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

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Abstract

Our study analyses the costs and benefits of early child care for mothers' labour supply and child development in Italy, exploring the role of the selection criteria used by local governments to assign 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 for children, for their mothers, and also for municipalities, using a sample of households with children under three years of age (EU-SILC), and the selection criteria used by six representative Italian municipalities. Our results have some potentially interesting policy implications. The benefits in terms of child outcomes and mothers' labour supply are stronger in contexts where selection criteria give priority to more disadvantaged households. However, in these contexts the selected households contribute less to the costs of child care, which reduces the municipalities' monetary revenues.

Key words: Child care, mothers' employment, child development.

JEL Classification J13 I2 H75

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1 Introduction

In the last few years, greater attention has been devoted to the role of public child care for children under age three, and its potential impact on mothers' labour supply 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 which has been less explored: the selection criteria used by local governments to assign 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 is more valuable.¹

While the selection criteria appear to be similar from one municipality to another, the weight each municipality gives to each family characteristic varies. Thus, different types of households have access to child care services in different municipalities. The main selection criteria are family composition (whether the household is led by a single parent, and the number of siblings), the parents' working status (whether they are employed or unemployed), and whether the family is disadvantaged (whether they suffer from health problems or social exclusion). The selection criteria adopted by the municipalities and the different types of families selected have a range of 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, the use of these criteria can lead to a reduction in monetary revenues for the municipality, as households vary in their ability to pay fees.

¹ We will refer to the selection process operated through eligibility criteria by each municipality as *rationing*.

The aim of our paper is to explore the costs and benefits of introducing different selection criteria, both for the municipalities and for the families, 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 briefly summarise the literature which analysed the impact of early child care on child development and maternal labour market participation. Section 3 introduces the main characteristics of the Italian child care system. In Section 4, we present the theoretical framework which helps us interpret our empirical work. In Section 5 we describe the data used and the simulation methods. We simulate how six large Italian municipalities using different selection criteria assign their available slots, leading to different groups of children having access to care, and thus to different levels of benefits for individual households, as well as to different levels of cost for the municipalities. We summarise our conclusions in Section 6.

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 the US and the UK, the focus is on the cost of the services; while in countries where the provision is mostly public, like 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 mothers' labour supply.² 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 "rationing" is more severe, 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

² See Pronzato and Sorrenti (2015) for a survey of recent studies on the relationship between child care and maternal employment.

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 analysis of the impact of child care attendance on child outcomes. 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 and two in West Germany, and found that children with less educated mothers and children of immigrants benefited disproportionately 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 socioeconomic status, and of native-born and immigrant parents.

Felfe et al. (2012) evaluated the long-run effects of a policy (implemented in the late 1990s) which introduced universal child care for three-year-old children in Spain. Their investigation of the later cognitive outcomes of the children who attended child care showed that, compared to previous cohorts, these children had a sizable increase in reading and math test scores, and a sizable decrease in the likelihood of falling behind a grade. The results were stronger for children from disadvantaged households. Havnes and Mogstad (2011, 2014) 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 human capital investment from their parents than their more advantaged peers.

Recent research focusing on Italy investigated in greater detail the specific characteristics of the child care market and the heterogeneity of local municipalities' decisions. Using INVALSI data, Brilli et al. (2015) 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, when analysing heterogeneous effects, they found 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 to assign slots to children. We consider the impact of selection criteria on mothers' labour supply 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 lower.

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 resource allocation 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 of 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 been established for a longer period of time 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, the government announced that another important objective of public child care is to support child development, especially among children from low-income households. This objective has been implemented through the introduction of quality

standards, especially in areas with greater experience in child care provision (such as Emilia Romagna and Tuscany).³

Over the years, there has been some evidence that different “models” of child care objectives appear when municipalities adopt different selection criteria. On the supply side, the municipalities’ decisions concerning the number of child care slots they will offer depend on their preferences (on 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 classified into two main categories. The first category is related to the parents’ employment status: for example, whether one or both parents work, and 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 tool to help families reconcile work and parenthood during the childbearing years, and as a social service aimed at supporting early education and promoting 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 ages 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).

³ 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”.

4 The theoretical framework

In order to contextualise our analysis and help with the interpretation of our simulations and results, we present the following simple framework in which the preferences and the constraints of local municipalities are given.

Following Brilli et al. (2015), we assume that the municipalities' decisions regarding the supply of child care slots are based on the budget constraints and the preferences of each local government. We assume that the two main 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 objective of the municipality is given by

$$U(L,E)$$

where L is the participation of mothers (of young children) and E is an indicator of the educational outcomes of the children in the local area. The social planner seeks to maximise her objective by manipulating (final) demand, which is accomplished by using the policy variables at disposal.

We assume that N , the number of available slots, is given, while the policy variables at our disposal are as follows: P_{SES} , the price charged for a slot depending on the socio-economic conditions of the family; and R , the criteria used to assign slots to potential demanders in the case of excess demand at the price P_{SES} . Given the population of potential demanders (mothers with young children), there is a set of households who would gain access to public child care under (R, P_{SES}) . In this set of households, we assume that the number of working mothers is given by $L^*(R, P_{SES})$, and that the educational outcome of children is given by $E^*(R, P_{SES})$. Hence, the social planner solves the following maximisation problem:

$$\max_{[R,P]} U[L^*(R, P_{SES}), E^*(R, P_{SES})]$$

We now consider the constraints on the social planner's choices. A social planner may use rationing as a means of maximising her objective function. 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 acquiring a slot. If the social planner wants to increase the educational outcomes of children in this

population, she will make household 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. The monetary constraint the social planner faces is given by

$$C * N = S + \sum_{n=1}^N P_{SES}$$

C is the cost of each child care slot sustained by the municipality; S are the fixed subsidies that the central government has allocated to the local government; and P_{SES} , the price per slot sustained by the family.

We assume that for any N , potential demand is such that there exists a $P(N)$ allowing demand to exactly equal supply (N) at that price. At any P less than $P^*(N)$, there will be excess demand and the rationing rules become operative, under which potential demanders whose characteristics and choices the social planner values are selected. By lowering the price and creating excess demand, the social planner can choose the individuals who acquire the slots, instead of having the “market” do so 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 contribution to the cost of child care provision.

