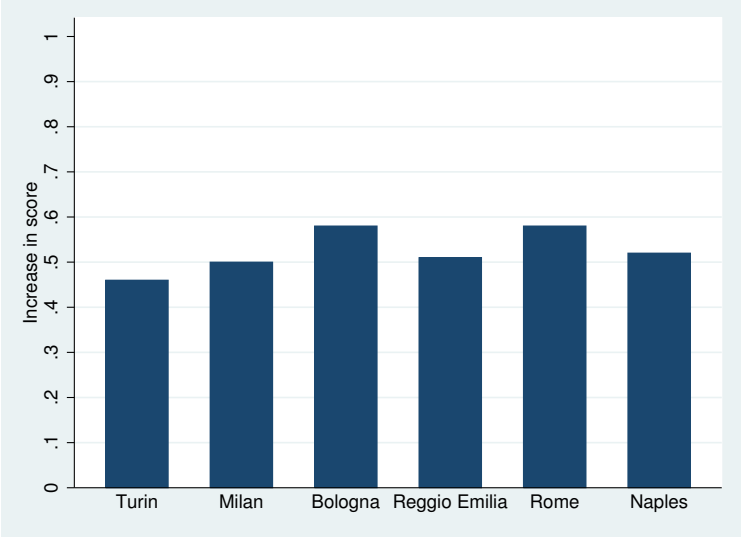


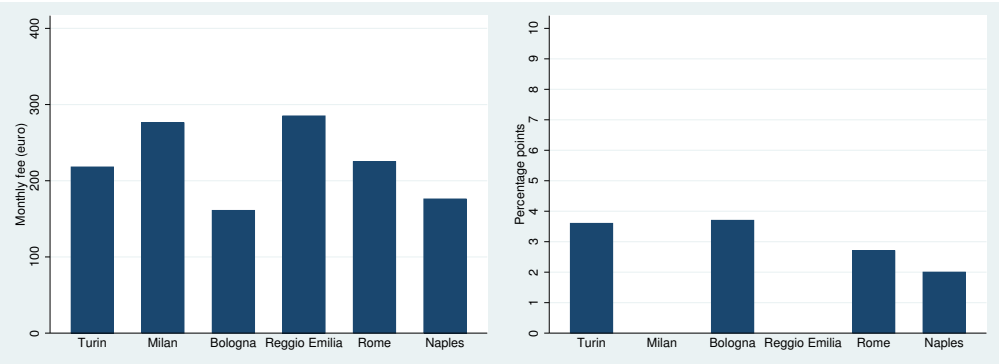
Figure 5 replicates the exercise for the case of pro-social behaviour. The increase in the pro-social behaviour score appears to be smaller under Turin's criteria, as families with

[8]The estimated effects are in line with the results from other studies (Havnes and Mogstad, 2011, 2015; Felfe et al., 2015) and confirm the hypothesis that early formal care is more important for disadvantaged families.

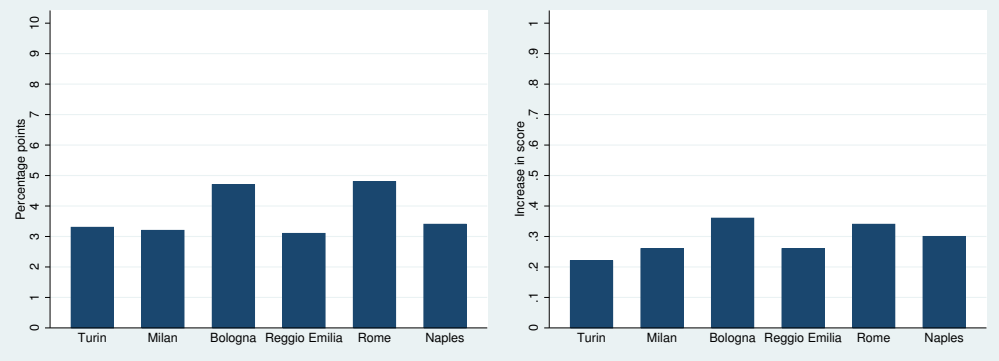
a greater number of siblings are more likely to be selected. The increase in the score is, however, higher under the criteria of Bologna and Rome, as families with only one child are more likely to be selected. As the simulation of the gains in the two different child outcomes shows, there are no "right" selection criteria; or, in other words, what the "right" selection criteria are depends on the preference each municipality has for one potential outcome over the other.

