Cognitive and non-cognitive costs of daycare 0–2 for children in advantaged families

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ONLINE APPENDIX

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Appendix to Section 3: Theory

This part of the Online Appendix contains extensions and variants of the baseline model described in Section 3 of the main text.

Heterogeneity of effects across gender

The psychological literature mentioned in the Introduction and discussed in Section 7 of the main text suggests that gender differences in the effect of daycare time may be expected if girls are better equipped than boys at exploiting one-to-one interactions with adults for the development of their skills. To introduce this possibility in the model presented in the main text, we employ a simplified version of the technology of skill formation and we allow it to differ between boys and girls,

$$\theta = (1 + \lambda(f))(q_g y \tau_g + q_d(z)\tau_d) + \chi(f), \tag{A–1}$$

where $f = 1$ if the child is female and $f = 0$ otherwise, $\lambda(1) > \lambda(0) = 0$, and $\chi(f)$ is an unrestricted outcome shifter.[1] We also assume that parents make daycare decisions based on a belief $\tilde{\lambda}(1) \geq 0$ about $\lambda(1)$. To further simplify the exposition of the results, we assume here that a parent is offered some daycare program among those listed in the application set, i.e., we focus on case (L), defined in the main text as the case in which the alternative to the most preferred program is some less preferred program. Moreover, we assume $b = 1$, where b is the amount of care time required by the child in the model presented in the main text and the parent's time endowment is still normalized to 1.

Using Eq. A–1, the gender gap in the skill effect of a variation in daycare time induced by the offer of the most preferred program can be written as

$$\left.\frac{d\theta^*}{d\tau_d^*}\right|_{f=1} - \left.\frac{d\theta^*}{d\tau_d^*}\right|_{f=0} = -2q_g w(\tau_d^*|_{f=1} - \tau_d^*|_{f=0}) + \left.\frac{\lambda(1)}{1+\lambda(1)}\left(\frac{d\theta^*}{dz}/\frac{d\tau_d^*}{dz}\right)\right|_{f=1} - \left.q_d'(z)\frac{\tau_d^*}{d\tau_d^*/dz}\right|_{f=0}. \tag{A–2}$$

This gender gap has three components. The sign of the first one depends on the gender difference in the optimal daycare time chosen by a parent, which, using the interior solution for τ_d^* and the parental belief about gender differences, is

$$\tau_d^*|_{f=1} - \tau_d^*|_{f=0} = \frac{-\tilde{\lambda}(1)}{1+\tilde{\lambda}(1)}\frac{(w - k(z) - \phi y_{-1})}{2\alpha q_g w} \leq 0, \tag{A–3}$$

because $w - k(z) - \phi y_{-1} > 0$ at the interior solution for consumption. That is, the parent

[1] The shifter is unrestricted because the existence and sign of gender differences in cognitive or non-cognitive outcomes is controversial and our analysis is not affected by this issue.

chooses a weakly shorter daycare attendance for girls than for boys. This happens because if $\tilde{\lambda}(1) > 0$ and if the child is a girl, the marginal unit of parental time is more valuable at producing child ability than at consumption, therefore labor supply decreases, home care increases, and daycare time decreases, relative to the case in which the child is a boy. The sign of the second component, instead, depends on the sign of the skill effect for a girl, $\frac{d\theta^*}{dz}|_{f=1}$, given that $\frac{d\tau_d^*}{dz}|_{f=1} > 0$ because of Remark 1 in the main text. The sign of the third component is non-positive if daycare quality does not decrease between the most preferred daycare program and its best alternative, an assumption supported by the analysis of parents' preferences conducted in Section 4.1. of the main text.

A particularly relevant case that is supported by our data is that parents perceive no gender difference in the technology of skill formation, i.e., $\tilde{\lambda}(1) = 0$, even if $\lambda(1) > 0$. In this case, the optimal levels of daycare time do not differ between boys and girls ($\tau_d^*|_{f=1} = \tau_d^*|_{f=0}$), nor do parents' responses to the offer of the most preferred program ($\frac{d\tau_d^*}{dz}|_{f=1} = \frac{d\tau_d^*}{dz}|_{f=0}$).[2] Therefore, the gender gap in the skill effects of being offered $z = 1$ vs. $z < 1$ reduces to

$$\left.\frac{d\theta^*}{d\tau_d^*}\right|_{f=1} - \left.\frac{d\theta^*}{d\tau_d^*}\right|_{f=0} = \frac{\lambda(1)}{1+\lambda(1)}\left(\left.\frac{d\theta^*}{dz}\right|_{f=1} / \frac{d\tau_d^*}{dz}\right) - q_d'(z)\left.\frac{\tau_d^*}{d\tau_d^*/dz}\right|_{f=0}. \tag{A–4}$$

The sign of this expression depends on the sign of $\frac{d\theta^*}{dz}|_{f=1}$, which is negative for affluent households if Remark 2 of the main text holds. This implies a larger ability loss for a girl than for a boy in an affluent population. The findings described in Section 7 of the main text (and reported in greater detail in the Appendix to Section 7 below) are precisely consistent with this prediction and thus with the hypothesis that $\tilde{\lambda}(1) = 0$ and $\lambda(1) > 0$: the offer of the most preferred program induces the same increase of daycare time for both genders, but in affluent families the ability loss is larger for girls than for boys.

A more general model with specific features of the BDS

We next relax some major restrictions of the model used in the main text, so to be able to solve and calibrate a more general model embedding additional features of our institutional setting and delivering quantitative predictions of the skill effect of being offered the most preferred daycare program at any possible level of the FAI. This quantitative exercise allows

[2] This because

$$\frac{d\tau_d^*}{dz}|_{f=1} - \frac{d\tau_d^*}{dz}|_{f=0} = \frac{k'(z) - \frac{k'(z)}{(1+\tilde{\lambda}(1))}}{2\alpha q_g w},$$

which is zero if $\tilde{\lambda}(1) = 0$. The intuition is similar to the one for levels: the offer of a more preferred program weakly increases daycare quality, thereby making the marginal unit of daycare time more valuable to the parents of girls than to the parents of boys, provided they are aware of gender differences in the technology of skill formation.

us to characterize in a more realistic setting the heterogeneity of this effect by family affluence, and specifically the possibility of the existence of a FAI level at which the effect turns negative. Moreover, using the empirical density of the FAI, we show that while the estimand predicted by the model for the entire population of applicants in all baskets is positive, the corresponding estimand for the more affluent applicants in Basket 4 is negative.