5 Empirical analysis

In this section, we explain all of the empirical analyses and present the related results. In the first part of the empirical work, we use a sample of families with children under age three who are representative for Italy. We pretend that all of the families applied for a slot in public child care, and that they did so in six different municipalities with varying selection criteria. As we can see in sub-section 5.1, assuming a 50% acceptance rate, some families would get a child care slot in all of the municipalities (families with members who have serious health issues); whereas some families would get a child care slot only in municipalities in which working gives them a higher score (families in which both parents work), but not in municipalities in which being unemployed gives them a higher score. As is clearly shown in subsection 5.1, living in one municipality rather in another makes a difference in the chances that an average Italian family will have

access to the public child care system.⁴ In addition, the criteria used can make a difference for municipalities: since in Italy child care fees are based on household income, municipalities that give priority to disadvantaged households face higher costs, as they have lower revenues (sub-section 5.2). However, the literature suggests that disadvantaged families benefit more than higher income families when their children attend child care. There is a trade-off: municipalities could decide to give priority to disadvantaged families to maximise the benefits to children, but because they would then have lower revenues, the services could become more difficult to fund, especially in times of economic crisis.

In this paper, we 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 sub-section 5.3, we calculate the benefits municipalities accrue by assigning child care slots to some families rather than to others. In our exercise, the benefits of child care attendance for child development are allowed to vary between children who live with only one parent, children who have only one working parent, and children with siblings. Meanwhile the benefits of child care attendance for mothers’ labour market participation are allowed to vary between mothers who are more or less attached to the labour market. Each municipality gets a different level of benefits depending on whether they select families with more/fewer single parents, more/fewer working parents, more/fewer only children, and more/less labour-attached mothers. In sub-section 5.4, 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 5.5 we show how this simulation framework can be used by policy-makers to determine which selection criteria can help them reach their goals, given their financial constraints.

For our empirical analysis, we use data from the Italian part (IT-SILC) of the European Survey on Living and Income Conditions (EU-SILC) for the year 2010. The EU-SILC is a European harmonised survey released by Eurostat which 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 level of deprivation, and their

⁴ Whether a municipality is more child-oriented or more work-oriented could be theoretically captured by looking at the number of points assigned for each characteristic, which is shown on the municipalities’ websites. However, a comparison across municipalities would be difficult without simulations, as the municipalities use different metrics and different methods to compile the list: some simply add up the points; while others order by the most “important” characteristic, and then, *ceteris paribus*, by the second-most “important” characteristic.

household conditions. At the individual level, we have detailed information about each person’s employment, income, education, and access to child care.

We have selected 1,210 households with at least one child under age three (see Section 5.1). We have information about each family’s composition, health, working status, degree of social exclusion, and income. We use this information to simulate how many points each family would get in six Italian municipalities—Turin, Milan, Bologna, Reggio Emilia, Rome, and Naples—which use different selection criteria to assign public child care slots. For each municipality, 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. We are interested in describing how the six populations differ from each other (Section 5.1) based on how much they can be expected to pay for child care services (Section 5.2), and what benefits they can be expected to receive from child care attendance in terms of child development and maternal employment (Section 5.3). In Section 5.4 we analyse the extent to which the results are sensitive to different acceptance rates: we measure the financial contributions and the benefits associated with a lower acceptance rate (25%) and with a higher acceptance rate (75%). Finally, in Section 5.5 we show how this simulation framework can be used by policy-makers to determine which selection criteria can help them achieve their aims, given their financial constraints.

5.1 Selection criteria and users’ characteristics

Table 1 displays the average characteristics of the sample, while details on how the variables are constructed from the original information are reported in Appendix 1.

Table 1: EU-SILC sample

Variable	
Single-head 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

Our findings indicate that 52% of mothers and 82% of fathers were employed, (with average weekly hours of between 34 and 43), and that both parents were working in less than half (45%) of the families. The average number of siblings under age 18 was 0.7, and 12% of children were living in a single-parent household. In almost 2% of the households at least one family member had serious health limitations; while in almost 4% of the households the family had been in arrears on utility bills in the last 12 months, had been unable to keep the house adequately heated, or had faced structural problems. From this point onwards, we will refer to these families as “households at risk of social exclusion”. The variables used to calculate the fee families pay for public child care are described in the next section (Section 5.2).

With these initial data, we replicate what each municipality does: we calculate the family’s score according to the selection criteria, rank the families, and assign a child care slot to 50% of the children.⁵ Because the criteria differ across the six municipalities, we will be able to distinguish six different groups of households eligible for a child care slot. Our aim is to evaluate how the different groups contribute financially to the costs of child care, and how much they benefit from attendance. Table 2 describes the characteristics of the families which may be taken into account in the selection criteria, including the parents’ employment status, the family’s circumstances, and the family’s health and social disadvantages. Figure 1 graphically represents some of the more relevant cross-municipality heterogeneity.

