Child-Care Choices by Working Mothers: The Case of Italy*

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Abstract.   In spite of relatively generous public subsidies and a reputation for high quality, only a very limited proportion of Italian families use public child-care and a large proportion use informal care. In this paper, we attempt to explore the determinants of the use of child-care among dual workers families. Given the limitations of data available we match two different data sets: the Bank of Italy (SHIW) and ISTAT Multiscopo. We find evidence that the availability of public child-care affects in an important way its demand. We also find that increases in costs of public child-care reduce the use of public as well as private indicating a shift to informal child-care. The presence of a grandmother who lives near and is in good health is an important explanation of the choice especially in presence of very small children. An understanding of the importance of these factors is relevant in the evaluation of child-care policies. This is particularly important in Italy, where the majority of families with children have only one child and children would benefit also from the socialization aspects of the child-care system.

Keywords: working mothers, child-care

JEL Classifications: J2, C3, D1

Introduction

The increase in the proportion of non-parental child-care has been the subject of numerous studies since the mid-1970s in the United States, the United Kingdom and Northern Europe. In these countries, the growth in women's participation has been

remarkable, especially among mothers of young children. This phenomenon has resulted in an increase in the number of families with children in which both parents work outside the home, and has had strong implications on the choices of child-care.

A large body of economic literature on the link between labor supply and child-care use is available in most advanced countries, but in Italy (as in other Southern European countries) the issue of child-care has been neglected until very recently. This can be explained by the relatively low mothers' participation in the labor market in these countries, which has not stimulated much interest regarding size and type of child-care needed (Table 1).

Moreover, no national data set has been available to provide information on both household members' labor market characteristics and child-care use. The Italian child-care system provides a very interesting case study. On the one hand, similarly to most Northern European countries, public child-care is highly subsidized and has high quality standards; however, the size of the supply is quite small: public child-care has a limited number of places available, and it is highly regulated in terms of hours and rate of access, especially for the care of the very young (less than 3-years-old). On the other hand, the number of private child-care services has not increased significantly over the last few decades and a large proportion of Italian families rely on informal child-care.

In this paper, we explore the determinants of public, private as well as informal child-care choices, combining two different data sets (ISTAT Multiscopo and Survey of Households Income and Wealth (SHIW)–Bank of Italy for 1998) in order to produce data relevant to our analysis. With these new sources of information, we are able to analyze and explore both child-care characteristics (availability and costs) of the different types of care (in the Multiscopo ISTAT survey) as well as important variables regarding individual and family resources (income and earnings) (in the Bank of Italy Survey).

Our results show that the choice of care for children less than 3-years-old appears to be significantly explained by the characteristics of the system (availability and costs). The increase in costs of public child-care reduces both demand for public and private, shifting to the more flexible informal care. Overall, the estimates seem to indicate that private child-care in Italy is not a substitute/alternative to the public

Table 1. Mothers' participation rates by age of the child.

Country	<3	3–5
Italy	50	54
France	61	69
Spain	40	44
Denmark	85	90
Sweden	81	82
U.K.	47	52

Source: OECD, Paris 1999.

service for very young children. Another factor that contributes significantly to explain the choice of care concerns family composition and support.

In Section 2 we describe the main characteristics of the child-care system in Italy and in Section 3 we discuss some potential interpretations for the limited use of public child-care, taking into account recent findings from other countries as well. In Section 4, we propose a simple model of child-care use on which to base the empirical analysis. Section 5 contains a description of the sample. Section 6 discusses the results of the empirical estimates. Section 7 provides concluding remarks and policy considerations.

1. The child-care system in Italy

In Italy, as in other European countries, public child-care is the most diffused type of formal child-care and it is characterized by high quality standards.[1] However, the availability has remained limited and it is highly regulated in terms of hours and rate of access in spite of the relative growth in participation of women in the last decades (from about 37% in 1980 to 46% in 2000). Surprisingly a private child-care system has not developed in order to compensate for the limitations of the public one.

The characteristics of child-care vary significantly according to the age of children and by region. First of all, there are important differences in the type of provision. While for children >3 years public child-care is provided both by state and municipal institution, for children <3 years it is solely provided by local municipalities.[2] The difference in the source of funding has generated large differences both in availability and prices. The availability of public care is much higher for children >3, reaching the same proportion as in other Northern European countries (95%).

Child-care for those under three is used by only 6% of the relevant population: Italy, together with Spain, has the lowest use of public child-care for children under three (Table 2). Moreover, the opening hours of public child-care facilities are strictly set and limited to 7–7.5 h a day (OECD 2000).

Another difference concerns the availability of child-care by region within Italy. While the availability of child-care for children older than three is very uniform

Table 2. Proportion of young children using public child-care arrangements.

Country	Year	Aged <3	Aged 3–5
Denmark	1998	64	91
Sweden	1998	48	80
Italy	1998	6	95
Spain	2000	5	84
UK	2000	2	60
France	1998	29	99

Source: OECD, Employment Outlook, 2001.

across regions (Appendix 2 – Table B2), this is not the case for children under three. There are marked differences across regions (Table 3).

The proportion of children under 3 years of age enrolled in public child-care is about 15% in some areas of the North, but only 1–2% in most Southern areas, indicating significant rationing of child-care in some areas of the country (see column 1 of Table 3).

Private market child-care is not more widespread than public (see column 2 of Table 3). Regulations by local public authorities seem to have affected the norms for private market child-care in addition to public, limiting both its supply and development. The relative lack of public child-care alternatives would seem to leave space for growth of private child-care services, but in fact is not the case. Both public and private child-care are less widely available in the South than in the North, indicating that public and private options are complementary rather than substitute. Not surprisingly, the labor market participation rate of women age 25–34 in the Northern areas is about 75%, while in the Southern regions it is only about 43% (ISTAT, 1998b) indicating a relationship between women labor force participation and the size of child-care availability (Maria Concetta Chiuri, 2000, Tindara Addabbo and Francesca Olivier, 2002).

The actual availability of places does not seem to satisfy households' demand. The proportion of applications per 100 children aged < 3 shows the potential demand of

Table 3. Public and private child-care availability by Italian region (for 100 children aged <3).