Setup

Let parents' preferences be represented by $\ln c + \alpha \ln \theta$, and the skill production function by $\theta = \tau(y)^{\xi} + \underline{\theta}$, where τ is a nonlinear aggregator (to be specified below) of time spent in 1:1 interaction with an adult in alternative child care modes (weighted by the quality of the interaction, which depends on household affluence), $\xi > 0$, and $\underline{\theta}$ is a constant minimum ability level. We allow the parent to also acquire child care time from the market, τ_m, at price π_m per unit of time. Although for brevity we refer to τ_m as "market" child care, we include in this category both extended family caregivers (e.g., grandparents and other relatives, whose services have some cost as well) and market services strictly defined (e.g., babysitters, nannies, and private daycare).[3] Assume that there are only two daycare programs: the most preferred, labeled P (program $z = 1$ in the model presented in the main text), and the less preferred, labeled L ($z < 1$). As before, the price of daycare reflects a transportation cost, k, and an income-based fee, $\phi(y_{-1})$, which is now nonlinear, so that $\pi_d^j = k^j + \phi(y_{-1})$, $j = \{P, L\}$. We assume $\pi_d^P \leq \pi_d^L$ because of the weakly lower transportation cost associated with the preferred program (see Table 1 in the main text).

Daycare is rationed, and offers are made based on eligibility cutoffs relative to past income, y_{-1}. Using $\mathcal{Y}^P$ and $\mathcal{Y}^L$ to denote the thresholds for admission to programs P and L, consider a neighborhood of $\mathcal{Y}^P$ and define $\mathcal{Y}^M \equiv \max\{\mathcal{Y}^L, \mathcal{Y}^P\}$. If $y_{-1} \leq \mathcal{Y}^P$, the ordering of $\mathcal{Y}^L$ and $\mathcal{Y}^P$ is irrelevant and the child is offered P. If $y_{-1} > \mathcal{Y}^P$, instead, the outcome depends on this ordering. Let μ, like in Section 6 of the main text, denote the probability that $\mathcal{Y}^M = \mathcal{Y}^L \geq \mathcal{Y}^P$. In this case the child is offered L. If $\mathcal{Y}^M = \mathcal{Y}^P \geq \mathcal{Y}^L$, which occurs with probability $1 - \mu$, then the child does not qualify for any daycare program. This case is labeled N. Once an outcome in $\{P, L, N\}$ is determined, qualified households choose their optimal daycare time τ_d. For not qualified households, $\tau_d = 0$.

Parental, market, and daycare time are aggregated into a single input by a CES function,

$$\tau = (q_g(y)\tau_g^{\rho} + q_m(y)\tau_m^{\rho} + \mathbb{I}[y_{-1} \leq \mathcal{Y}^M] q_d^j \tau_d^{\rho})^{\frac{1}{\rho}}, \quad j = \{P, L\}, \tag{A–5}$$

where $q_g(y)$ and $q_m(y)$ – the quality of parental and market care – are increasing functions of

[3] We assume for simplicity that π_m is an average price not changing with the composition of τ_m. See below for the details on the calibration of this parameter.

household income. This formulation captures the idea that market child care, being chosen by parents, is complemented by the same resources used in parental care.

Like in the model employed in the main text, the parent chooses working time, h, consumption, c, and the child care arrangement (τ_g, τ_m, τ_d) so to maximize utility, subject to the technology of skill formation, the budget constraint, $c+\pi_m(1-\tau_g-\tau_d)+\pi_d^j\tau_d = wh+B\mathbb{I}[h=0]$, where B represents a capped non-employment benefit in case of no labor income, the time constraint, $h+\tau_g = 1$, a child care requirement constraint, $\tau_g+\tau_m+\tau_d = 1$, and the daycare availability constraint. The model has solutions that can be grouped into three relevant cases for the theoretical interpretation of our RD estimand: the household is offered the preferred program (case P, associated with an ability level of θ^P), the less preferred program (case L, θ^L), or no daycare (case N, θ^N).

In this setting, the percentage change in child ability induced by the offer of the most preferred daycare program to a household with earnings y is approximated by

$$\Delta \ln \theta(y) = \ln \theta^P(y) - \mu \ln \theta^L(y) - (1-\mu) \ln \theta^N(y), \tag{A–6}$$

and the ITT-RD estimand around Preferred thresholds is, under the same continuity conditions discussed in the main text,

$$\beta_{ITT} = \mathbb{E}_{\mathcal{F}(\mathcal{Y}^P)} \left[(\bar{\vartheta}^P(\mathcal{Y}^P) - \mu\bar{\vartheta}^L(\mathcal{Y}^P) - (1-\mu)\bar{\vartheta}^N(\mathcal{Y}^P)) \right], \tag{A–7}$$

where $\mathcal{F}(\mathcal{Y}^P)$ is the distribution of Preferred FAI thresholds and $\bar{\vartheta}^P$, $\bar{\vartheta}^L$, and $\bar{\vartheta}^N$ are the population averages of the logs of θ^P, θ^L, and θ^N in a neighborhood of a Preferred threshold $\mathcal{Y}^P$.

Calibration

We solve the model numerically after calibrating the parameters as follows. For preferences, we set $\alpha = 0.25$, a value taken from estimates for Italy of the degree of intergenerational altruism provided by Bellettini, Taddei, and Zanella (2017). As for the skill production function, we set $\xi = 0.9$ and $\rho = 0.48$. These values are chosen to illustrate that it is possible to observe a positive average skill effect of qualifying for the preferred program in the universe of applicants to the BDS and, at the same time, a negative effect in the sample of more affluent dual-earner households that is the focus of our analysis. This same logic guides our choice of $\underline{\theta}$, which is set to reflect the ability level (expressed in model units) of the child from the least affluent model household who is offered the less preferred program (0.6). The $q_g(y)$ and $q_m(y)$ functions are assumed to be logistic and such that, for each parent, the quality of market daycare is 90% the quality of own parental care. Specifically, we set $q_g(y) = (1 + 15\exp(-2y - 0.5))^{-1}$, so that maximum parental quality is 1, and $q_m(y) = 0.9q_g(y)$.

Turning to institutional parameters, the probability that the Preferred and the Maximum thresholds coincide, $1 - \mu$, is predicted for the Basket 4 universe by a logistic regression as a function of the FAI and its square. The estimated probability is increasing in the FAI, indicating that Maximum and Preferred thresholds are more likely to coincide at higher levels of the Preferred threshold, as one should expect (as illustrated below, in this quantitative model there is one Preferred threshold at each level of the FAI), ranging from 0.04 at a FAI of 2k, to 0.58 at a FAI of 70k. Similarly, we input into the model the actual daycare fee schedule $\phi(y_{-1})$ described in footnote 25 of the main text.

The transportation cost component of the daycare price is assumed to be zero for the most preferred program, which on average is the one closest to home (see Table 1 in the main text). For the less preferred program, we assume that it takes 30 extra minutes to reach the facility,[4] and the value of this time is set equal to 1/16 (i.e., half an hour in a 8-hour working day) the wage of the provider of market daycare. The price of market daycare services, in turn, is calibrated to match the average annual wage of a babysitter in the city of Bologna, as calculated from jobpricing.it. This average is €20k per year, or about 37% the average household income among the universe of applicants to the BDS in our data, which is about €54k (both values are expressed in constant 2010 euros). Therefore, because in the model average household income is normalized to 1, we set $\pi_m = 0.37$. The non-employment benefit B is instead set at 0.1 of the average income, reflecting the prevailing levels in Italy at the time of the analysis.[5]

Finally, the quality of daycare is calibrated to reflect the difference in one-to-one interactions between daycare and parental care in a household with average income. Based on our calibration of $q_g(y)$, the former is about 0.45. Assuming that the BDS complements interactions in daycare with the same resources as the average household, then moving from an adult to child ratio of 1:1 at home to an adult to child ratio of 1:4/1:6 in daycare should reduce by 4/5 child care quality with respect to the average household. Therefore, based on the evidence in the main text that the preferred facilities are, on average, approximately of the same quality (or at most slightly better) than the less preferred ones, we set $q_d^P = 0.11$ and $q_d^L = 0.08$.