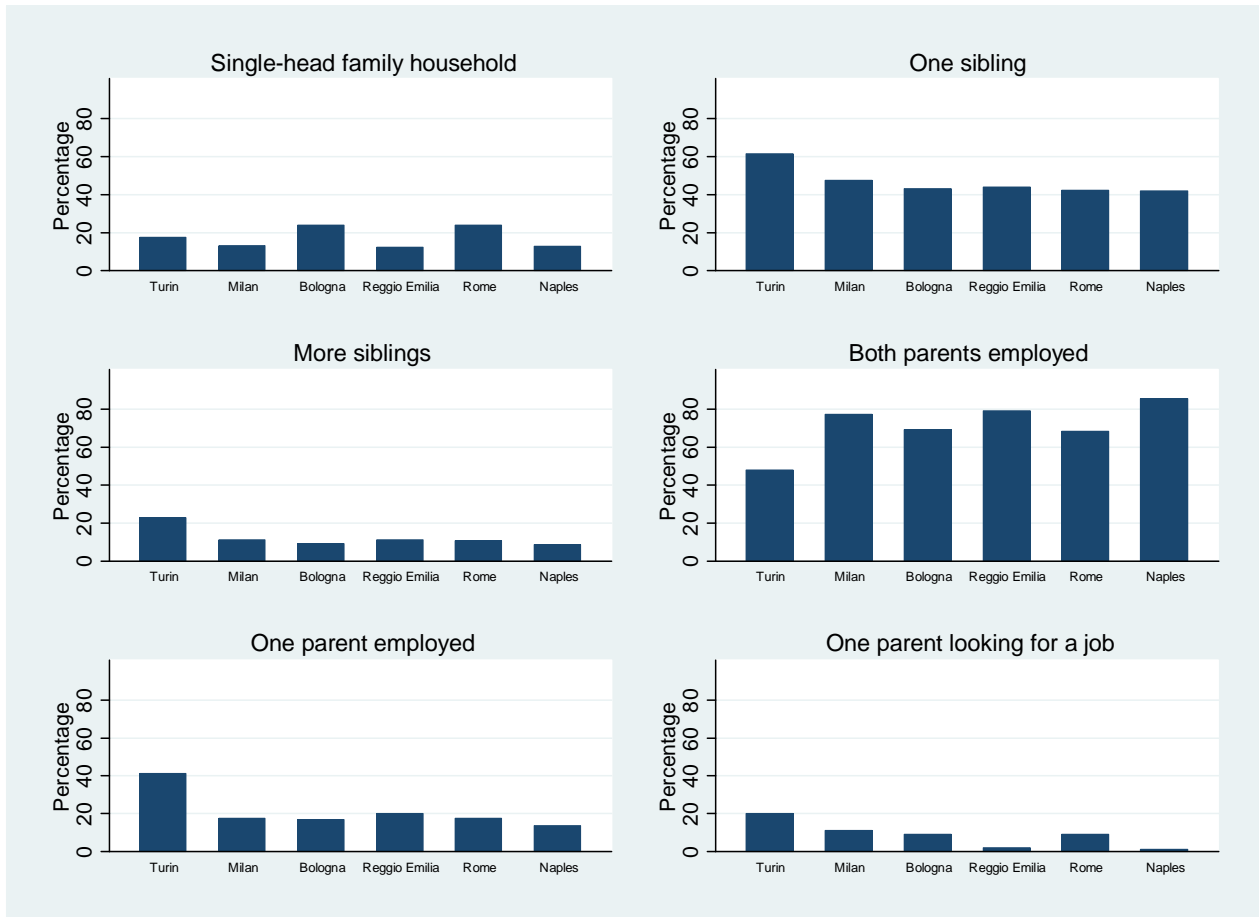
⁵ We obviously use the selection criteria of the six cities of our interest.

Table 2: Users according to different selection criteria

Acceptance rate 50%	Turin	Milan	Bologna	Reggio Emilia	Rome	Naples
Single-head 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 actively 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					

All of the municipalities, except Turin, tend to give high scores to families in which both parents work: 70% of these families are assigned a slot in Bologna and Rome, and 80%-85% in Milan, Reggio Emilia, and Naples. Turin selects only 45% of these families, while giving a higher relative weight to families headed by a single parent, and to families in which one parent is looking for a job. Turin also gives higher scores to larger families: the percentage of families selected in which the child attending care has at least one sibling is 60% (compared with 40% in the other municipalities), and the percentage of families in which the child attending care has more than one sibling is around 20% (compared to 10% in the other municipalities). The percentage of families selected who are headed by a single parent is particularly high in Bologna and Rome (over 20%). However, no difference is observed across the municipalities in term of the percentage of families selected with members have serious health limitations (the most important criterion in all municipalities). Finally, Turin, Bologna, and Rome seem to select more families at risk of social exclusion (around 7%) than Milan, Reggio Emilia, and Naples (around 3%).

Figure 1 Household characteristics in different municipalities



Notes: characteristics of the users simulated in different municipalities.

From a general view, we could state that municipalities such as Turin, Bologna, and Rome give a higher weight to more disadvantaged families than cities such as Milan, Reggio Emilia, and Naples: in Table 2, we can also observe 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%).

The simulated selection process assumes that all of the families in the sample applied for child care services, and that 50% gained access to the public system. To test whether this assumption is realistic, we validate our model by comparing our initial sample and our simulations with data provided by the municipality of Turin. We have information about all of the families who applied for public child care, and 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 true applicants in the

municipality of Turin), and the potential/true users of the service (the potential users based on EU-SILC data with Turin’s selection criteria, and the true users in the municipality of Turin).

Table 3: Validation of the model (comparison with the municipality of Turin)

<i>Whole population</i>	EU-SILC	Turin
One head family household (%)	12.1	12.2
Siblings (0-18)	0.7	0.6
Both parents employed (%)	45.0	53.6
One parent employed (%)	44.1	37.3
At least one parent employed (%)	89.2	90.9
At least one parent unemployed (%)	5.0	1.9
At least one parent actively looking for a job (%)	17.9	20.0
At least one parent student (%)	1.4	1.7
At least one parent with health lim. (%)	1.7	2.3
Social exclusion (%)	3.5	5.4
Observations	1,210	4,564
<i>Users</i>	EU-SILC	Turin
One head family household (%)	14.9	14.9
Average number of siblings (0-18)	1.1	0.8
Both parents employed (%)	51.3	58.3
One parent employed (%)	39.7	33.1
At least one parent employed (%)	91.0	91.4
At least one parent unemployed (%)	8.4	2.6
At least one parent actively looking for a job (%)	20.6	19.7
At least one parent student (%)	0.5	0.9
At least one parent with health lim. (%)	3.7	4.0
Social exclusion (%)	7.4	8.4
Monthly fee (€)	251	259
Observations	567	2,156

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

The top panel of the table shows that the two populations appear to be very similar: all of the characteristics are very close, 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 it is crucial for them to reconcile family and work duties. The comparison between the potential and the true users is reported in the bottom part of Table 3. In line with the real data provided by

the municipality of Turin, the acceptance rate in our simulations is fixed at 47%.⁶ In this case as well the two samples are very similar. As expected, there were more working parents in the Turin sample than in the EU-SILC data. There were also more siblings in Turin, which could be due to a different distribution of children in Turin than in the rest of the country.