Figure 6: The effect of selection criteria with a 25% acceptance rate

(a) *Financial contribution to the service* (b) *Gain in maternal employment*



(c) *Like reading* (d) *Pro-social behaviour*



4.4 Sensitivity analysis

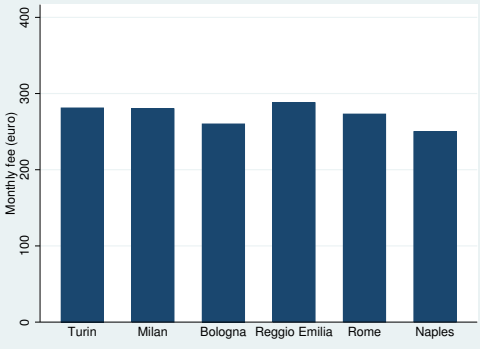
All of the simulations carried out so far assume an acceptance rate of 50%. This figure is rather close to the rate observed in the municipality of Turin (47%), and can be a good benchmark to start with. Without estimating the demand function, which would allow us to determine how many families would apply for a slot, and to compare them with the number of available slots, it is very difficult to provide a reliable measure. In fact, even if we could find out how many families have applied in each municipality, we would still have to assume that many families would like to secure a public child care slot, but do not apply because

they know that, given the selection criteria, they would not be assigned a slot. Thus, an acceptance rate of 50% can be considered biased upwards.

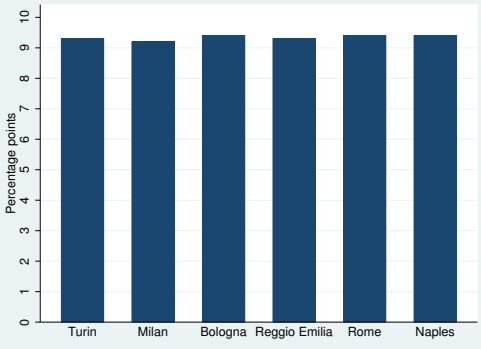
We propose other alternative scenarios: the first uses an acceptance rate of 25% while the second uses an acceptance rate of 75%. Figures 6 and 5 highlight the results. With an acceptance rate of 25% (Figure 6) the overall benefits to society are obviously smaller: child development levels are lower and fewer mothers participate in the labour market. The differences across the different sets of selection criteria are more polarised: compared to the criteria of other municipalities, the criteria of Bologna and Turin are associated with greater benefits for maternal employment. Bologna's and Rome's criteria are linked to better child development outcomes. With an acceptance rate of 75% (Figure 7), the overall benefits increase, and the differences across the municipalities' criteria almost disappear.

Figure 7: The effect of selection criteria with a 75% acceptance rate

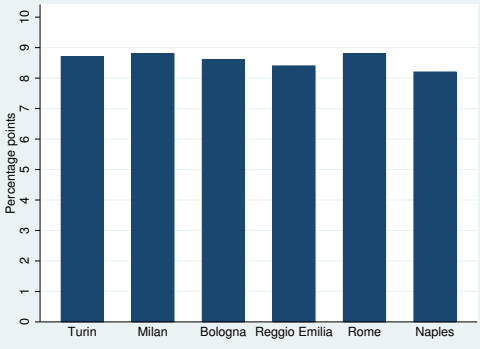
(a) *Financial contribution to the service*