Region	Public availability (%)	Private availability (%)*
Emilia Romagna	17.4	0.88
Valle d'Aosta and Piemonte	9.72	1.06
Umbria	10.6	0.97
Marche	10.7	0.65
Toscana	9.7	1.85
Lombardia	8.9	0.81
Liguria	9.3	0.27
Lazio	7.5	0.73
Friuli	6.1	1.84
Trentino	6.8	0.76
Italy	**7.0**	**0.91**
Veneto	5.5	1.73
Sardegna	5.7	0.73
Basilicata	4.4	0.79
Sicilia	4.7	n.a.
Abruzzo	3.8	0.23
Molise	2.5	0.38
Puglia	2.1	0.64
Campania	1.0	1.24
Calabria	1.1	0.82

Source: Fondazione degli Innocenti: I servizi educativi per la prima infanzia, 2002.
*Own calculations from I servizi educativi per la prima infanzia (2002).

the public service. Among those eligible for the public child-care, only about 10% actually apply for it (the average for Italy in bold in column 1 of Table 4). If we compare column 1 of Table 3 and column 1 of Table 4, it appears that on average only 7 out of 10 children who apply are actually able to use the public service (Table 3). In other words, the public service is able to satisfy about 70% of the total applications.[3] When we consider the percentage of children on the waiting list in the public child-care relative to the total number of applications we see that over 100 applications, 33% on average in Italy are on the waiting list (see column 2 in Table 4).

Hourly child-care costs also vary by age of the child. Child-care costs for children under 3 are much higher on average than child-care costs for children >3, in both the public and private sectors. Unlike private child-care, the cost of public care depends on income and family composition and varies substantially across regions. The amount that parents pay differs from one municipality to another depending on local policies.

Other important characteristics of the Italian labor market contribute to the difficulties experienced by working mothers in using child-care. Part-time jobs are scarce in most areas, while high unemployment makes it risky for mothers of young children to take time off beyond that guaranteed by basic maternity leave (see Table 5).

The use of non-parental child-care becomes a more important issue for working mothers in areas of low part-time opportunities. The low availability of part-time opportunities, on the other hand, create more difficulties in using the public system,

Table 4. Percentage of applications and children in the waiting list in the public child-care by Italian region (for 100 children aged <3).

Region	Applications (%)	Children on the waiting list
Emilia Romagna	21.1	20.8
Piemonte-Valle d'Aosta	16.8	38.9
Umbria	14.2	29.8
Marche	13.7	33.1
Toscana	15.9	35.7
Lombardia	11.9	31.4
Liguria	20.6	56.7
Lazio	11.4	37.5
Friuli	9.4	39.8
Trentino	8.5	27.0
Italy	**9.9**	**32.7**
Veneto	8.3	41.7
Sardegna	7.6	36.0
Basilicata	5.0	27.2
Sicilia	5.9	29.6
Abruzzo-Molise	3.2	11.5
Puglia	2.5	29.0
Campania	1.6	40.7
Calabria	1.3	27.6

Sources: ISTAT: Annuario Statistico Italiano, 1999–2001; Ministero del Lavoro e delle Politiche Sociali: I servizi educativi per la prima infanzia, 2002.

Table 5. Women in part-time and unemployment rates.

Country	% Part-time	% Unemployment
Italy	10.1	10.8
France	12.5	10.2
Spain	10.6	14.0
Denmark	22.8	4.5
Sweden	24.7	5.5
UK	25.6	5.6

Source: OECD, Employment Outlook, 2000.

especially due to rationing in terms of opening hours. Given these institutional characteristics, public child-care does not seem to be designed to accommodate the full-time employment of mothers. Public child-care is thus used by only a small proportion of households whose mothers are employed full time and are more likely to use it when it can be supplemented by the extended family or informal child-care. In the next section we review the important literature on the determinants of public, private and informal child-care.

2. Child-care choices

Economic studies of choices in child-care arrangements in the U.S. and Canada have mainly focused on the choice between formal and informal child-care. Sandra L. Hofferth and Douglas A. Wissoker (1992), Gordon H. Cleveland and Douglas E. Hyatt (1993), also taking into account child-care quality, find that price and incomes are very important determinants of the choices of using formal child-care.

Given the different institutional arrangements and the prevalence of public services in several European countries, researchers have focused instead on the choice between public, private and informal child-care specifically on the characteristics and limitations of the first. In most European countries public care is more widespread, on average less expensive than private child-care (lower income families receive large subsidies) and is widely recognized as being of higher quality. Yet despite these attractive features, the use of public child-care is quite limited. Several studies have attempted to understand this puzzle (Siv Gustafsson and Frank P. Stafford 1992; Chevalier Arnaud and Tarja Viitanien 2004; Katharina Wrolich 2005, among others).

Among the several explanations for the limited use of public child-care, rationing in the supply of child-care is often of key importance. Parents who are willing to purchase public child-care may find themselves on a waiting list, with their priority depending on their working status, family composition and family type, and children's health. Furthermore, limited availability implies that not every child is guaranteed a place and the limit on the maximum number of hours a facility that can remain open reduces the compatibility with the mother's working hours.

These limitations discourage the use of public child-care even though it costs less than private services. Gustafsson and Stafford (1992) have investigated the rationing hypothesis, estimating the responsiveness to use public child-care in relation to variations in child-care cost and availability of places in Sweden. They found that in regions where child-care availability does not appear to be rationed, the cost of child-care significantly affects mothers' choice to use public child-care; in areas where rationing is more severe, there is little evidence of significant price effects. Michaela Kreyenfeld and Hank Karsten (2000) have analyzed German data and pointed out several inadequacies in German child-care. Due to the very limited opening hours, working mothers (especially fulltime employed) must seek additional forms of child-care to combine with public child-care time. Chiuri (2000) and Daniela Del Boca (2002) found similar results for Italy.

Another explanation for the limited use of formal child-care is related to family preference (values and gender roles). The traditional role of mothers in child-care activities is highly valued by many families, especially in Southern European countries. According to this view mothers are the best caregivers for young children. In families where this view prevails, parents may choose not to use public or private child-care even if the mothers are employed full-time and would be eligible for child-care. Moreover, many families may prefer to rely on the assistance of relatives who they know and trust. In doing so, parents can rely on arrangements that are more similar to parental care (Karen Kuhlthau and Karen Oppenheim Mason 1996). Reliance on relatives for care reflects an attempt to maintain some stability for children who may suffer from their parents' absence during their hours of work. However, parental preferences for child-care arrangements might change as their children grow up. Parents of children under three are more likely to use informal child-care arrangements than parents of preschoolers.