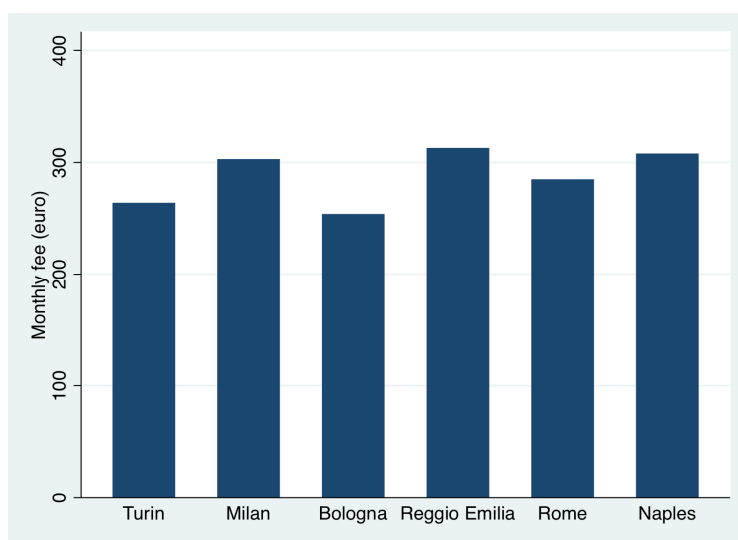
5.2 Selection criteria and financial contribution to the service

In all of the municipalities, families pay a fee according to their 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 2 for details), the measure seems to be quite reliable, at least for our purposes. Indeed, at the bottom of Table 3, in which we compare the population of Turin and our sample using Turin selection criteria, we observe that the average predicted fee is 251 euros, while the true average fee paid by Turin users is 259 euros.

In order to predict how much the users selected in different municipalities would contribute, we impute the fee according to their ISEE. We have chosen to apply the fee scheme adopted by Turin, but the results are robust when we apply other municipalities' schemes. We assume that, given these prices, the families in our sample would be willing to pay for a slot in public child care, and would therefore apply for one.

Figure 2 shows the average fee per child by selecting children according to different selection criteria.

Figure 2: Selection criteria and financial contribution to the service



Notes: simulated monthly fee (in euros) per child care slot.

⁶ According to the data provided by the Municipality of Turin, the number of real applications in Turin for the academic year 2010/2011 was 4,564, while the number of children accepted was 2,156.

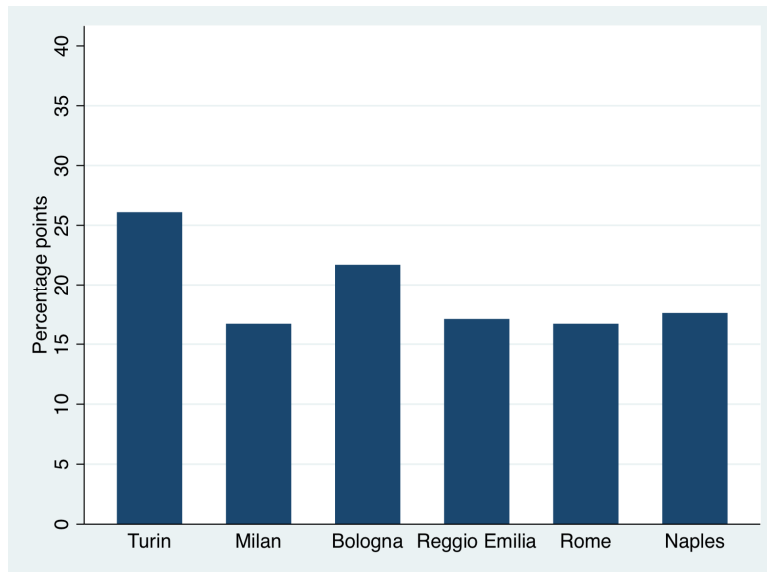
We observe that the households with a child attending child care in pay an average of 260 euros per month in Turin and Bologna, around 300 euros in Rome, and more than 300 euros per month in the three remaining municipalities. On average, the monthly cost of public child care for a family with one child attending is 300 euros⁷.

The different selection criteria affect the financial contribution paid by the households, which may have large implications for the economic sustainability of the services.

5.3 Selection criteria, maternal employment, and child development.

We now turn to the simulation of the benefits families receive by being assigned a slot in public child care, in terms of both maternal employment and child development. In order to simulate the effects of child care on maternal employment, we use estimated effects from a study conducted in the Italian part of the European Survey on Income and Living Conditions (see Appendix 3). The impact of the availability of child care on maternal employment is positive and significant.

Figure 3A: Selection criteria and gain in maternal employment



A one percentage point increase in child care availability increased the mother's probability of working 0.58 percentage points. The effect is stronger among mothers who are less attached to the labour market (1.29

⁷ The *Cittadinanza Attiva* observatory of prices and tariffs (2009) considers a hypothetical family to be composed of three people (parents plus one child ages 0-3) with an annual gross income of 44,200 euros, corresponding to an equivalent financial situation index of 19,90 euros; for more information: www.cittadinanzattiva.it.

percentage points) than among those who are more attached⁸. The comparison across the municipalities (Figure 3A) shows that the impact is greater in Turin and Bologna: the increase in maternal employment would be higher than 20% in those two cities, but only around 15% in the other cities.

We now consider the benefits of child care attendance in the different municipalities in terms of child development. We consider one cognitive and one non-cognitive child outcome: difficulties in school and having good friends. We use estimated coefficients from a study carried out with data from *La famiglia e l'Infanzia nel Nord Italia*, a recent survey which investigated the effects of child care on several outcomes (see Biroli et al., 2015). We simulate two outcomes: whether the child had difficulties upon entering primary school, and whether the child has at least one friend. Having attended child care decreases the probability that the child experienced difficulties at the beginning of primary school (as reported by the parents) by 5.3 percentage points, and increases the probability of the child having at least one good friend (as reported by the child) by 3.7 percentage points. The benefits are, however, heterogeneous: the effect on having difficulties at school is stronger among children with a non-employed mother (-7.1 percentage points), children living in single-parent households (-12.6 percentage points), and children with many siblings (-8.5 percentage points); while the effect on friendships is stronger for only children (+ 5.6 percentage points). The estimated effects are in line with results from other studies, and confirm our assumption that early formal care is more important for more disadvantaged families.⁹ Figure 3B shows that the effect of child care attendance on the percentage of children who had difficulties in school was greatest in Turin, followed by in Bologna. This is due to the fact that these two cities select more large families, and fewer working families.

⁸ A mother is considered attached to the labour market if she is working in the trimester before the birth of the child.

⁹ Felfe and Lalive (2014) found that attending early child care increased a child's probability of having friends by 11.7 percentage points. Brillì et al. (2015) found that a one percentage point increase in childcare availability raises the maternal employment rate by 1.3 percentage points.