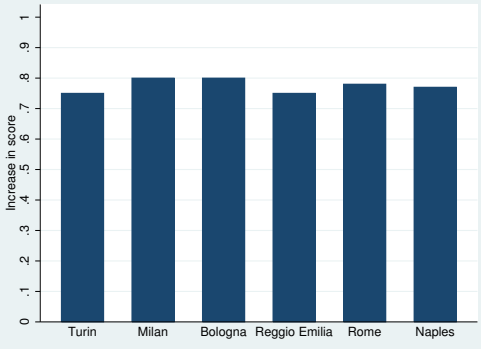
(b) *Gain in maternal employment*



(c) *Like reading*



(d) *Pro-social behaviour*



4.5 A simple simulation exercise

We now discuss how this simulation model may be used by policy-makers, and provide some examples. Obviously, a policy-maker could look at the estimated benefits of child care (based on empirical evidence from the vast literature on this subject) for outcomes other than reading, pro-social behaviour, and maternal employment.

Suppose a municipality needs a minimum average of 220 euros per child for its child care services to be financially sustainable, and to achieve its goal of maximising mothers' employment. What selection criteria should be adopted? If, for example, the municipality awarded each family two points if the parents have been recently unemployed, one point if the mother is working at the time of application, one point if the household is headed by a single parent, and three points if the child has siblings, the municipality would realise a 6.0 percentage point increase in the number of children who like to read, a 3.5 per cent increase in pro-social behaviour, and an 8.3 percentage point increase in mothers' employment.

If instead the municipality wants to maximise the number of children who like to read, what selection criteria should be adopted? If, for example, the municipality awarded each family three points if the parents have been recently unemployed, one point if the mother is working at the time of application, three points if the household is headed by a single parent, and two points if the child has siblings, the municipality would realise a 7.5 percentage point increase in the number of children who like to read, a 4.6 per cent increase in pro-social behaviour, and a 7.3 percentage point increase in mothers' employment.

If the municipality needs a minimum average of 250 euros per child, it has to assign two points if the parents have been recently unemployed, three points if the mother is working at the time of application, two points if the household is headed by a single parent, and one point if the child has siblings. In this example, the municipality would realise a 7.0 percentage point increase in the number of children who like reading, a 5.3 per cent increase in pro-social behaviour, and a 2.1 percentage point increase in mothers' employment.

Finally, if the municipality needs a minimum average of 250 euros per child and can only provide access to childcare services to 25% of children, it has to assign 1 point if the parents have been recently unemployed, two points if the mother is working at the time of application, three points if the household is headed by a single parent, and one point if the child has siblings. In this example, the municipality would realise a 4.8 percentage point increase in the number of children who like reading, a 3.0 per cent increase in pro-social behaviour, and a 1.3 percentage point increase in mothers' employment.

5 Conclusions

Our study explores the impact of selection criteria on the costs and benefits of early child care for mothers' employment, child development, and municipalities' revenues by exploiting selection criteria variability across different Italian municipalities.

Our results have interesting policy implications. The benefits for child outcomes and mothers' employment are, as expected, shown to be stronger in contexts in which the selection criteria give priority to more disadvantaged households. However, in these contexts the selected households contribute less to the financial sustainability of the service. There is a trade-off between the benefits to the households and the costs faced by the municipalities.

The most evident limitation of this study is that we are not able to estimate the demand side. If we had access to information on how much families are willing to pay for a slot in a public child care centre, we would be able to estimate who would be likely to apply at certain prices, and given certain selection criteria. In addition, we are making two simplifying assumptions. First, we assume that there are no peer effects between children in child care centres. If there are such effects, the greater benefits observed in the municipalities that give priority to disadvantaged children are positively biased. Our second assumption, which is probably less problematic, is that parental behaviours (work, divorce, fertility) are not influenced by the selection criteria themselves. Finally, we compare the benefits to children and mothers across municipalities without taking into account the possibility of attending private child care. If we assume that children from more advantaged families who are excluded from the public system can afford private child care, that there are no peer effects, and that the benefits of attending private child care are similar to those of attending public child care, then we are underestimating the positive benefits of giving public slots to more disadvantaged children.