Another explanation is related to the existence of fixed costs—that is, the costs in terms of transportation, clothing, and stress associated to taking young children to a formal child-care center—that do not vary according to the hours of service. The fixed costs are likely to be higher for younger children and in areas where public child-care places are few, thus causing higher costs in terms of travel (as well as anxiety and stress). These costs may discourage parents who are only mildly interested in child-care use and who would be interested in using only a few hours of care (Jutta M. Joesch and Bridget G. Hiedemann, 2002). In the presence of fixed costs, we would expect that most households would either choose to use no care at all or, alternatively, would rely on a significant number of hours of service. Table 6 shows that this pattern does not seem to characterize the behavior of the sample of households in our data set. A non-negligible number of households whose youngest child is younger than 3 years only use a few hours of child-care while households with older children aged 3–5 tend to use more hours of child-care. However, in general for children >3 the use of child-care is quite widespread over the entire range of 50 h. This result seems to imply that fixed costs are not very important here.

Table 6. Number of hours of formal child-care attended by children ≤3 and children >3.

Hours of school	Aged under or equal 3	From 3 to 5
0	398	6
1–5	1	2
6–12	10	21
13–19	3	9
20–26	19	47
27–31	14	47
32–37	11	71
38–50	25	93

Source: Own calculations from ISTAT, Multiscopo 1998c.

3. Behavioral model

Assuming that women are the principal caregivers in the household, the mother bases her decisions on the costs and benefits of working in the labor market and these will depend on her wage minus the cost of child-care per hour worked.

   Assume that only women who work use child-care and hours of work coincide with child-care time.[4] We assume that public child-care is limited in the hours of service given the regulations of the public sector. Since in Italy most of the informal child-care is provided by grandparents, we assume that the informal child-care may have a limitation in the time provided motivated by the older age (limited energy) as well as other activities (besides retirement). Informal child-care may entail some costs (mostly implicit) which are on average lower than for public and private child-care. For example, a grandparent may live with the child's parents during the period in which they provide child-care or receive other services in exchange (see Alessandro Cigno, Gianna C. Gianelli and Furio C. Rosati 1998). We then assume a utility function of the Cobb Douglas type for the mother:

$$U = \alpha \ln L + (1 - \alpha) \ln C \tag{1}$$

The consumption (C) is given by:

$$C = I + (w - \pi)(T - L) \tag{2}$$

in which I is the non-labor income of the mother (non-labor income plus husband's total income), π is the hourly price of child-care, w is the mother's wage, T is total amount of time available, L is hours of leisure, and ($T-L$) is the time of work. The three regimes of child-care (public, private and informal) are characterized as follows.

1. Income limit for public child-care $\overline{Y}$ (total income of the household as a proxy for the limited number of slots available).
2. An upper bound of hours $\overline{h_p}$ in public child-care.

3. An upper bound of hours also in informal child-care $\overline{h_i}$
4. The prices are determined as $\pi_i < \pi_p < \pi_m$ (where π_i is the implicit price of informal child-care, such as housing for the grandparent or relative providing child-care, the hourly π_p is the price of public child-care and π_m is the price of market private child-care).

The households maximize the values associated with the three regimes which are characterized as follows.

The value of choosing public child-care is:

$$V_p(I, w, \alpha) = \max_{T-\overline{h_p} \leq L \leq T} \alpha \ln(L) + (1 - \alpha) \ln(I + (w - \pi_p)(T - L)) \tag{3}$$

The value of choosing private child-care is:

$$V_m(I, w, \alpha) = \max_{L \leq T} \alpha \ln(L) + (1 - \alpha) \ln(I + (w - \pi_m)(T - L)) \tag{4}$$

The value of choosing informal child-care is:

$$V_i(I, w, \alpha) = \max_{T-\overline{h_i} \leq L \leq T} \alpha \ln(L) + (1 - \alpha) \ln(I + (w - \pi_i)(T - L)) \tag{5}$$

The leisure demand under public child-care (L^*_p), without imposing the hour constraint, is:

$$L^*_p = \alpha(I + (w - \pi_p)T)/(w - \pi_p) \tag{6}$$

The actual $\hat{L}_p$ in presence of the constraints is equal to:

$$\hat{L}_p = \begin{cases} T & \text{if } L^*_p > T \\ T - \overline{h_p} & \text{if } L^*_p < T - \overline{h_p} \\ L^*_p & \text{if } T - \overline{h_p} \leq L^*_p \leq T \end{cases} \tag{7}$$

where $\overline{h_p}$ is the upper bound on hours in the public child-care.

The leisure demand under private market care is given by:

$$L^*_m = \alpha(I + (w - \pi_m)T)/(w - \pi_m) \tag{8}$$

The actual L^*_m in presence of the constraints is equal to:

$$\hat{L}_m = \begin{cases} T & \text{if } L^*_m > T \\ L^*_m & \text{if } L^*_m \leq T \end{cases} \tag{9}$$

The leisure demand under informal child-care (L^*_i), without imposing the time constraint, is:

$$L_i^* = \alpha(I + (w - \pi_i)T)/(w - \pi_i) \tag{10}$$

The actual $\hat{L}_i$ in presence of the constraints is equal to:

$$\hat{L}_i = \begin{cases} T & \text{if } L_p^* > T \\ T - \overline{h_i} & \text{if } L_p^* < T - \overline{h_i} \\ L_i^* & \text{if } T - \overline{h_i} \leq L_i^* \leq T \end{cases} \tag{11}$$

where $\overline{h_i}$ is the upper bound on hours in the informal child-care.

The value of the maximum solutions (evaluated at the best choice that can be made in the presence of constraints) for public child-care is given by:

$$V_p = \alpha \ln(\hat{L}_p) + (1 - \alpha) \ln(I + (w - \pi_p)(T - \hat{L}_p) \tag{12}$$

and for private market child-care is:

$$V_m = \alpha \ln(\hat{L}_m) + (1 - \alpha) \ln(I + (w - \pi_m)(T - \hat{L}_m) \tag{13}$$

and for informal child-care is:

$$V_i = \alpha \ln(\hat{L}_i) + (1 - \alpha) \ln(I + (w - \pi_i)(T - \hat{L}_i) \tag{14}$$

In public child-care besides the constraint on hours, $\overline{h_p}$, another constraint concerns the eligibility/availability criterion:

$Y_i \leq \overline{Y} \Rightarrow$ eligible

$Y_i > \overline{Y} \Rightarrow$ non-eligible

If $Y_i \leq \bar{Y}$ the household chooses between public, private or informal child-care. The public child-care will be chosen if $V_p \succeq V_m$ and $V_p \succeq V_i$ However given the restrictions on the number of hours, even if eligible, households where mothers are full time employed will choose as a second best private or informal child-care. Only if the help of relatives or other informal support is available they can use the public service. For example, having grandparents near and in good health, increasing household's potential time available for child-care, may compensate for the hours limitations allowing working mothers to use the public service.