The results of the numerical solution are plotted in Figures A–1 and A–2. The first

[4]As shown in Table 1 of the main text, the difference in the distance from home between the the most preferred program and the average of the ranked less preferred programs is about 750 meters, which, according to Google Maps, in Bologna can be covered by an adult in approximately 8 minutes, so that 30 minutes is about the total time for delivery and pick-up of the child.

[5]See the "Decreto Legislativo" n. 151 of 26/03/2000.

three panels of Figure A–1 plot the optimal child care arrangement chosen by the parent when the child is offered the preferred program, the less preferred one, and no program, respectively, as a function of the FAI. These panels exhibit the following patterns. First, conditional on being offered admission, more affluent households use less daycare, because of the higher quality of the two home-based care modes (the daycare lines in the top two panels of Figure A–1 are downward sloping). This prediction can be tested and is confirmed by our data: regressing the number of days spent in daycare on FAI as well as on grade and year fixed effects in the group of 5,897 children in Basket 4 who were offered admission at their first application, the estimated coefficient on FAI is –0.81 (robust s.e. 0.10).[6]

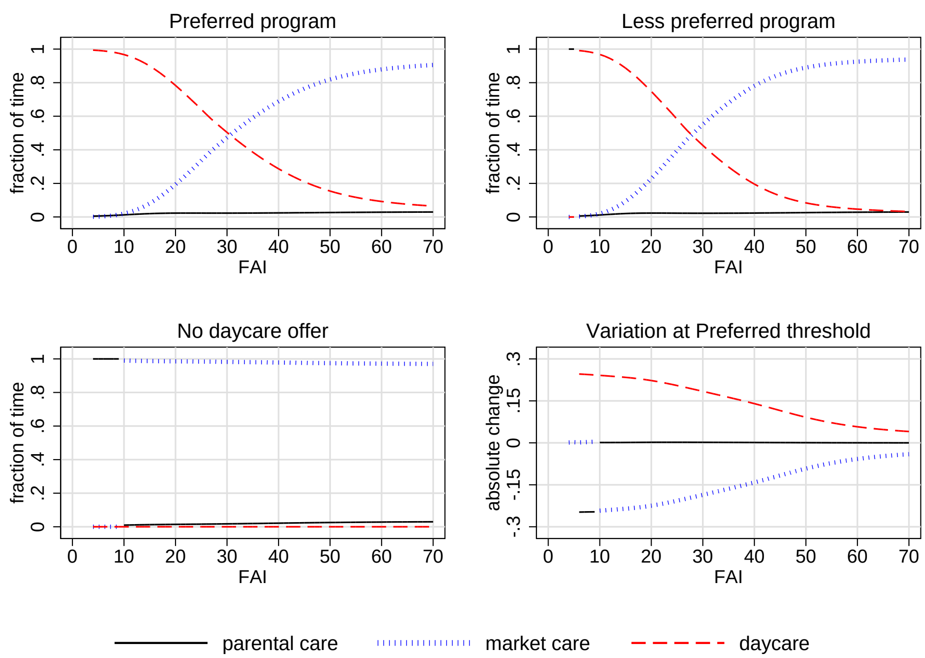
Second, a comparison of the vertical height of the daycare lines between the top two panels shows that parents use more daycare at any level of the FAI when offered the preferred program, because of the lower transportation cost and the weakly higher quality. For the universe of children in Basket 4, this is shown in the left panel of Figure A–7; for the interview sample, the corresponding evidence is in Figure A–12. How this variation changes at different levels of the FAI is shown by the daycare line in the fourth panel, which describes the change in the optimal child care arrangement when the child crosses the threshold for the preferred program at each level of affluence. As in the baseline model (Remark 1) and in the data, we see that the change in optimal daycare time is positive but smaller at higher levels of the FAI. We also see in this panel that the offer of the preferred program allows the sufficiently affluent household to economize on market care (the market line indicates negative changes after a FAI level of about €9k, corresponding to a gross annual family income of approximately €24k). This reduction is smaller for households that are progressively above the €9k level because they can access a market care of increasingly higher quality.

At low levels of the FAI, below €9k, the patterns are influenced by the fact that the cost of market care exceeds the earning potential of the parent, who therefore spends all her time with the child in case of no daycare offer (bottom left panel). As a results, in this range of FAI levels, qualification for the preferred program induces no change of market care usage and a decrease of time spent by parents with their children (bottom right panel). At the €9k FAI level we observe a discontinuity in the behaviour of parents: above this level of affluence the parent is always employed, parental care does not change with qualification for the most preferred program, and the parent just substitutes market care with daycare. Another discontinuity is observed at a FAI of €5k (approximately €13k of annual family income), a level below which a parent who is offered the less preferred program prefers to

[6]The remaining 678 children to reach the total of 6,575 in Basket 4 were not offered admission at their first application because they were relatively more affluent. If we include them in the sample for this test, they mechanically induce a negative relation between the FAI and days of attendance. Indeed, when they are included, the estimated coefficient on FAI is –1.43 (robust s.e. 0.13).

turn down the offer, provide full-time parental care, and live off the unemployment benefit (top-right panel). Below this level, the parent is at the same corner solution both in the L and in the N cases, and so the offer of the preferred program induces a downward jump of nearly 100 percentage points in the fraction of time the child is in parental care, fully substituted by an increase in daycare time.[7]

Figure A–1: Child care arrangement and its variation at the Preferred threshold, by FAI



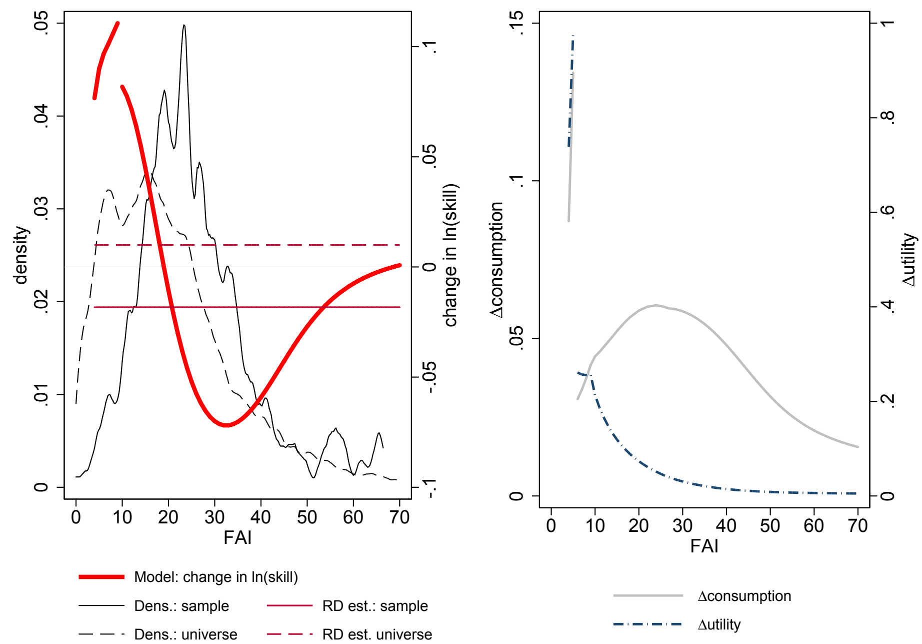
Notes: The figure shows the child care arrangement optimally chosen by the parent when the child is offered the preferred program (top-left), the less preferred program (top-right), and no program (bottom-left), as well its variation at the preferred threshold (i.e., when the child is offered the preferred program, bottom-right) as a function of the FAI. The data are generated by a numerical solution of the calibrated model.