Figure 3B: Selection criteria and gains in child development (Difficulties in school)

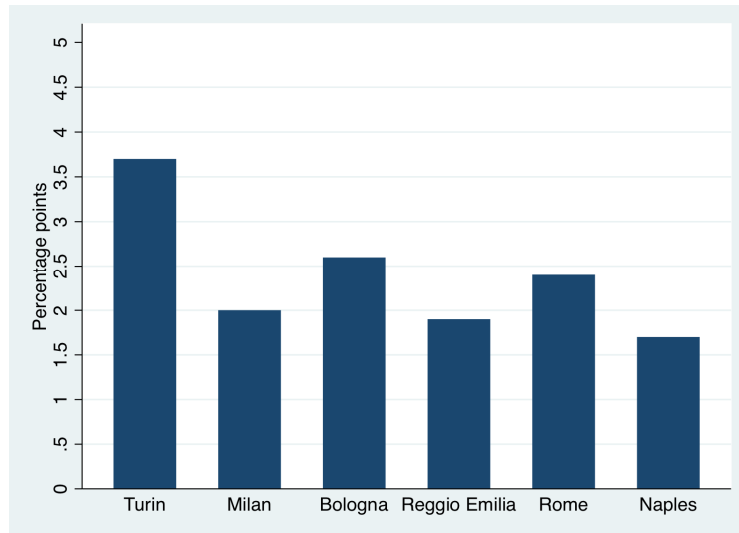
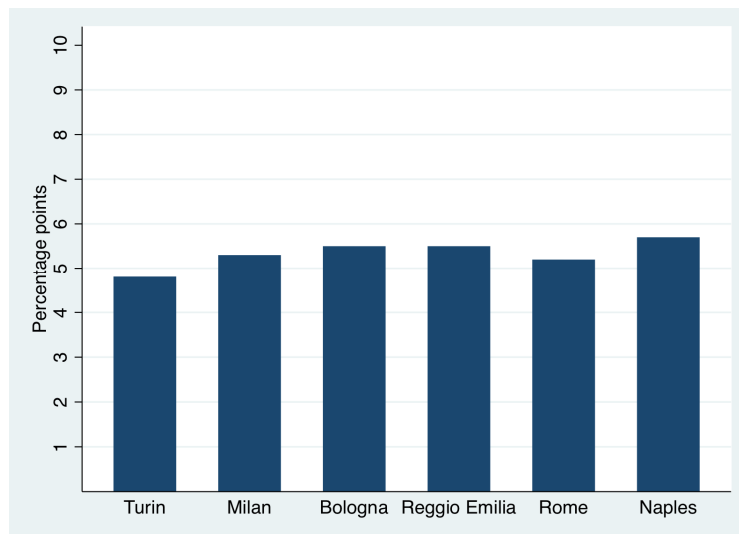


Figure 3C: Selection Criteria and gains in child development (Having a best friend)



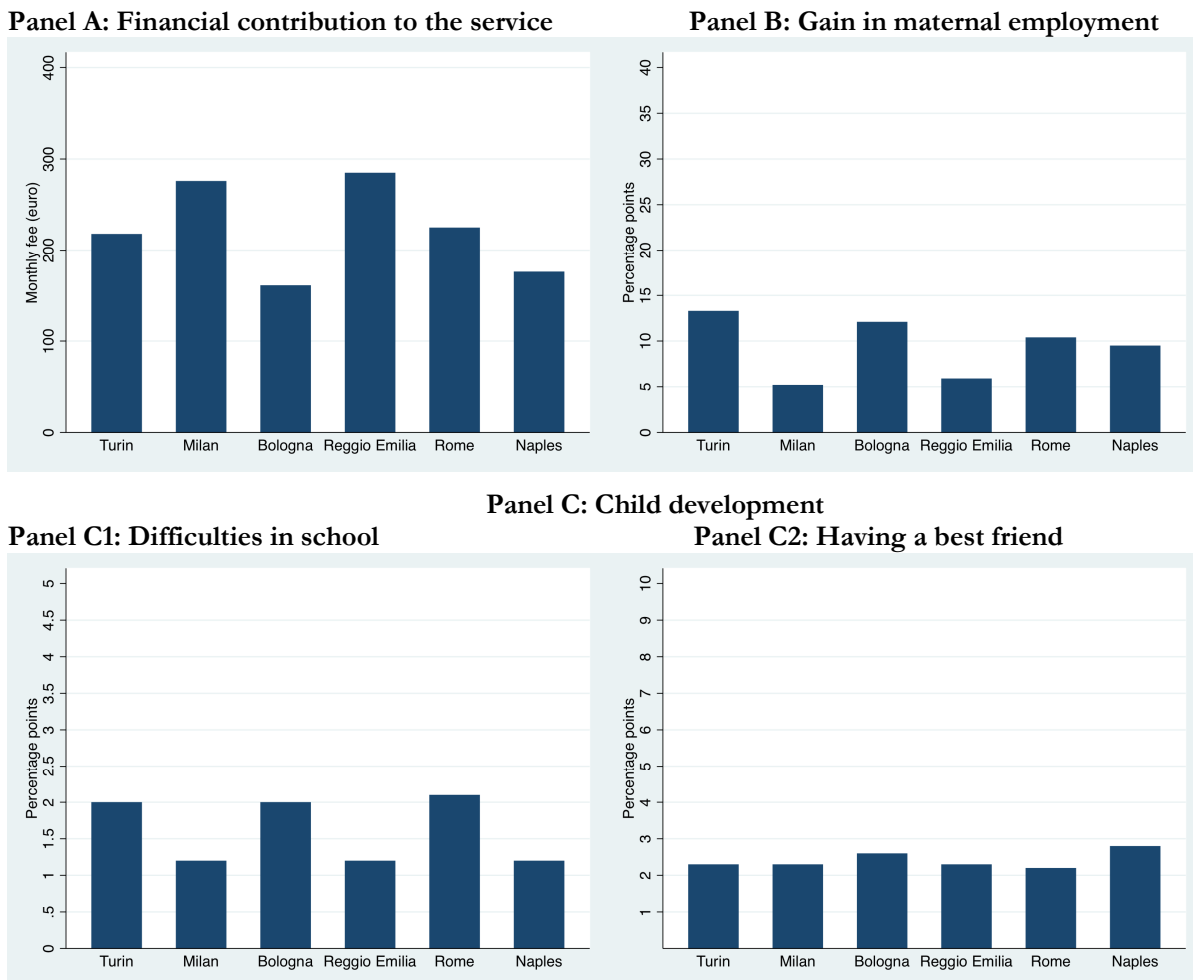
The heterogeneity of the effects implies that the selection criteria leads to different results. Figure 3C shows that the differences across municipalities are less strong here. The proportion of children with a best friend is smaller in Turin, where more families with more siblings are selected; but it is higher in Naples, where more only children are selected.