If $Y_i > \bar{Y}$ the household's choice is instead reduced only between private child-care and informal child-care. Having grandparents near and in good health may reduce the costs of informal child-care encouraging its use relative to private child-care.

In the econometric model below we will estimate the impact of eligibility/availability, as well as costs of child-care on the demand for public, private and informal care, conditional on several personal and family characteristics and the "mediating" effect of relatives' help.

4. The sample description

Unfortunately, as we mentioned in the introduction, none of the data sets currently available in Italy contains all the information relevant to our analysis. The Bank of Italy's SHIW contains detailed information on the income and wealth of family members, labor market activities, and socio-demographic characteristics of the household but no information on child-care (with the exception of a limited section on child-care use for 1993). The Multiscopo survey, collected by the Italian Institute for Statistics ISTAT in 1998, provides detailed information on family structure, every-day life, past and present working experiences, use of social services and use of child-care. In particular, information on child-care use, child-care costs, hours of service, and type of child-care, i.e., formal (public or private) and informal (grandparents, relatives, and neighbors), is provided. However, the main drawback of this survey is that it does not collect information on household earnings and income.

In order to overcome these limits, we merged the above two data sets using the statistical matching method (see the Appendix for details on the procedure).[5] Data fusion provides a means of combining information from different sources into a single data set.[6] The aim of statistical matching is to match an individual of the Multiscopo with a similar individual of the SHIW according to some particular criteria, in order to collect relevant information from both surveys. Specifically, we impute income and earning variables of an individual from the SHIW to a similar individual from the Multiscopo.

The final data set is completed by adding ISTAT regional information about availability of child-care places, both public and private. Merging regional data with micro observations on the households may entail a number of potential pitfalls (as illustrated by Brett R. Moulton, 1990), including the possibility that units sharing an observable characteristics such as a particular region (characterized by child-care availability) also share unobservable characteristics that would lead the disturbances to be correlated. However in the Italian case, where households' mobility is extremely low, we can assume that the correlation is very small and unlikely to affect the analysis in a serious way.

To analyze the determinants of child-care choices by working mothers, we restrict our sample to married and working women aged 18–45 with spouse present, (so as to exclude those who might still be enrolled in school or retired) and with children aged ≤5, since, as mentioned in the previous sections, child-care availability and affordability is an issue for households with children of preschool age. Furthermore, we exclude self-employed workers due to measurement errors in identifying their income and hours of work. This reduces the sample from 20,153 households originally interviewed in the Multiscopo survey to 786 households. Table 7 provides descriptive statistics of the sample of household with children aged ≤5.

The geographical distribution of the selected sample has 26.62% of the households living in the North–West, 22.94% living in the North–East, 17.87% in the Center, 23.19% in the South, and 9.38% on the Islands.

Table 7. Descriptive statistics for children ≤ 5 (means and standard deviations in brackets).

Characteristics of child-care	
Public regional child-care availability, children 0–3 (%)	7.03 (3.65)
Private regional child-care availability, children 0–3 (%)	0.9 (0.5)
Public regional child-care availability, children 3–5 (%)	59.2 (15.7)
Private regional child-care availability, children 3–5 (%)	37.4 (16.1)
Public hourly child-care costs (Euro)*	3.9 (5.5)
Private hourly child-care costs (Euro)*	5.1 (6.1)
Parents' characteristics	
Age of wife	33.8 (4.4)
Wife's schooling (average years)	12.1 (3.3)
Age of husband	36.7 (5.1)
Husband's schooling (average years)	11.5 (3.7)
Wife's non-labor income**	23.91 (5.06)
Wife labor income**	11.1 (1.28)
Children's characteristics	
Number of children ≤ 5	1.2 (0.4)
Presence of children 12–17 (%)	11.4 (31.8)
Youngest child aged between 0 and 1 (dummy)	0.35 (0.48)
Youngest child aged between 2 and 3 (dummy)	0.36 (0.48)
Youngest child aged between 4 and 5 (dummy)	0.29 (0.46)
Family characteristics	
Presence of grandmother (near and healthy) (dummy)	0.73 (0.44)
Mother works full time (dummy)	0.84 (0.36)
Number of observations	*786*

*For households with positive child-care costs (265 for public and 114 for private child-care).

**In Euro divided by 1000. Wife's non-labor income is given by the sum of household non-labor income and husband's labor income. The household non-labor income aggregates income from real and financial wealth, and transfers.

Concerning the characteristics of child-care, we see that the availability of both public and private child-care for children aged 0–3 is very scarce, below 8%, while the coverage for children older than three is almost complete. The costs are higher for the private services than for the public services, as expected. Schooling does not vary much across parents and the average number of children aged between 0 and 5 is very low, around 1.2 children per family, which is coherent with the low fertility rates of Italian households; only 11% of the families have older children aged 12–17, due probably to the fact that we are selecting young couples with the youngest child below 5 years of age. Around 70% of the families can rely on the help of a grand-mother near the family and in good health.[7] Most of the women in this sample work full time especially due to the fact that part time jobs are not very widespread in Italy.[8] We do not include in the analysis variables of nationality, race and ethnicity because they are a very low proportion of Italian households.

As far as child-care utilization is concerned, the Multiscopo survey collects information on the type of child-care used, both formal and informal. Formal child-care is intended as using any type of formal providers of care, i.e. public and private,

while child-care provided by family members or friends on a voluntary basis and baby-sitter is considered as informal.[9]

Even if it is likely that working mothers supplement formal arrangements with informal arrangements, we distinguish these three different modes of child-care used as the primary mode of care for the youngest child in the family, i.e., use of public care, use of private market care and use of informal care. In particular, a household is indicated as using informal childcare if the youngest child in the family is sent neither to the public school nor to the private school (crèche or nursery). Ideally, we would like to include an indicator of quality care. In the literature, the most common indicators of quality used are the child/staff ratio, the group size and the education/ training of the care giver (David C. Ribar 1992, 1995; Hofferth and Wissoker 1992). Unfortunately, these variables are not available in our data.