The percentage variation in child ability when the child is offered the preferred program (Eq. A–6) is given by the thick line shown in the left panel of Figure A–2. For each level of the FAI, this is the effect for a child with that FAI and whose preferred program has a hypothetical threshold exactly equal to that same FAI. Like in the baseline model, there exists a FAI level such that the effect is positive for less affluent households and negative for more affluent ones. Our calibration implies that this sign reversal occurs at a FAI of about €18k, roughly equivalent to a gross annual family income of €48k. We also see in this figure that at very high levels of affluence the negative skill effect decreases in absolute size after reaching a minimum at a FAI of about €33k (gross annual family income of about €88k).

[7]These extreme changes are omitted from the bottom-right panel to preserve a readable scale of the graph.

The reason is that very affluent parents are relatively less inclined to increase daycare time following the offer of the preferred program (fourth panel of Figure A–1). As a consequence, the negative ITT-RD estimand approaches zero at very high levels of the FAI.

Figure A–2: Variation of IQ, consumption, and utility at the Preferred threshold, by FAI



Notes: The thick line in the left panel shows the change in log ability, denoted ln(skill), of the child at the preferred threshold (i.e., when the child is offered the most preferred program) as a function of the FAI. This is generated by a numerical solution of the calibrated model. Superimposed on this figure are the empirical densities of the FAI in the interview sample (dens.: sample) and in the universe of applicants to the BDS across all baskets (dens.: universe), obtained via kernel density estimation with a triangular kernel and a bandwidth of 5. Applying these empirical weights to the change in ln(skill) produced by the model yields the two horizontal lines, which represent the ITT-RD estimands of the skill effect of qualifying for the preferred daycare program in the interview sample of Basket 4 (RD est.: sample) and in the universe of applicants to the BDS across all baskets (RD est.: universe). The right panel shows the variation in household consumption and parental utility at the preferred threshold as a function of the FAI, as generated by the numerical solution.

At very low levels instead (below the €9k FAI level), qualification for the preferred program allows the parent to move from non-employment to work and thus to increase resources that complement the infra-marginal home care time in the production of child ability. This increase in resources is larger at higher levels of earning potential and this explains why the thick line is upward sloping in this range, up to a discontinuity point which corresponds to the one observed in the bottom-left panel of Figure A–1. In the range between the €9k and the €33k FAI levels, the thick line is downward sloping because the increase in resources for infra-marginal home care time triggered by the offer of the preferred program does not compensate the effect of decreasing parental time of progressively higher quality.

Superimposed on this figure are the empirical densities of the FAI in the interview sample and in the universe of applicants to the BDS. By integrating the changes in ln(skill) generated by the model with respect to these distributions, it is possible to obtain quantitative predictions of the RD effect of qualifying for the most preferred program in these two samples.[8] The result is given by the two horizontal lines in the left panel of Figure A–2. In our sample, which is shifted towards higher levels of the FAI, the model predicts an average negative effect of about -1.8%. However, the model also predicts a positive average effect of about $+1.0\%$ in the universe of applicants to the BDS, where the incidence of less affluent households is higher. The right panel of Figure A–2 shows the variation in household consumption and parental utility following the offer of the preferred program. These changes are always positive.

Dynamic model

The parental decision to send a child to daycare has intertemporal dimensions that are relevant for the interpretation of our estimates. First, as suggested by Cunha, Heckman, and Schennach (2010) there is evidence of dynamic complementarities in cognitive skill formation: an early parental investment in the production of these skills increases the return to later investment. Second, the psychological literature (see Section 7) indicates that parental time with children is relatively more crucial for skill formation when they are very young, while at older ages interactions with other adults and with peers acquire more relevance. Third, there is evidence (see, for instance, Lalive and Zweimüller, 2009) that delaying the return to work after the birth of a child is costly for a parent in terms of future wages and career prospects. A longer delay would not only reduce household consumption, but also family resources that could be later devoted to complement parental interactions with children for a more effective investment in their ability. Therefore, a household faces a dynamic trade-off, which is illustrated below keeping only the relevant features of the baseline model. We assume that the first three years of life of a child (period "age 0–2"), can be divided in two sub-periods, $t \in \{0, 1\}$. The parent decides whether to apply for daycare in sub-period 0 and then again in sub-period 1. Denoting with s_t an indicator taking value 1 if an application is filed in sub-period t, there are four possible combinations defined by $\{s_0, s_1\}$. A parent does not apply for daycare in a sub-period when, even if the child is admitted to her preferred program, her utility from daycare attendance is lower than the utility of staying at home with the child. Therefore, to analyze the participation decision we focus on the preferred

[8] This exercise is in the spirit of Bertanha (2017), who suggests an estimation procedure to extrapolate from the average treatment effect on the observed distribution of subjects at the available cutoffs, to a more general average effect based on the entire distribution of subjects. This procedure cannot be applied in our case, due to the small sample size, but we aim for a similar goal with the calibration described here.

program only, $z = 1$, which is assumed to have a quality $q_d(1) = q_d$ and a cost of attendance $\pi_d = k(1) = k$. Note that this cost of attendance does not depend on family affluence (i.e., $\phi = 0$) and relates only to the distance of the preferred program from home. This assumption simplifies the analysis at no loss of generality and is in line with the low cap on attendance fees that effectively characterizes the BDS see footnote 25 of the main text).