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Appendix

A1. Selection criteria

Selection criteria ranking across different municipalities

Ranking	Turin	Milan	Bologna	Reggio Emilia	Rome	Naples
1	Disabled child	Disabled child	Disabled child	Disabled child	Disabled child	Disabled child
2	Social exclusion	Twins	Social exclusion	Social exclusion	Social exclusion	One head family hh, parent working
3	Serious health limitations	Serious health limitations	One head family hh	One head family hh	One head family hh, parent employed	Disabled parent
4	One head family hh	Both parents full time workers	Serious health limitations	Number of hours worked per week	One head family hh parent unemployed	Both parents employed
5	Parent employed	Full time worker & part time worker (/student)	Both parents employed	Typology of work	Both parents full time workers	Both parents unemployed
Other criteria	Siblings characteristics, household characteristics, parents' working status, residential characteristics	Siblings characteristics, household characteristics, parents' working status, residential social exclusion	Both parents unemployed	Siblings characteristics, household characteristics, health limitations, parents' working status, job characteristics, residential characteristics	Siblings characteristics, health limitations, parents' working status, job characteristics	Social exclusion

A2. Variables description

Variables' definition - EU SILC

Age children	From 1 to 3
Siblings	Number of siblings in the household
Household size	Number of members in the household
Single-headed family household	Only one parent in the household (1), otherwise (0)
Mother's activity	7 dummy variables: full-time worker, part-time worker, unemployed, student, domestic tasks, disable, inactive
Father's activity	7 dummy variables: full-time worker, part-time worker, unemployed, student, domestic tasks, disable, inactive
Working hours per week	Number of hours worked per week
Looking for a job	The individual is looking for a job (1), otherwise (0)
Work availability	The individual is available to work (1), otherwise (0)
Past activities	Work activities in the last 12 months
Tertiary education	Tertiary education attained (1), otherwise (0)
Health limitation	Activity limitation because of health problem (1), otherwise (0)
Serious health limitation	Activity strongly limited because of health problem (1), otherwise (0)
Leaking roof	Leaking roof (1), otherwise(0)
Arrears on utility bills	The household has been in arrears on utility bills in the last 12 months (1), otherwise (0)
House adequately heated	Household unable to keep the house adequately heated (1), otherwise (0)
Poverty indicator	The household is at risk of poverty (1), otherwise (0)
Monthly rent dwelling	Current monthly rent related to occupied accommodation in €
Tenure status	The individual is the accommodation owner (1), the tenant is paying rent at the prevailing or market rate (2), the tenant is paying at a reduced rate (3), accommodation provided for free (4)
Interest	Interest, dividends, profits from capital investments in €
Total gross household income	Total household gross income in €
Equivalised disposable income	Equivalised disposable income in €
Monthly disposable income	Monthly disposable income in €

A3. ISEE calculations

We have constructed the ISEE indicator using the available information about the household in the EU-SILC dataset, and following an approach similar to the one used in (Bucciol et al., 2014).[9] The ISEE is an Indicator of the Equivalent Economic Situation of the family. It was created to ensure that we have a comparable measure of economic well-being for families based on their income, property, assets, and number of members. The ISEE is composed of a weighted sum of two different indicators. The first indicator is the so-called ISR (Indicatore della Situazione Reddituale), which measures income flows from different sources received by the household in the previous fiscal year. The second factor is an estimation of the value of the property (Figari et al. (2012)), assets, and capital owned by the family. Therefore, ISEE for household h is defined in the following way:

$$Isee_h = \frac{\sum_{j=1}^{n}(Y_j + P_j + r{W_j}^M - D_1) + 0.2\sum_{j=1}^{n}({W_j}^I - D_2{W_j}^I) + 0.2\sum_{j=1}^{n}({W_j}^M - D_3{W_j}^M)}{p(s,c)} \quad (1)$$

in which n is the size of household h. Y and P are income measures, while W^M are the aggregate financial assets owned by the family, and r is the interest rate.[10] W^I is an estimation of the value of property assets, such as the primary and the secondary residences. The denominator $p(s,c)$ is a weight computed as a function of household size (s) and other characteristics (c), such as the age of household components and health problems.