Child-care choices vary by the level of the mother's education. Highly educated women (with a high school diploma or college degree) use more formal child-care for their children than lower educated women, while the opposite holds for the use of informal child-care. Child-care choice also varies significantly by the age of the child. Comparing the use of child-care of mothers whose youngest child is under 3 years of age with mothers whose youngest child is between 3 and 5 years of age (five is included), it turns out that a higher percentage of mothers of very young children use informal care as compared to mothers of older children (see Table 8). Only 12.01% of households with children younger than 3 years of age use public services and 5.59% use private, while the majority use informal child-care.[10] The fact that the use of public and private child-care is low might be due either to the rationing in access to public child-care or to the limited supply of both public and private child-care slots mentioned in Section 2.[11] The situation is completely different if we consider pre-school children aged > 3. For children older than three, formal child-care (both public and private) is used by almost the entire population of families; since a large proportion of Italian children have no siblings, child-care centers are seen as an opportunity for education as well as socialization (in the Multiscopo Survey almost 97% of families with children older than three give these reasons for sending their children to the nursery).

Concerning child-care costs, hourly child-care costs are higher in the North West and in the Center than in the South, and in the private sector than in the public sector. Table 9 shows the average expenditures for child-care (for the sample who pays, i.e. 379 households) by region and type of child-care for children ≤ 5.

Table 8. Child-care use of working mothers for children ≤ 3 and children >3.

	Children ≤ 3	Children >3
Public	12.01	69.0
Private	5.59	29.02
Informal	82.40	1.98

Source: Own calculations from ISTAT, Multiscopo 1998c.

Table 9. Hourly child-care costs for children ≤ 5 (in Euro per hour).

	Public school	Private school
North–West	4.39	6.50
North–East	3.83	5.44
Center	5.39	7.01
South	2.30	2.79
Isles	3.14	3.67
Total	3.9	5.1

Source: Own calculations from ISTAT, Multiscopo 1998c.

Finally, hourly child-care costs are higher in the private sector than in the public sector both for children under 3 years of age (8.25 vs. 7.67) and between 3 and 5 (4.16 vs. 2.61).

In the analysis that follows we analyze the choice between the three alternative modes of child-care by using a multinomial logit model. The reference alternative consists of mothers using informal child-care. The remaining two alternatives are using public child-care and using private child-care. The following groups of variables are used as controls in the estimates:

- Socioeconomic characteristics (age and years of schooling of the wife, wife's labor income, wife's non-labor income (household non-labor income plus husband's labor income)).
- Children's characteristics (number of children younger than 5 years of age, a dummy for the youngest child less than 1-year-old (11 months)).
- Family characteristics' indicators of household's potential time available for child-care: potential relative's help (whether the grandmother is living near the family and is in good health, whether the mother works full time and a dummy for the presence of children between 12 and 17 years of age).
- Characteristics of child-care: availability of places[12] and costs.[13]

The multinomial logit is then estimated by using maximum likelihood methods. The Extreme-Value distribution imposes the independence of irrelevant alternatives (IIA) assumption, according to which any pairs of choices are independent from all the other choices. The validity of this assumption is tested by the Hausman's specification test.[14]

5. Empirical results

Consistent with the model outlined in Section 4, we now focus on the child-care choices (public, private and informal) of working mothers, with informal child-care as the reference category. The key objective of this analysis is the child-care choice of working mothers (conditional on personal, family and child-care market characteristics).

We estimate this specification separately for two groups of children, those <3 and those aged >3 because they show different behavior in terms of child-care choices. Children aged three belong to the first group if they attend the crèche or stay at home and to the second group if they attend the nursery.

First we estimate the model for the sample of children ≤3 who are potential users of crèches. As we have discussed throughout the paper this is the child-care that is more severely limited in terms of hours of services and availability (given the eligibility criteria and the small supply). Moreover, relatively to other European countries (France, Spain, Northern Europe) Italian women do not have long optional parental leave but need to rely on non-parental child-care in order to maintain an attachment to the labor market. The results for the group of children aged ≤ 3 are presented in Table 10. In column I we estimate the model including only variables which are related to personal characteristics. In column II we also include family support variables and finally in column III we introduce variables that are related to costs and availability of public and private child-care.

These three specifications of the model are analyzed in detail below.

- The first specification (column I) in Table 10 includes the socioeconomic characteristics of wives (age, schooling, wife's labor income and mother's non-labor income) and the children's characteristics (number of children younger than 5 years of age, whether the youngest child is less than 1-year-old). We find that mother's education positively affects the choice of both public and private care relatively to informal. This is consistent with the fact that more highly educated parents place greater value on the services provided by regulated child-care settings (the opportunity for socialization with other children, relationship with teachers, etc.). Wife's age increases the probability of using private services. Both non-labor income and labor income do not have any influence on the choice of child-care. This result is consistent with the fact that income determines how much a family can pay for care, but does not determine which child-care mode is selected. The number of children aged ≤5 in the household has a positive effect on public child-care use and negative on private. The presence of a child less than 1-year-old reduces the probability of using both public as well as private child-care relative to informal.
- The second specification (column II) in Table 10 includes variables describing family characteristics that indicate household's potential time available for child-care. The effect of having a parent in good health and living nearby significantly decreases the probability of using private services relative to informal services. We include a dummy for the presence of children aged 12–17 who might provide additional care for younger siblings. We would expect that having an older child in the household may increase the chance of having relative care rather than paid care. In our case, this effect does not appear to be significant probably due to the fact that we are considering young couples and few of them have children older than 12. There is no effect of mothers working full time on the demand of child-care. However, if we do not include mother's wage in the estimation, which could

Table 10. Multinomial Logit—child-care choices in households with children ≤3 where wives work (reference category: informal).