5.4 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 also know that many families would like a slot in public child care, 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.

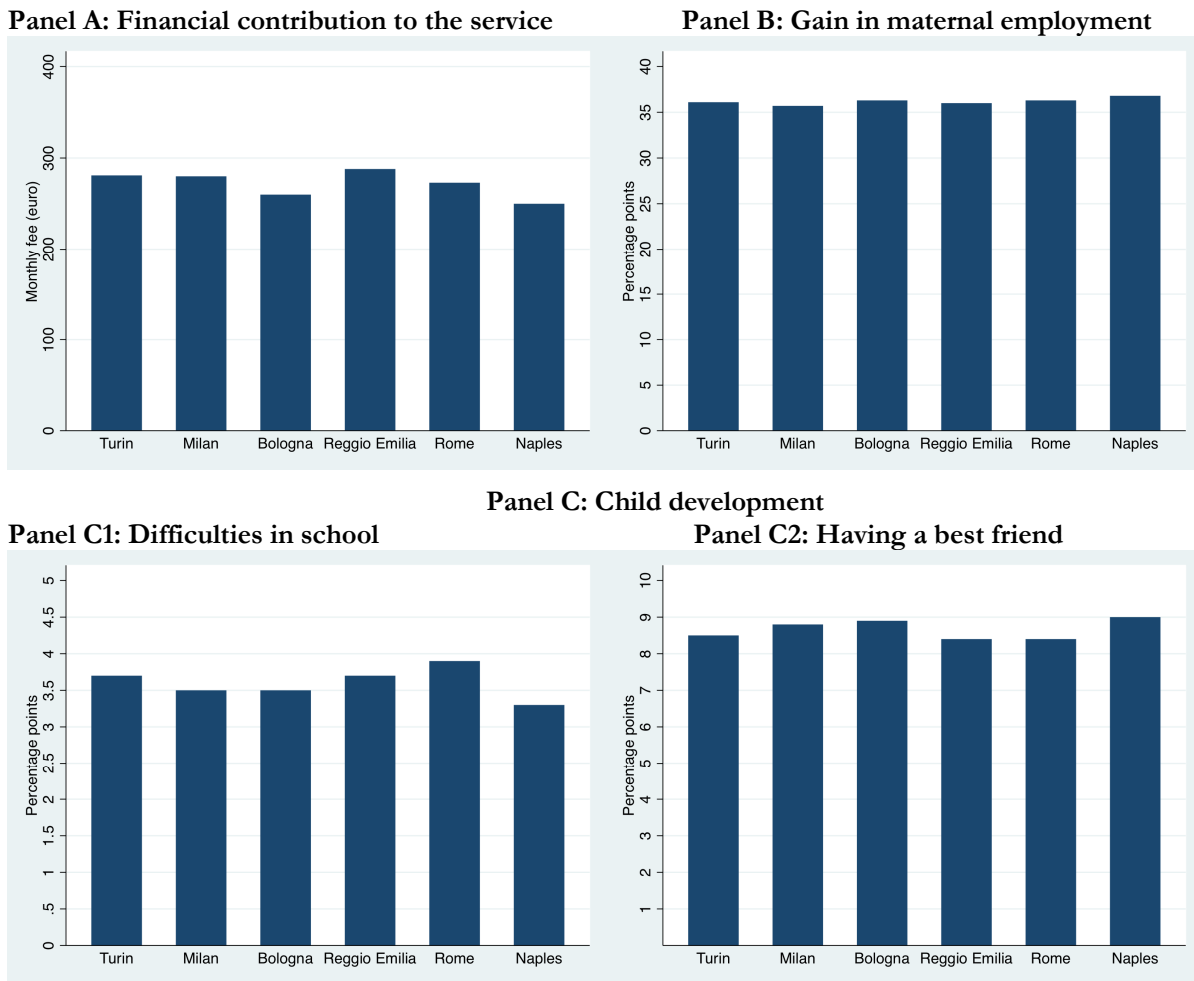
We propose other two scenarios: the first with an acceptance rate of 25% (more realistic), and the second with an acceptance rate of 75% (less realistic). Figures 4 and 5 summarise the results.

Figure 4: The effect of selection criteria with a 25% acceptance rate



With an acceptance rate of 25% (Figure 4) the overall benefits to society are obviously smaller: child development levels are lower and fewer mothers participate in the labour market. Differences across municipalities are more polarised: Bologna and Turin in particular receive much greater benefits than the other municipalities. With an acceptance rates of 75% (Figure 5), the overall benefits to society increase, and differences across municipalities almost disappear.

Figure 5: The effect of selection criteria with a 75% acceptance rate



5.5 A simple simulation exercise

We now discuss how this simulation model may be used by policy-makers. As we explained in the theoretical framework, each municipality faces certain budget constraints, and may prefer to emphasise some aspects of child development rather than others, or to support parents' employment. We now provide some examples. Obviously, any policy-maker could use estimated benefits from outcomes other

than difficulties at school, friends, and maternal employment; based on suggestions from the vast literature on this subject.

Suppose, for example, a municipality needs funding of at least 220 euros per child per month to maintain its child care services, and its priority is support mothers' labour market participation. What selection criteria should this municipality adopt? Through simulations, we can determine which criteria are associated with maximum levels of maternal employment. By assigning one point for maternal unemployment, one point for a one-parent household, and three points for having siblings, the municipality would have a 4.0 percentage point decrease in the number of children with difficulties at school, and a maternal employment rate of 72.1%.

If the municipality instead has a preference for promoting early childhood education, the objective may be to maximise the number of children without difficulties at school. By assigning one point for maternal unemployment, three points for a one-parent household, and two points for having siblings, the municipality would have a 4.1 percentage point decrease in the number of children with difficulties at school, and a maternal employment rate of 69.5%.

What if the municipality needs to collect an average of 250 euros per child per month? By assigning two points for maternal unemployment, one point for a one-parent household, and two points for having siblings, the municipality would have a 2.3 percentage point decrease in the number of children with difficulties at school, and a maternal employment rate of 58.9%.

6 Conclusions

Our study explored the costs and benefits of early child care for mothers' labour supply and child development in Italy by analysing the role of the selection criteria used by local governments to assign child care slots. We exploited the variability across different municipalities and simulated the effects of introducing different selection criteria for costs and benefits for children, mothers, and municipalities; using a sample of households with children under age three (EU-SILC).