Daycare attendance is treated as a discrete choice in each sub-period: $\tau_{dt} \in \{0, 1\}$. That is, we abstract from the within-sub-period decision concerning days of attendance, and focus on the intertemporal variation across sub-periods, which goes from a minimum of 0 in the combination $\{0, 0\}$ to a maximum of 2 in the combination $\{1, 1\}$. The problem faced by the parent is, therefore:

$$\max_{c,\tau_{d0},\tau_{d1}} \; c + \alpha\theta \text{ s.t.} \begin{cases} c = (w-k)(\tau_{d0} + \tau_{d1}) + \gamma\tau_{d0}\tau_{d1} \\ \theta_0 = q_{g0}(1 - \tau_{d0}) + q_d\tau_{d0} \\ \theta_1 = q_{g1}(1 - \tau_{d1}) + q_d\tau_{d1} \\ \theta = \theta_0 + \theta_1 + \theta_0\theta_1 + w(\tau_{d0} + \tau_{d1}) + \gamma\tau_{d0}\tau_{d1} \\ \tau_{d0} \in \{0, 1\} \\ \tau_{d1} \in \{0, 1\} \end{cases} \tag{A–8}$$

where we set $q_{g0} > q_{g1}$ to reflect the assumption that the quality of parental time with a child is higher in the first sub-period. The term γ captures instead the wage premium for labor market attachment, which gives more resources for both consumption and skill formation in addition to baseline earnings $w(\tau_{d0} + \tau_{d1})$.

Utility at the optimum, V_{s_0,s_1}, derived by the parent in the four possible combinations is:

$$\begin{aligned} V_{0,0} &= \alpha(q_{g0} + q_{g1} + q_{g0}q_{g1}), \\ V_{0,1} &= w - k + \alpha(q_{g0} + q_d + q_{g0}q_d + w), \\ V_{1,0} &= w - k + \alpha(q_d + q_{g1} + q_dq_{g1} + w), \\ V_{1,1} &= 2(w - k) + \gamma + \alpha(q_d + q_d + q_d^2 + 2w + \gamma). \end{aligned}$$

A comparison of these values reveals that the decisions about whether and when to apply depend on household affluence in the way summarized by the following remark.

Remark A–1 *Under the assumption that the quality of parental care is sufficiently higher in sub-period 0 than in sub-period 1,*[9] *less affluent families are more likely to delay daycare*

[9]Specifically, it must be that

$$q_{g0} - q_{g1} > \gamma\frac{(1 + \alpha)}{\alpha} + q_d^2 + q_{g0}(q_{g1} - 2q_d). \tag{A–9}$$

application or to not apply at all. More precisely, let T_{0100} be the affluence level at which the parent switches from $\{s_0, s_1\} = \{0, 0\}$ to $\{s_0, s_1\} = \{0, 1\}$, and similarly for T_{1101}. These values are:

$$T_{0100} \equiv \frac{k + \alpha(q_{g1} - q_d)(1 + q_{g0})}{1 + \alpha} \tag{A–10}$$

$$T_{1101} \equiv \frac{k - \gamma(1 + \alpha) + \alpha(q_{g0} - q_d)(1 + q_d)}{1 + \alpha}. \tag{A–11}$$

If

$$w < T_{0100} \tag{A–12}$$

the parent never applies for daycare. If

$$T_{0100} < w < T_{1101} \tag{A–13}$$

the parent stays with the child in sub-period 0 and applies for daycare only in sub-period 1. If

$$T_{1101} < w \tag{A–14}$$

the parent applies in both periods.

We cannot test empirically the predictions of Remark A–1 because we do not observe potential applicants who did not apply to the BDS. However, indirect evidence is offered by the comparison of the average FAI of the households who first apply at age 0, which is €24.7k, or at age 1, which is instead €23.8k. Although not statistically significant at conventional levels (p-value: 0.11), this difference indicates that on average the parents who delay by one year after birth their first application are less affluent, while those who first apply immediately after birth tend to be more affluent.[10] Note that this finding does not contradict Remark 2 in the main text or Figure A–1: affluent parents prefer to anticipate the application for the reasons discussed here, but this is compatible with a smaller reaction to the offer of a more preferred program or with a shorter daycare attendance conditional on positive attendance.

Given that the continuity conditions are satisfied in our empirical application, the finding that affluence induces parents to apply as early as possible after birth does not constitute a threat for identification.[11] This finding, however, is relevant for the interpretation of Remark

[10] If q_{g0} were not sufficiently higher than q_{g1} (i.e., if condition A–9 were not satisfied), we would not be able to rank T_{0100} and T_{1100} and the relationship between affluence and the decision about whether and when to apply for daycare would be more blurred. The indirect evidence reported above suggests this is not a concern in our setting.

[11] The reason is that this estimand compares the ability of children whose parents have the same level of

2 in the main text and thus for the sign of the estimate in the case of relatively more affluent parents. If these parents apply for daycare earlier than the less affluent ones, then the negative skill effect for the more affluent induced by qualification for the most preferred program may reflect early attendance, i.e., the deprivation of valuable home resources when these are most effective.

Under different hypotheses, the three theoretical extensions that we have analyzed lead to similar predictions: when offered the most preferred daycare program, as opposed to a less preferred one, relatively affluent parents take advantage of this opportunity to increase daycare attendance of their children and so work more or reduce costly market care. Even if this increase in daycare attendance is smaller than the one occurring in a less affluent household, it generates an increase of family resources that is large enough to become attractive even at the cost child ability.

affluence and who differ only by whether they are offered their preferred program or not.

Appendix to Section 4: Institutional setting and administrative data sources

How the Family Affluence Index is constructed

The Family Affluence Index is the ISEE (*Indicatore della Situazione Economica Equivalente*), an index of family income and net wealth that is used by the Italian public administration to determine access priority and fees for a wide range of public services, including public daycare. For the years we consider (2001-2005), the index is computed in three steps. First, earnings of all family members living in the household are added to the income from financial activities in a given year. The latter is estimated by applying the average interest rate on 10-year government bonds during the previous year to all financial assets held by family members. If the family pays a rent for its primary dwelling, then an allowance of up to about €5,000 is subtracted from this total income component. Denote with I_{it} the final income component.

Second, the net wealth component is the sum of the values of all non-housing assets (at face value, except for stocks which are priced at their market value at the end of the previous year), and the value of the housing stock (register value), net of the maximum between about €50,000 and the residual value of all mortgage loans for which that stock is a collateral. A further allowance of up to about €15,000 can be subtracted from the value of non-housing assets. The 20% of such measure of net wealth is the net wealth component, denoted here by W_{it}.

Finally, the resulting total income and net wealth index is adjusted for family size by dividing the total income and net wealth components by a concave transformation of family size: 1.00 for a single-person household, 1.57 for a two-person household, 2.04 for three members, 2.46 for four members, 2.85 for five members. For households with more than five members, a coefficient of 0.35 is added to the family size factor for each additional member from the sixth onward. The family size factor is further increased by 0.2 if the household has a single-parent with children below 18, 0.2 if the household has two-working-parents , and 0.5 for each family member with a permanent disability. Denoting with S_{it} the family size factor, the FAI index is: $Y_{it} = (I_{it} + W_i)/S_{it}$.