	I Public	I Private	II Public	II Private	III Public	III Private
Characteristics of child-care						
Public child-care availability					0.132** (0.048)	−0.037 (0.084)
Private child-care availability					−0.160 (0.394)	10.027 (0.646)
Public child-care costs					−0.014 (0.041)	0.173* (0.076)
Private child-care costs					0.000 (0.039)	0.011 (0.066)
Socioeconomic characteristics						
Wife's schooling	0.120** (0.048)	0.222** (0.068)	0.132** (0.050)	0.240** (0.072)	0.138** (0.051)	0.205** (0.075)
Wife's age	0.026 (0.038)	0.092~ (0.052)	0.017 (0.041)	0.054 (0.057)	0.021 (0.042)	0.038 (0.059)
Wife's non-labor income	0.036 (0.032)	−0.037 (0.043)	0.027 (0.033)	−0.063 (0.043)	0.018 (0.035)	−0.072 (0.043)
Wife's labor income	−0.183 (0.123)	−0.158 (0.180)	−0.134 (0.131)	−0.168 (0.192)	−0.150 (0.135)	−0.076 (0.198)
Children's characteristics						
Number of children 0–5	0.554~ (0.320)	−1.141~ (0.647)	0.580~ (0.324)	−1.63~ (0.669)	0.606~ (0.328)	−1.232~ (0.729)
Youngest child aged <1	−1.505* (0.340)	−0.783~ (0.447)	−1.540** (0.344)	−0.709~ (0.465)	−1.562** (0.354)	−0.864~ (0.487)
Family support						
Grandmother near and healthy			0.004 (0.335)	−1.461** (0.344)	0.119 (0.344)	−1.600** (0.464)
Mother works full time			−0.490 (0.391)	−0.418 (0.571)	−0.416 (0.402)	−0.761 (0.597)
Presence of children aged 12–17			0.449 (0.583)	0.973 (0.697)	0.357 (0.611)	0.686 (0.755)
Constant	−3.21~ (1.91)	−4.34 (2.75)	−3.03 (1.98)	−1.46 (2.81)	−3.78~ (2.07)	0.802 (2.95)
Log likelihood	−247.8088		−240.0281		−226.7931	
Number of observations	483		483		483	
Pseudo R^2	0.1081		0.136		0.184	

Standard errors in parenthesis; **Significant at 0.01 level; *Significant at 0.05 level; ~Significant at 0.10 level.

be potentially collinear with the dummy for mothers working full time, we find that if the mother works full time the use of public child-care is discouraged relative to the use informal child-care probably due to the fact that it is difficult to reconcile full time work and the limited opening hours of the public service (results available on request). Furthermore one can argue that this variable is somewhat endogenous. However because of the characteristics of the Italian labor market we have described above hours of work are often not a matter of choice.

• The third specification (column III) includes the characteristics of child-care: costs and availability of places. Regarding the child-care cost variable, we have a problem of self-selection. In fact, we only observe the child-care costs paid by each household who uses formal child-care, but not the child-care costs for all the mothers in the sample. Therefore, we would need estimates for those mothers not using any type of formal child-care. One solution would be to estimate a child-care price equation by using the Heckman two-step procedure to predict prices for the whole sample,[15] but this would require an exclusion restriction assumption. In order to avoid making strong assumptions, we use regional public and private child-care costs instead,[16] which are a proxy for the price potentially faced by each household in the sample. Public and private child-care availabilities have the expected sign, but only the coefficient related to the supply of public child-care in the first equation is significant on the demand for public child-care which indicates the importance of access and the presence of rationing. The demand for the private care does not change significantly instead. Public child-care costs reduce significantly the demand of private child-care relatively to informal child-care. When private child-care costs increase no significant effect emerges. This result seems to indicate that if public child-care would become more expensive, Italian families would rather use the informal child-care.[17,18]

We then have estimated the model for the group of children >3 who are potential users of nursery school. The empirical results show that the variables related to the characteristics of child-care system do not have a significant impact on the children >3 given that most of them are in nursery school which is used by 98% of children in the age group (results are reported in Table B1). Only two effects are worth mentioning: an increase in the costs of private care significantly discourages its demand and the presence of older children aged 12–17 in the family has a positive effect on the probability of using public child-care. Adolescents seem to be potential caregivers for children aged 3–5 after school but not for very young siblings under 3 years of age (as shown in Table 10).

Overall, our results seem to indicate that private child-care in Italy is not a substitute/alternative to the public service for very young children, given that it is regulated by similar rules; in any case, an increase in private and public costs shifts away households from the use of formal child-care towards the use of informal child-care (the omitted category), at least for very young children. Finally, Table 11 presents child-care availability and price simulations based on model III of Table 10 to assess

the degree to which a government intervention (an increase in availability or child-care subsidies) would "impact" child-care decisions.

The empirical estimates reported here prove useful in discussion of policy implications. The "base case" probabilities are those predicted by the model with no simulated changes. Table 11 shows that an increase in public child-care availability from 7% (the mean in our sample) to the average of Danish child-care (64%) would induce many women to shift from using informal child-care or private market child-care to using public services. In fact, the probability of using public child-care would increase from 0.12 (the baseline) to 0.87 (the simulated cases), while the probability of using private child-care would decrease from 0.06 to 0.01,[19] while the use of informal child-care would decrease from 0.82 to 0.12. If the increase in public child-care availability is limited to 48% (the figure for Sweden), the increase in the probability of using public child-care is still relevant (from 0.12 to 0.80).

Conversely, when public child-care is subsidized by reducing its costs by 20%, the changes in the probability of using public child-care is modest (from 0.12 to 0.17). Even if public child-care is almost entirely subsidized by reducing its costs by 80%, the changes in probabilities are very modest (see Note 19). The simulation results show that government interventions have different effects on choices in child-care. For instance, child-care subsidies are found to have a negligible effect on the use of public child-care, while an increase in availability has strong effects on child-care decisions. Thus, from a public policy perspective, the simulation results point to a clear need to increase the provision of available slots in public centers (and reduce the regulations also affecting private child-care) in order to reduce the constraints affecting child-care choices of mothers of young children.

6. Conclusion

Our exploratory analysis shows that the demand for public child-care for very young children is influenced by availability of places. In a market with rationing supply *does* affect demand.

Table 11. Simulation of employment–formal child-care choice probabilities (FCC) for children ≤3.

	Public	Private	Informal
1. Baseline	0.12	0.06	0.82
2. Public regional child-care availability (mean = 64)	0.87	0.01	0.12
3. Public regional child-care availability (mean = 48)	0.80	0.02	0.18
4. Public hourly regional child-care costs (− 20%)	0.17	0.12	0.71
5. Public hourly regional child-care costs (− 80%)	0.19	0.06	0.75

The baseline is computed at the mean of the covariates.

Probabilities in rows 2 and 3 are built by using the baseline specification and imposing the mean of public child-care costs respectively at 64% and 48%. Probabilities in rows 4 and 5 are built by using the baseline specification and reducing the public child-care costs by respectively 20% and 80%.

The findings suggest that for very young children the substitutability between public and private services is limited: when public or private child-care costs increase, mothers tend to rely more on informal care rather than switching to the alternative type of formal market care. This indicates that private child-care in Italy is not a substitute/alternative to the public service but shares similar characteristics and regulations. Furthermore these results suggest that child-care cost is less relevant when the system is characterized by a predominance of public provisions and of a rather limited private market which is regulated in a fashion similar to the regulation of public care.