[9] A detailed explanation of the variables used to construct ISEE indicator is available upon request.

[10] The interest rate applied to financial assets is the state bond interest rate.

A4. Formal child care and mothers' labour supply

Our goal is to investigate the heterogeneous effects of child care provision on mothers' work decisions. We utilise a newly available dataset from the survey Reggio Children Evaluation, in which a complete set of information about household characteristics and children outcomes is collected. The survey was conducted in 2013, and involves five different cohorts who have been interviewed in different Italian cities. We exploit information from the survey carried out on the cohort of children born in 2006 who were interviewed together with their parents. The dependent variable is the working condition of the mother when the child is seven years old.

Partial observability model

Supply side	
Score	0.112**
	(0.044)
Constant	-1.246
	(0.908)
Demand side	
Distance from formal child care centre	-0.088**
	(0.044)
Single-headed family household	0.371*
	(0.223)
Closeness to grandparents	-0.493***
	(0.148)
Migrant	-0.761***
	(0.162)
Constant	0.860***
	(0.167)
Athrho	-2.761
	(56.836)
ρ	-0.992
	(0.902)
Wald χ^2	36.44
Observations	421

Dependent variables: Indicator variable for being offered a slot in the formal child care system (Supply side); Indicator variable for demanding a slot in the formal child care system (Demand side). Partial observability bivariate probit. Standard errors in the two equations are jointly normally distributed. Robust standard errors are reported in parenthesis. *** indicates significance at 1% level, **indicates significance at 5% level, * indicates significance at 10% level.

We are interested in the effect of early child care attendance on the mother's work status (when the child is age seven), and in testing whether the effect is different between mothers who were working/not working during their child's pre-school years (ideally, at the moment of application

for early child care). We are able to control for a large number of household characteristics: the age (in months) and the gender of the child, the presence of younger or older siblings, whether the parents have a tertiary education, the mother's IQ, whether the household is headed by a single parent, whether the family owns their own home, and whether the parents are immigrants. In order to address the endogeneity of the early child care attendance decision, we use a propensity score matching method. We match treated children with untreated children with a close degree of probability of demanding early child care and a close degree of probability of being offered early child care if they were to apply. We first estimate a partial observability model, whereby the supply of early child care depends on the admission criteria (in scores), and the demand depends on the distance to the closest public child care centre, living in a household headed by a single parent, having grandparents who live nearby, and the family's immigrant status. The errors in the two equations are jointly normally distributed. We find that the supply positively depends on the scores as defined by the admission criteria. Meanwhile, the distance to the closest childcare centre, having grandparents who live nearby, and having parents who are immigrants have a negative impact on the demand; and living in a household headed by a single parent has a positive impact on the demand (Table A1). We therefore predict the probability of wanting to have a child care place according to the family characteristics, and we predict the probability of being offered a slot depending on the score all families would get if they applied for a child care place. We have a treatment group of 242 units (children in child care 0-2) and 179 potential control units (children not in child care at ages 0-2). We match each treated child with one untreated child with the closest probability of being offered a slot and the closest probability of demanding child care at ages 0-2 (with replacement). We employ a linear probability model. The three columns in Table A2 show the estimated coefficients: we find a positive association between having a child care slot and mother's work when the child is age seven among mothers who were not working in the child's pre-school years (Column 1). We find no significant association for mothers who were previously working (Column 2).