Additional figures and tables for Section 4

Table A–1 describes the distribution of the Family Affluence Index (FAI) across the five priority groups ("baskets") used by the Bologna Daycare System (BDS) to rank applicants before they are ordered by FAI within each basket. The analysis of the main text is restricted to Basket 4, i.e., dual-earner households with cohabiting parents. As shown in the table, this group comprises 70% of all applicants and contains, on average, the most affluent households among the applicants to the BDS. Moreover, Final FAI thresholds typically fall in this basket. Note that the minimum FAI is always zero. This is so because in every basket there is at least one household with zero taxable income and non-positive net wealth in at least one year between 2001-2005. The last column of Table A–1 provides an estimate of the annual household income corresponding to a given FAI level, expressed in 2010 €. This estimate is computed from http://calcoloisee.it/ for a family of 4 (a family of 3 for Basket 3) with a stock of assets of €18.5k. We average the implied income values of two types of households: non-homeowner paying an annual rent of €5.7k; homeowner with a net housing wealth of €170k. All these values are expressed in 2010 €, and are taken from the Bank of Italy's Survey of Household Income and Wealth for comparable households in Northern Italy. This is also the estimation procedure used in the main text whenever a given FAI level is translated into annual household income.

Table A–1: FAI distribution across baskets.

Basket	Description	N children	Mean FAI	st. dev.	Min	Max	Income
1	Disabled child	90	1.3	5.9	0	36.5	4.0
2	Socially assisted	549	1.0	4.0	0	55.3	3.5
3	Single-parent	869	12.4	15.3	0	193.6	30.5
4	Two working parents	6,575	24.9	20.5	0	515.0	67.0
5	One working parent	1,417	12.1	16.5	0	218.2	32.5
All		9,500	20.3	20.2	0	515.0	53.5

Notes: The table describes the distribution of the Family Affluence Index (FAI, thousand €) in the five priority groups ("baskets") at the Bologna Daycare System. The last column contains an estimate of the annual household income (thousand €) underlying a specific mean FAI, and is calculated from http://calcoloisee.it/ for a family of 4 (a family of 3 for Basket 3) with a stock of assets of €18.5k. We average the implied income values of two types of households: non-homeowner paying an annual rent of €5.7k; homeowner with a net housing wealth of €170k. All these values are expressed in real 2010 €, and are taken from the Bank of Italy's Survey of Household Income and Wealth for comparable households in Northern Italy. The minimum is always zero because in every basket there is at least one household with zero taxable income and non-positive net wealth in at least one year between 2001-2005. Sample: universe of children born between 1999 and 2005 whose parents first applied for admission to daycare between 2001 and 2005 and whose FAI is not missing (the total including observations with missing FAI is 9,667.)

Table A–2 describes the characteristics of daycare programs and the corresponding facilities to which households in the Basket 4 universe have applied for admission. The table distinguishes between all programs and facilities, those characterized by rationing of daycare spaces, and those actually associated with invited and participating children. The table shows that grade 0 (applicants for entry in daycare during the first year of life) was slightly oversampled in our data collection design. This is the most interesting group to study the cognitive effects of very early daycare attendance. Moreover, charter programs are under-represented in our sample. Also note that the average quality (as measured by the reputational indicator described in Section 4.1 of the main text) is higher for programs and facilities characterized by rationing.

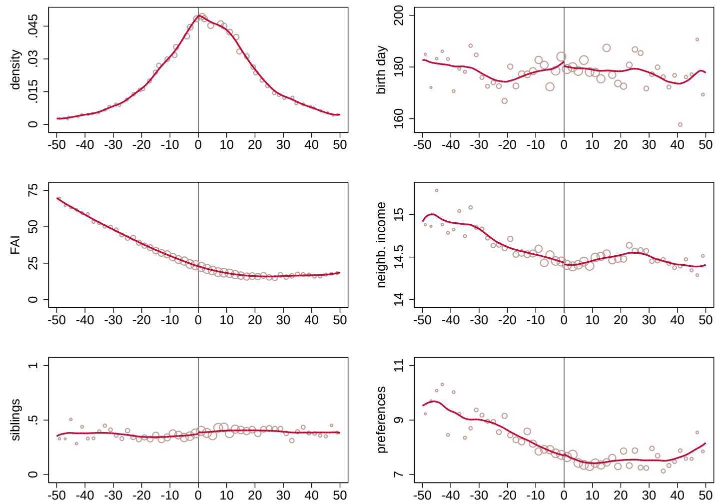
Table A–2: Descriptive characteristics of programs and facilities

	Program characteristics							
	Programs (number)	Grade 0 (%)	Grade 1 (%)	Grade 2 (%)	Part-time (%)	Charter (%)	Quality (mean)	Distance (mean)
All B4	890	22.25	37.42	40.34	23.71	3.82	0.041	4.120
Ration B4	545	31.19	40.18	28.62	19.08	2.39	0.144	4.092
Invited	400	37.25	40.75	22.00	16.50	1.50	0.155	4.137
Interview	296	40.54	41.22	18.24	15.20	1.35	0.186	4.125
	Facility characteristics							
	Facilties (number)	Grade 0 (%)	Grade 1 (%)	Grade 2 (%)	Part-time (%)	Charter (%)	Quality (mean)	Distance (mean)
All B4	65	30.32	40.62	29.06	14.33	10.77	0.105	4.119
Ration B4	63	36.74	38.85	24.41	13.74	9.52	0.154	4.124
Invited	57	39.83	43.08	17.08	12.08	0.05	0.173	4.188
Interview	53	43.37	40.39	16.24	11.75	0.04	0.194	4.186

Notes: The table describes the characteristics of daycare programs (top panel) and facilities offering these programs (bottom panel) in four different samples, all referring to years 2001 to 2005 (pooled): all programs and facilities in the Basket 4 universe (All B4); programs and facilities with rationing of daycare spaces in the Basket 4 universe (Ration B4); programs and facilities where the households invited to participate in the study had applied for admission (Invited); programs and facilities where the households participating in the study had applied for admission (Interview). "Distance" is the distance (in km) between the applicant's home and the facility. Quality is a reputational indicator described in Section 3 of the main text.

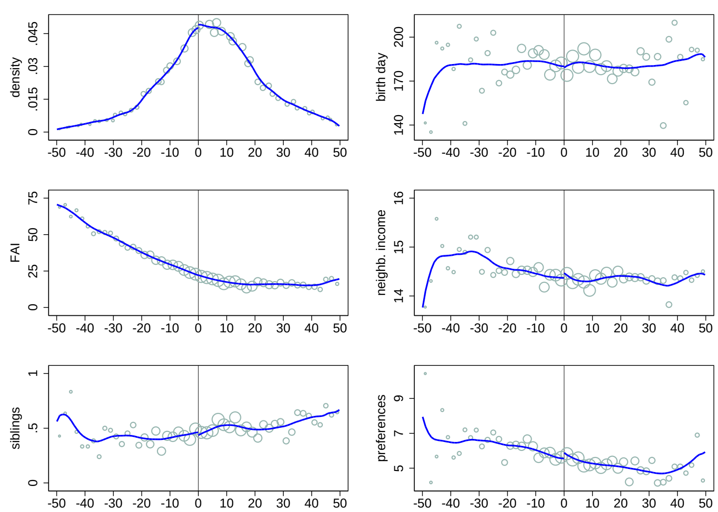
Figures A–3 and A–4 show the continuity, in the Basket 4 universe, of the FAI density and of the mean of pre-treatment covariates at Final and Preferred FAI thresholds, respectively. The corresponding Canay and Kamat (2018) tests of the continuity of the distribution of these covariates are reported in columns 1 and 2 of Table 2 of the main text.