Our analysis of other factors describing family characteristics shows that less educated mothers and mothers with children less than 1-year-old are less likely to use public and private child-care and tend to prefer informal child-care. When there are additional children under 5 years of age the use of private market relative to the informal care is discouraged probably because public child-care is more affordable and easier to access. Family support seems to be a substitute for the use of private child-care; in particular the presence of a grandmother nearby and in good health discourages the use of costly market child-care, like the private one. It appears that some substitutability occurs here.

These results help us to understand how the Italian child-care market works and to explain parents' child-care decisions. They also offer insights for effective policy development aimed at providing an adequate and affordable supply of child-care in order to meet the demand of Italian households. Public child-care institutions were developed in an era when the wife either did not participate in the labor market and was responsible for organizing all family activities in a very bureaucratic society, or worked in public sector jobs which required limited time commitments each day (e.g., teaching or public administration). These institutions are evolving slowly over time and continue to do little to increase the attractiveness of full-time work for women with children. Despite the limitations due to the small sample size, our results are still relevant and provide interesting insights given that a high number of women are limited in their choice and it affects their participation and fertility. This is particularly important in the Italian context, where a growing number of families have only one child and a growing number of mothers would like to continue working throughout their child-bearing years.

Appendix A – Statistical matching

The purpose of this section is to explain how the statistical matching was performed. First, two constraints must be satisfied to make matching feasible: (i) the two surveys must be random samples from the same population;[20] (ii) there must be a common set of conditioning variables. In our case, the first condition is met by design, since both the Multiscopo 1998 and the SHIW 1998 data are representative of the Italian population. The second condition is satisfied after some recoding.

To satisfy the second constraint, we need to define a function which measures the "*similarity*" between the individuals of the two samples and which assigns to each

individual of the Multiscopo set a similar individual from the SHIW, according to some particular criteria. Each pair of individuals created according to this procedure will give origin to an integrated record, with the relevant information from both surveys.[21]

In this case, we select married couples with both partners present. Next, we take into consideration only women who are housewives, unemployed, students or employed; in addition, they have to be married to men who are either unemployed, retired or employed.[22] This reduces the sample to 3140 couples belonging to the SHIW survey and to 8347 from the Multiscopo survey. In order to impute non-labor household income, the total sample of 11,487 households is used. When the labor earnings and hours of work from women and men of the SHIW survey respectively to women and men of the Multiscopo survey have to be imputed, the statistical matching is realized only on women (1122 from the SHIW and 3039 from the Multiscopo) and men who work (2033 from the SHIW and 5669 from the Multiscopo) and the matching is realized separately for men and women to further reduce imprecision.

As a baseline analysis, we compare the averages for all of variables the two surveys have in common. We compute descriptive statistics for women and for men related to selected variables from the two surveys (members, number of children in different age groups, age, education, area of residence).[23] Within the Multiscopo set, young children and larger families are over-represented, as are young and less-educated women and men. Those having a permanent job are only slightly over-represented. A significant percent of working women have working partners. Finally, those living in the center of Italy are significantly under-represented compared with the SHIW survey. For occupational qualifications and sector of activity, most of the differences between the two surveys are not significant.

The next step could be to match units from the two surveys, conditional on the common variables X. However, this procedure is problematic when the vector of common variables is large, as in this case. Donald B. Rubin (1977) and Paul R. Rosenbaum and Donald B. Rubin (1983) suggest using as an alternative the conditional probability of belonging to a sample, e.g. the Multiscopo sample, for purposes of stratification. This is the so-called *propensity score*, computed as $p(X_i) \equiv \Pr(i \in \text{Multiscope}|X_i = x)$.[24] Therefore, matching can be performed on $p(X_i)$ (alone, thus reducing a potentially high dimensional matching problem to a one dimensional problem.

In order to compute the propensity score, we have run a probit regression of the binary indicator taking value 1 for observations in the Multiscopo sample (and 0 for the SHIW sample) over the set of above-mentioned common household character-istics plus some interaction terms.[25] Since the propensity score is a continuous variable, exact matches will rarely be achieved and a certain distance between individuals belonging to the two samples has to be allowed. Thus, we chose to use the *radius method of matching*; among the units within the radius, we randomly select one unit, and we repeat this procedure 20 times. The final value of each imputed variables is obtained by averaging the 20 values previously obtained.[26] After the statistical matching is performed, each individual from the Multiscopo will be im-puted the annual labor earnings, the annual hours of work and the household non-

labor income of a similar individual from the SHIW according to the value of the function of the propensity score.

Finally, we proceed with an internal evaluation of the statistical matching. We first compare the average values between the values of the imputed variables after the matching and the corresponding average values in the donor set, i.e. the SHIW sample. For working women, the total number of hours worked differs between the two samples by 2.8%, while the total annual earnings differ by 2.0% and are not significant at conventional levels of testing. For the sample of matched men, the differences of hours worked and total labor earnings between the two groups are not significant; finally, the difference of household non-labor income between the two groups is 5% and not significant at 10%.

Next, we evaluate the preservation of relations between variables. For each common variable, we compute the correlation with the imputed variables, for the fused data set (Multiscopo variables plus labor earnings, hours of work for men and women and household non-labor income variables) and for the donor set. The differences between the common-fusion correlations in the SHIW data set vs. the fused Multiscopo data set seem to be well preserved for most variables.

Appendix B

Table B1. Multinomial logit—child-care choices for children >3 in households where wives work (reference category: informal).

	Public	Private
Characteristics of child-care		
Public availability*	0.044 (0.036)	0.005 (0.044)
Private availability*	0.054 (0.036)	0.040 (0.042)
Public child-care costs	−0.096 (0.225)	0.372 (0.279)
Private child-care costs	−0.020 (0.073)	−0.305** (0.110)
Socioeconomic characteristics		
Wife's schooling	−0.051 (0.048)	−0.042 (0.057)
Wife's age	0.045 (0.041)	0.029 (0.050)
Wife's non-labor income	0.042 (0.138)	0.111 (0.159)
Wife's labor income	0.028 (0.031)	0.028 (0.037)
Family support		
Grandmother near and healthy	0.589 $\sim$ (0.342)	0.603 (0.407)
Mother works full time	0.568 (0.445)	−0.144 (0.509)
Presence of children aged 12–17	1.357* (0.653)	1.09 (0.728)
Constant	−6.34 (4.40)	−4.28 (5.36)
Log likelihood	−278.1070	
Number of observations	303	
Pseudo R^2	0.06	

Standard errors in parenthesis; **Significant at 0.01 level; *Significant at 0.05 level; $\sim$ Significant at 0.10 level.