Heterogeneous effects of formal child care on mothers' employment

	(1)	(2)	(3)
	Mother not employed when child aged 3	Mother employed when child aged 3	Whole sample
Formal child care (FCC)	0.253***	-0.032	0.278***
	(0.057)	(0.035)	(0.048)
FCC*Mother employed$_{child3}$			-0.334***
			(0.067)
Mother employed$_{child3}$			0.475***
			(0.049)
Male	0.070	-0.013	-0.005
	(0.059)	(0.037)	(0.035)
Age	0.034	0.095*	0.088*
	(0.078)	(0.049)	(0.045)
Siblings	-0.279***	-0.076**	-0.128***
	(0.076)	(0.038)	(0.040)
Tertiary education, mother	0.062	0.089**	0.061
	(0.070)	(0.044)	(0.042)
Tertiary education, father	-0.116*	0.073	-0.024
	(0.068)	(0.049)	(0.044)
IQ score	0.380***	-0.121**	0.031
	(0.119)	(0.060)	(0.062)
Single-headed family household	0.207	0.043	0.154**
	(0.130)	(0.064)	(0.066)
House owner	0.161**	0.003	0.072*
	(0.069)	(0.037)	(0.037)
Migrant	-0.136*	-0.027	-0.173***
	(0.075)	(0.049)	(0.044)
Observations	243	257	500
R^2	0.333	0.264	0.349

Dependent variable: Mother's employment when the child is age seven. Robust standard errors are reported in parenthesis. *** indicates significance at 1% level, **indicates significance at 5% level, * indicates significance at 10% level.

A5. Formal child care and children's outcomes

Our goal is investigate the potential heterogeneous effects of formal child care on children's outcomes. We use the same data and the same methodology as in the Appendix 4. Our dependent variables are related to the child's attitudes toward reading and to his/her behaviour with friends. The first is the answer "yes/no" to the question "Do you like reading?" The second is the score (from zero to 10, whereby 10 indicates the highest pro-social behaviour) assigned to answers to five questions asked of the mother. The questions are designed to assess whether the child is considerate of others' feelings; shares readily with others; is helpful if someone is hurt, upset, or ill; is kind to younger children; and often volunteers to help others. We employ a linear probability regression for the outcome related to reading and a linear regression for the pro-social behaviour outcome. We are interested in the effect of early child care attendance and in testing whether the effect is different for children living in a couple- or a single-headed household, with or without parental unemployment parent, and with or without siblings. We observe (Table A3) a positive effect of early child care on the reading attitudes of children from disadvantaged backgrounds (i.e., children who live in a single-parent family, in a large family, or in a family in which the parents are unemployed). We also observe (Table A4) a positive effect on pro-social behaviour for all sub-groups of children, and particularly for children who live in a single-headed household or who have no siblings.

Heterogeneous effects of formal child care on children's outcomes: Like reading

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Both parents	One parent	No parental unemployment	Parental unemployment	Only children	With sibling	Whole sample
Formal child care (FCC)	0.113**	0.317	0.086	0.246***	0.106	0.152***	0.059
	(0.047)	(0.206)	(0.059)	(0.078)	(0.108)	(0.053)	(0.098)
FCC*Single-headed fam. hh.							0.229
							(0.189)
FCC*One parent unemployed							0.091
							(0.105)
FCC*Siblings							0.034
							(0.109)
Single-headed family household			-0.262	-0.157	0.228	-0.214*	-0.271*
			(0.284)	(0.114)	(0.188)	(0.112)	(0.160)
One parent unemployed	-0.069	0.185			-0.327**	-0.020	-0.097
	(0.055)	(0.633)			(0.156)	(0.059)	(0.074)
Male	-0.138***	-0.043	-0.154***	-0.012	-0.043	-0.127**	-0.126***
	(0.049)	(0.167)	(0.059)	(0.076)	(0.112)	(0.052)	(0.047)
Age	-0.137**	-0.056	-0.210***	-0.001	-0.202*	-0.098	-0.131**
	(0.063)	(0.217)	(0.078)	(0.101)	(0.114)	(0.073)	(0.060)
Siblings	-0.001	-0.433**	-0.067	0.075			-0.059
	(0.058)	(0.172)	(0.064)	(0.106)			(0.084)
Tertiary education, mother	-0.077	0.027	0.013	-0.219**	-0.208	-0.024	-0.067
	(0.061)	(0.171)	(0.069)	(0.097)	(0.132)	(0.063)	(0.057)
Tertiary education, father	0.026	0.060	-0.014	0.152	0.203	0.001	0.039
	(0.060)	(0.560)	(0.071)	(0.104)	(0.140)	(0.064)	(0.058)
IQ score	0.086	0.395	-0.003	0.283*	0.077	0.109	0.097
	(0.084)	(0.412)	(0.100)	(0.153)	(0.207)	(0.092)	(0.082)
House owner	0.036	-0.152	0.033	0.020	0.021	0.035	0.040
	(0.052)	(0.226)	(0.064)	(0.083)	(0.104)	(0.058)	(0.050)
Migrant	-0.113*	0.174	0.045	-0.158*	0.036	-0.100	-0.086
	(0.063)	(0.190)	(0.089)	(0.087)	(0.175)	(0.065)	(0.060)
Observations	449	43	308	184	114	378	492
R^2	0.113	0.335	0.109	0.165	0.155	0.117	0.115