Figure A–3: Density of distance and continuity of the mean of covariates around Final FAI thresholds



Notes: The circles represent the frequency distribution (top-left panel) and the average of five pre-treatment variables (remaining panels) inside €2k bins, plotted as a function of the distance (thousands of real €) of a child's FAI from her Final FAI threshold. The size of a circle is proportional to the number of observations in the corresponding €2k bin. The bold lines are LLR on the underlying individual observations, with a triangular kernel and optimal bandwidth selection, from Calonico *et al.* (2014b). FAI stands for Family Affluence Index. Sample: 5,861 children with two working parents, born between 1999 and 2005 whose parents first applied for admission between 2001 and 2005 to programs with rationing, whose FAI distance from the Final FAI thresholds is at most €50k and is different from zero.

Figure A–4: Density of distance and continuity of the mean of covariates around Preferred FAI thresholds



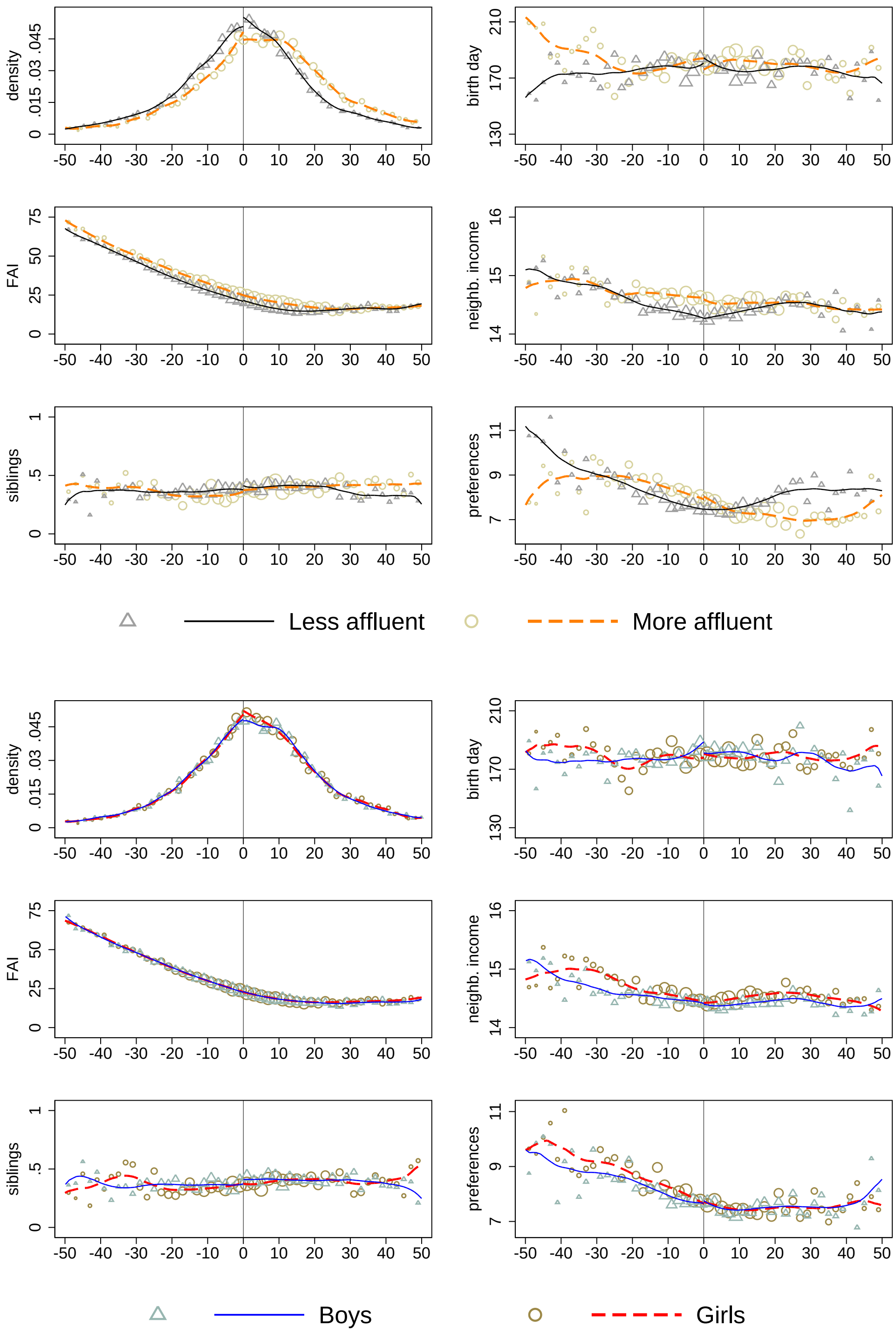
Notes: The circles represent the frequency distribution (top-left panel) and the average of five pre-treatment variables (remaining panels) inside €2k bins, plotted as a function of the distance (thousands of real €) of a child's FAI from her Preferred FAI threshold. The size of a circle is proportional to the number of observations in the corresponding €2k bin. The bold lines are LLR on the underlying individual observations, with a triangular kernel and optimal bandwidth selection, from Calonico *et al.* (2014b). FAI stands for Family Affluence Index. Sample: 5,101 children with two working parents, born between 1999 and 2005 whose parents first applied for admission between 2001 and 2005 to programs with rationing, whose FAI distance from the Final FAI thresholds is at most €50k and is different from zero.

Figures A–5 and A–6 show the continuity, by affluence group and by gender, of the FAI density and of the mean of pre-treatment covariates at Final and Preferred FAI thresholds, respectively. Each figure splits the Basket 4 universe by level of the Preferred FAI threshold in the top panel and by gender in the bottom panel.

In the top panels, the density for more affluent households is shifted to the right relative to the density of less affluent ones. To see why this is the case, consider first Figure A–4, where the rightward shift is more pronounced. Remember that a household is defined as being relatively "more affluent" if it is associated with a Preferred FAI threshold above the median. A large value of the Preferred threshold means that there is little rationing in the corresponding program, and so there are relatively more households at the right of this program's threshold than at the left. Therefore, in the sample of more affluent households the density is mechanically shifted to the right. The fact that this is the case also in Figure A–3 where Final FAI thresholds are considered (although in a less pronounced way), is just a reflection of the fact that each Preferred FAI threshold is also a Final FAI thresholds.