Data for public and private availability are reported in Table B2.

Table B2. Public and private child-care availability by Italian region (for 100 children aged >3).

Region	Public availability (%)	Private availability (%)*
Emilia Romagna	43.6	57.9
Valle d'Aosta and Piemonte	60.3	39.5
Umbria	80.8	24.2
Marche	84.7	19.7
Toscana	71.2	32.1
Lombardia	42.1	59.7
Liguria	58.4	45.3
Lazio	56.3	36.9
Friuli	56.1	44.2
Trentino	–	–
Italy	**59.2**	**37.4**
Veneto	32.5	70.9
Sardegna	69.2	29.9
Basilicata	80.0	20.0
Sicilia	69.9	21.9
Abruzzo	82.4	20.3
Molise	76.4	23.2
Puglia	76.6	26.2
Campania	68.9	22.7
Calabria	76.8	22.5

Source: Fondazione degli Innocenti: I servizi educativi per la prima infanzia, 2002.

*Own calculations from I servizi educativi per la prima infanzia (2002).

Notes

1. In Italy strict standard are imposed by government and municipal rules for every kind of child-care (as well to some extent to private) in terms of health and safety conditions, equipment of child-care, numbers of providers to ensure proper supervision of children, training of teachers, etc. Recent research overviews child-care quality indicators and reports that Italy is high in the ranking (De Henau, Meulders and O'Dorchai, forthcoming).
2. If children turn 3-years-old during the schooling year while attending the crèche, they can keep attending it until the end of the year.
3. The number of places available in the public service is 104,742, while the number of applications is equal to 143,691.
4. We only consider working mothers because, although also not working mothers make use of formal child-care, the working mothers are those who find it difficult to reconcile full time work and care of their children and may be forced to withdraw from the labor market.
5. Previous papers in the economic literature dealing with the problem of matching data sets are by Joshua D. Angrist and Alan B. Krueger (1992), and Manuel Arellano and Costas Meghir (1992). They discuss issues concerning identification and estimation of structural parameters from complementary data sources.
6. Other techniques consist in imputing the missing variables in the main data set by computing a regression model in the secondary data set and then using the coefficients to predict estimates of these variables. In this case, the imputed variables are not values observed on a "similar" individual who participates in the survey, but are simply estimates.
7. The variable "grandmother near and in good health" takes value 1 if the grandmother lives less than 16 km far away and she is in good health (mother's report). By grandmother, we mean maternal

grandmother. If we include paternal grandmother, the fraction of families with grandmothers near and healthy rises to 87% but the estimation results do not change significantly (results available on request). This figure confirms the tendency of Italian families to live close to their parents.

8. Women working more than 30 h are considered as full time workers.

9. With respect to the model outlined in Section 4, where the costs of informal child-care has been indicated with π_i, in this empirical section we are identifying the informal child-care the one with zero costs. We argue that this can be a valid approximation since the informal child-care is mainly provided by grandparents for whom the costs can be assumed to be non-pecuniary.

10. In this table, the figures on the use of formal child-care are higher than what reported at national level, but it is easily explained by the fact that we are only considering working mothers who tend to rely more on formal services.

11. Even if the situation regarding the provision of formal child-care has improved in the last decade, there is still a shortage of supply of formal child-care services.

12. We have two measures of availability, one computed for very young children aged less than three and one computed for children >3-years-old. In particular, availability is calculated as the ratio of the number of child-care places available for children ≤ 3 (or >3) to the number of children ≤ 3 (or >3) by area of residence.

13. Concerning the child-care costs, in the questionnaire it is not specified if they include tuitions or not.

14. Hausman's test suggests that the omission of an irrelevant choice set should not change the parameter estimates since the odds of two alternatives do not depend on the other existing alternatives.

15. See Rachel Connelly (1992), Ribar (1992) and Charles Michalopoulos and Philip K. Robins (2002).

16. Regional public and private costs are computed for each of the 18 regions which compose Italy (Piemonte and Valle d'Aosta are considered together since the latter is a very small region).

17. This result can be better seen if we take the private child-care as the reference category. In this case the odds ratio of the probability of public child-care relatively to the probability of private child-care is not significantly different from zero.

18. Even if only one out of four coefficients is significantly different from zero, three out of four have signs coherent with the interpretation provided. Given the small sample size which can lead to lack of significance in the estimations, this result is still important from an economic point of view.

19. The small change in private child-care choice is expected since the coefficient of public child-care availability on private demand is not significant in Table 11.

20. However, even if the samples have different compositions and it is not reasonable to assume that they are drawn from the same population, it is still possible to proceed in matching them by choosing one data set as the recipient (usually the most representative) and the other one as the donor. The final integrated data set will be representative of the recipient dataset's population.

21. However, it is not possible to generate one-to-one matching because the two surveys are of different sizes; we only impute the relevant information taken from an individual of the SHIW survey to an almost identical individual belonging 30 to the Multiscopo survey.

22. We exclude self-employed workers in order to have a more uniform sample for the matching procedure, and retired women because they are not relevant to the problem at hand (child-care opportunities for very young children). In particular, the number of retired women with very young children is negligible and we argue their elimination should not bias the results.

23. Descriptive statistics and comparisons are available on request from the authors.

24. They show that by definition individuals belonging to two different groups but with the same value propensity score have the same distribution of the full vector of observable X_i.

25. The choice of interaction or higher order term to include for estimating the propensity score is determined solely by the need to obtain an estimate of the propensity score that satisfies the balancing property (see Rajeev Dehejia and Sadek Wahba, 1999). To build the propensity score we follow the algorithm proposed by Rajeev Dehejia and Sadek Wahba (1998). We end up with 11 blocks when we impute women labor earnings and hours of work and 13 blocks when we impute household labor income and husband labor income; in each of them the score was balanced across the treated blocks and controls. Then, within each block, we test for equality of means between the treated and the

control groups for each of the variables in X_i. In almost every case we find equality of means of the X_i at the 10% confidence level, and none of the covariates systematically fails the test in all the blocks. The results are not reported, but are available on request from the authors.

26. The standard errors are computed by bootstrapping.

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