Dependent variable: Like reading. Robust standard errors are reported in parenthesis. *** indicates significance at 1% level, **indicates significance at 5% level, * indicates significance at 10% level.

Heterogeneous effects of formal child care on children outcomes: Pro-social behaviour

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Both parents	One parent	No parental unemployment	Parental unemployment	Only children	With sibling	Whole sample
Formal child care (FCC)	0.670***	1.813*	0.700***	0.705***	1.169***	0.592***	1.147***
	(0.158)	(0.910)	(0.197)	(0.263)	(0.297)	(0.186)	(0.327)
FCC*Single-headed fam. hh.							1.080*
							(0.639)
FCC*One parent unemployed							-0.336
							(0.353)
FCC*Siblings							-0.473
							(0.360)
Single-headed family household			-0.602	-0.067	0.010	-0.544	-1.157**
			(0.947)	(0.378)	(0.509)	(0.397)	(0.537)
One parent unemployed	0.308*	-2.230			-0.131	0.283	0.460*
	(0.183)	(2.798)			(0.431)	(0.210)	(0.246)
Male	-0.744***	-0.675	-0.552***	-0.896***	-0.306	-0.870***	-0.761***
	(0.159)	(0.740)	(0.196)	(0.248)	(0.307)	(0.182)	(0.156)
Age	-0.923***	-0.901	-1.404***	0.100	-0.919***	-0.769***	-0.880***
	(0.207)	(0.959)	(0.259)	(0.331)	(0.325)	(0.256)	(0.201)
Siblings	0.099	-0.207	-0.040	0.227			0.294
	(0.189)	(0.758)	(0.215)	(0.342)			(0.270)
Tertiary education, mother	0.168	-0.230	0.137	-0.005	0.606	-0.095	0.052
	(0.200)	(0.758)	(0.232)	(0.322)	(0.369)	(0.223)	(0.190)
Tertiary education, father	-0.167	2.985	0.181	-0.748**	0.005	-0.096	-0.073
	(0.198)	(2.476)	(0.238)	(0.347)	(0.401)	(0.225)	(0.195)
IQ score	0.366	-0.601	0.189	0.016	-0.634	0.640**	0.318
	(0.278)	(1.822)	(0.330)	(0.515)	(0.586)	(0.322)	(0.277)
House owner	0.337**	0.627	0.444**	0.007	0.462	0.291	0.328*
	(0.171)	(1.001)	(0.211)	(0.280)	(0.299)	(0.202)	(0.168)
Migrant	0.199	0.436	0.635**	-0.125	0.338	0.229	0.137
	(0.206)	(0.840)	(0.297)	(0.284)	(0.453)	(0.228)	(0.200)
Observations	455	43	310	188	118	380	498
R^2	0.205	0.238	0.268	0.203	0.321	0.185	0.202

Dependent variable: Pro-social behaviour. Robust standard errors are reported in parenthesis. *** indicates significance at 1% level, **indicates significance at 5% level, * indicates significance at 10% level.