Our results have potentially interesting policy implications. The benefits in terms of child outcomes and mothers' labour supply are, as expected, 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

cost of child care, which reduces the municipalities' monetary revenues. There is a trade-off between the benefits to the households and the costs borne by the municipalities. Municipalities which selected more disadvantaged households and provide more benefits had lower revenues.

The most evident limitation of this study is that we were 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 assumptions. First, we assume that there are no peer effects between children in child care centres. If there is an effect, the greater benefits observed in the municipalities which give priority to disadvantaged children are positive 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 1: Variables description (EU-SILC)

Age children	From 1 to 3
Siblings	Number of siblings in the household
Household size	Number of members in the household
One head 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 last 12 months (1), otherwise (0)
House adequately warm	Household unable to keep the house adequately warm (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), tenant is paying rent at prevailing or market rate (2), at a reduced rate (3), accommodation provided 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 €

Appendix 2: ISEE calculations

We construct 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).¹⁰

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 by a weighted sum of two different indicators. The first indicator is the so-called ISR (*Indicatore della Situazione Reddittuale*), 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, assets, and capital owned by the family. Therefore, ISEE for household b is defined in the following way:

$$Isee_h = \frac{\sum_{j=1}^n (Y_j + P_j + rW_j^M - D_1) + 0.2 * \sum_{j=1}^n (W_j^I - D_2W_j^I) + 0.2 * \sum_{j=1}^n (W_j^M - D_3W_j^M)}{p(s, c)}$$

in which n is the size of household b . Y and P are income measures, while W^M are the aggregate financial assets owned by the family, and r is the interest rate.¹¹ 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.

¹⁰ A detailed explanation of the variables used to construct ISEE indicator is available upon request.

¹¹ The interest rate applied to financial assets is the state bond interest rate.

Appendix 3: Formal child care and mothers' labour supply

The analysis was conducted by Pronzato and Sorrenti (2015). Our goal is to investigate the heterogeneous effects of child care provision on women's labour supply. In particular, the objective is to understand whether the response of female labour supply to formal child care provision differs between working and non-working mothers. To assess whether this heterogeneity exists, we need a dataset with information about each mother's labour position before her child was born, and when the child was three years old. IT-SILC panel data from 2004 to 2010 allow us to create a unique dataset with a complete set of information on 921 mothers with a child between ages zero and three. The household members who participate in IT-SILC are interviewed for four consecutive years. This makes it possible to determine whether a woman was working in the trimester preceding the birth of her child, and when the child was three years old. Unfortunately, IT-SILC data do not contain individual information about child care utilisation; we therefore *proxy* this variable with the regional coverage rate when the child was one year old.

Using a logistic model, we estimate the probability that the mother would be employed when the child was three years old. The main variable of interest is the child care regional coverage when the child was one year old. We also control for mother's age and level of education, and for whether she has a partner and younger/older children in addition to the three-year-old child. In column (1) of Table A1 we show the estimated coefficients: living in a region with higher availability of child care makes mothers more likely to work. In columns (2) and (3), we split the sample into two sub-samples: previously working and non-working mothers. We find that the estimated effect of child care is significant for non-working mothers only. However, the t-ratio of the estimated coefficient of child care availability for working mothers is larger than one; while this is not statistically significant, it indicates a small positive effect. Finally, in column (4) we interact the regional availability with the employment situation of the mother before birth, which confirms the results in columns (2) and (3).

Table A1: Heterogeneous effects of formal child care on mothers' labour supply

	(1)	(2)	(3)	(4)
	Whole sample	Working before	Not working Before	Whole sample
Formal child care coverage	0.28** (0.11)	0.23 (0.19)	0.62*** (0.20)	0.64*** (0.21)
Working before (WB)				2.80*** (0.45)
Formal child care coverage*WB				-0.37 (0.25)
Age	0.16 (0.16)	0.27 (0.25)	0.01 (0.19)	0.10 (0.16)
Age squares	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Secondary schooling	0.61*** (0.12)	0.24 (0.25)	0.40*** (0.15)	0.39*** (0.13)
Tertiary schooling	1.37*** (0.21)	0.97*** (0.31)	1.04*** (0.26)	1.09*** (0.21)
In a couple	-0.23 (0.34)	-0.41 (0.83)	-0.26 (0.52)	-0.27 (0.47)
Older siblings	-0.23* (0.13)	-0.16 (0.19)	-0.10 (0.15)	-0.12 (0.13)
Younger siblings	-0.43 (0.27)	-0.88*** (0.27)	-0.18 (0.30)	-0.34 (0.28)
Constant	-3.83 (2.54)	-3.67 (4.38)	-2.54 (2.88)	-4.04* (2.35)
Observations	921	374	547	921

Dependent variable: Mother's employed. Logit Regression Model. Robust. Clustered at the regional level, standard errors in parenthesis. Col. (1) estimates refer to the whole sample. Col. (2) estimates refer to the sample of mothers working before childbirth. Col. (3) estimates refer to the sample of mothers not working before childbirth. Col. (4) estimates refer to the whole sample. Models (1) to (4) contain regional and time dummies.

*** indicates significance at 1% level, ** indicates significance at 5% level, * indicates significance at 10% level.

Appendix 4: Formal child care and children's outcomes

Our goal is investigate the potential heterogeneous effects of formal child care on children outcomes. 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 2012-2013, and involves five different age cohorts who have been interviewed in three different Italian cities. We use two different pieces of information collected when the child was seven years old: having difficulties at the beginning of primary school (as reported by the parents), and having a best friend (as reported by the children). As in our analysis of female labour supply, the aim of this analysis is to gain a better understanding of the magnitude of the potential heterogeneous effects related to child care utilisation

We employ two logistic regressions. The main variable of interest is whether the child has attended formal child care while under age three. We include as control variables maternal employment, living in a single-parent household, and the presence of siblings in the household. Table A2 reports the results concerning the variable “having difficulties at school”, while Table A3 reports results concerning the variable “having a best friend”. In column (1) we estimate the model on the whole sample, in columns (2)-(7) we estimate the model for different subsamples, and in model (8) we estimate the model with interactions.

Formal child care plays a significant and negative role in explaining the individual probability of experiencing any kind of difficulty at school. This means that children who used to attend formal child care are less likely to experience difficulties while in elementary school. This effect is stronger for children from households with only one parent, and in which the mother is unemployed. The benefits appear to be greater for children with siblings.

Formal child care utilisation also seems constitute an important determinant of an individual's probability of having a best friend. The coefficient for the whole sample is statistically significant, and has the expected positive sign. This result confirms the importance of child care in shaping individual skills related to socialisation. The effect is equal in households with employed and non-employed mothers. The effect is stronger for children from two-parent households, while only children benefit more from attending child care. This result confirms the importance of formal child care in building social skills among disadvantaged individuals.

Table A2: Heterogeneous effects of formal child care on children outcomes: Any difficulty at school

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Whole sample	Unemployed mother	Employed mother	One head family hh	Both parents	No siblings	Siblings	Whole sample
Formal child care (FCC)	-0.26*	-0.33*	-0.16	-0.58	-0.23	0.04	-0.40**	-0.01
	(0.14)	(0.18)	(0.22)	(0.36)	(0.15)	(0.25)	(0.16)	(0.28)
FCC*Mother employed								0.14
								(0.28)
FCC*One head family hh								-0.43
								(0.38)
FCC*Siblings								-0.34
								(0.29)
Male	0.30**	0.23	0.38*	0.29	0.30**	0.02	0.43***	0.30**
	(0.13)	(0.17)	(0.21)	(0.36)	(0.14)	(0.24)	(0.16)	(0.13)
Age	-0.12	0.00	-0.38	-0.37	-0.05	-0.01	-0.24	-0.10
	(0.19)	(0.24)	(0.30)	(0.48)	(0.20)	(0.35)	(0.23)	(0.19)
Tertiary ed. mother	-0.26*	-0.23	-0.33	-0.30	-0.26	-0.04	-0.38**	-0.27*
	(0.16)	(0.21)	(0.24)	(0.38)	(0.18)	(0.29)	(0.19)	(0.16)
Tertiary ed. father	0.08	-0.13	0.31	0.01	0.01	0.09	0.05	0.08
	(0.16)	(0.21)	(0.25)	(0.46)	(0.17)	(0.30)	(0.19)	(0.16)
Mother employed	-0.27*			-0.50	-0.28*	-0.62**	-0.12	-0.35
	(0.14)			(0.37)	(0.15)	(0.26)	(0.17)	(0.22)
One head fam. hh	0.17	0.11	0.15			0.34	0.17	0.44
	(0.20)	(0.31)	(0.28)			(0.35)	(0.26)	(0.31)
Siblings	-0.04	-0.23	0.21	0.12	-0.02			0.14
	(0.14)	(0.20)	(0.22)	(0.38)	(0.16)			(0.21)
Constant	-0.08	-0.55	0.93	2.20	-0.61	-0.97	0.80	-0.35
	(1.29)	(1.69)	(2.02)	(3.33)	(1.41)	(2.44)	(1.56)	(1.32)
Observations	1156	636	520	167	989	343	813	1156

Dependent variable: Child with any difficulty at school. Logistic Regression Model. Robust standard errors in parenthesis. Col. (1) estimates refer to the whole sample. Col. (2) estimates refer to the sample of unemployed mothers. Col. (3) estimates refer to the sample of employed mothers. Col. (4) estimates refer to one head family household. Col. (5) estimates refer to household composed by both parents. Col. (6) estimates refer to individual without siblings in the household. Col. (7) estimates refer to individual with at least one sibling in the household. Col.(8) estimates refer to the whole sample. Models (1) to (8) contain controls for citizenship, house tenure status, interview typology and city dummies.

*** indicates significance at 1% level, ** indicates significance at 5% level, * indicates significance at 10% level.

Table A3: Heterogeneous effects of formal child care on children outcomes: To have a best friend

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Whole sample	Unemployed mother	Employed mother	One head family hh	Both parents	No siblings	Siblings	Whole sample
Formal child care (FCC)	0.86*** (0.31)	0.94** (0.39)	0.93* (0.53)	0.15 (0.65)	1.00*** (0.36)	1.64** (0.65)	0.65* (0.36)	1.65** (0.69)
FCC*Mother employed								-0.08 (0.64)
FCC*One head family hh								-0.82 (0.72)
FCC*Siblings								-0.78 (0.70)
Male	-0.26 (0.30)	-0.38 (0.37)	0.08 (0.51)	-0.24 (0.65)	-0.23 (0.34)	-0.99 (0.62)	-0.04 (0.35)	-0.26 (0.30)
Age	0.22 (0.42)	0.47 (0.52)	-0.39 (0.73)	0.36 (0.87)	0.28 (0.49)	1.15 (0.85)	0.04 (0.50)	0.29 (0.42)
Tertiary ed. mother	0.17 (0.34)	0.39 (0.44)	-0.30 (0.58)	-0.83 (0.69)	0.35 (0.43)	0.17 (0.71)	0.10 (0.41)	0.16 (0.35)
Tertiary ed. father	-0.39 (0.34)	-0.78* (0.41)	0.55 (0.64)	-0.78 (0.86)	-0.33 (0.41)	-0.39 (0.73)	-0.37 (0.40)	-0.39 (0.34)
Employed mother	0.42 (0.33)			0.11 (0.64)	0.48 (0.40)	0.42 (0.60)	0.43 (0.40)	0.45 (0.45)
One head fam. hh	-0.58 (0.39)	-0.35 (0.56)	-1.09* (0.63)			-1.31* (0.73)	-0.33 (0.52)	-0.19 (0.54)
Siblings	-0.02 (0.32)	0.02 (0.42)	0.03 (0.54)	0.86 (0.69)	-0.25 (0.40)			0.27 (0.40)
Constant	1.34 (2.93)	-0.47 (3.65)	5.95 (5.06)	1.47 (6.11)	0.99 (3.42)	-2.85 (5.81)	2.14 (3.48)	0.61 (2.98)
Observations	1156	636	520	167	989	343	813	1156

Dependent variable: To have a best friend. Logistic Regression Model. Robust standard errors in parenthesis. Col. (1) estimates refer to the whole sample. Col. (2) estimates refer to the sample of not employed mothers. Col. (3) estimates refer to the sample of employed mothers. Col. (4) estimates refer to one head family household. Col. (5) estimates refer to household composed by both parents. Col. (6) estimates refer to individual without siblings in the household. Col. (7) estimates refer to individual with at least one sibling in the household. Col.(8) estimates refer to the whole sample. Models (1) to (8) contain controls for citizenship, house tenure status, interview typology and city dummies.

*** indicates significance at 1% level, ** indicates significance at 5% level, * indicates significance at 10% level.