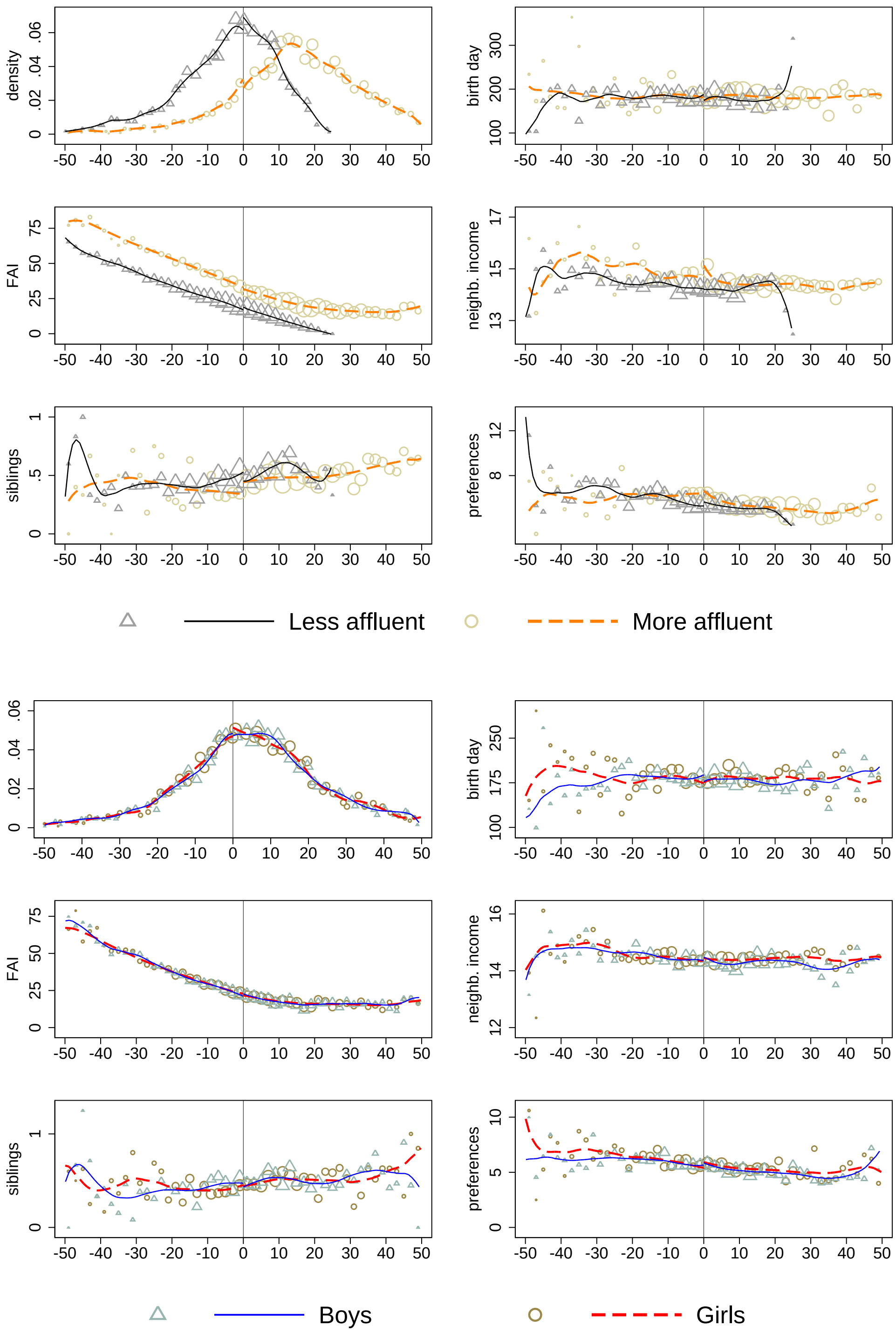
The corresponding Canay and Kamat (2018) tests of the continuity of the distribution of these covariates by affluence and by gender are reported in columns 1 and 2 of panel A of Tables A–3, A–4, A–5, and A–6. Specifically, columns 1 and 2 in **Table A–3** report p-values of tests for the continuity of the distribution of pre-treatment covariates in the universe for children from less affluent household (defined in all cases as children whose Preferred FAI threshold is below the median in the interview sample, i.e., 23.2k). Columns 1 and 2 in **Table A–4** report p-values of the corresponding tests for children from more affluent households. Columns 1 and 2 in **Table A–5** report p-values of tests for the continuity of the distribution of pre-treatment covariates in the universe and in the interview sample for boys. Columns 1 and 2 in **Table A–6** report p-values of the corresponding tests for girls. In few cases only, the p-value is smaller than 5%.

Figure A–5: Density of distance and continuity of the mean of covariates around Final FAI thresholds, by affluence group and by gender



Notes: The circles and triangles represent the frequency distribution and the average of five pre-treatment variables inside €2k bins, plotted as a function of the distance (thousands of real €) of a child's FAI from her Final FAI threshold, by level of the Preferred FAI threshold (top panels) and by gender (bottom panels). "Less affluent" and "More affluent" are observations associated with Preferred FAI thresholds below or above the median Preferred FAI threshold, respectively. The size of a circle or a triangle is proportional to the number of observations in the corresponding €2k bin. The bold lines are LLR on the underlying individual observations, with a triangular kernel and optimal bandwidth selection, from Calonico *et al.* (2014b). FAI stands for Family Affluence Index. Sample: 5,089 children with two working parents, born between 1999 and 2005 who first applied for admission between 2001 and 2005, whose FAI distance from the Final FAI thresholds is at most €50k and is different from zero.

Figure A–6: Density of distance and continuity of the mean of covariates around Preferred FAI thresholds, by affluence group and by gender



Notes: The circles and triangles represent the frequency distribution and the average of five pre-treatment variables (remaining panels) inside €2k bins, plotted as a function of the distance (thousands of real €) of a child's FAI from her Preferred FAI threshold, by level of the Preferred FAI threshold (top panels) and by gender (bottom panels). "Less affluent" and "More affluent" are observations associated with Preferred FAI thresholds below or above the median Preferred FAI threshold, respectively. The size of a circle or a triangle is proportional to the number of observations in the corresponding €2k bin. The bold lines are LLR on the underlying individual observations, with a triangular kernel and optimal bandwidth selection, from Calonico *et al.* (2014b). FAI stands for Family Affluence Index. Sample: 5,101 children with two working parents, born between 1999 and 2005 who first applied for admission between 2001 and 2005, whose FAI distance from the Preferred FAI thresholds is at most €50k and is different from zero.

Table A–3: Continuity of the distribution of pre-treatment covariates for children in less affluent households, p-values.

Covariate	Final thresholds, B4 universe	Preferred thresholds, B4 universe	Preferred thresholds, interview sample
Panel A			
FAI	0.118	0.106	0.502
Siblings	0.573	0.436	0.112
Preferences	0.669	0.749	0.009
Birth day	0.199	0.409	0.552
Neighborhood income	0.753	0.514	0.704
Father's years education			0.720
Mother's years education			0.088
Father's year of birth			0.032
Mother's year of birth			0.000
Father self-employed			1
Mother self-employed			1
Cesarean delivery			0.515
Joint Test - CvM statistic	0.315	0.0910	0.263
Joint Test - Max statistic	0.178	0.242	0.0771
Panel B			
Invitation of universe	0.784	0.005	
Response of the invited	0.447	1.000	
Interview of universe	0.450	0.652	
Joint Test - CvM statistic	0.447	1	
Joint Test - Max statistic	0.433	1	

Notes: The table reports, for the less affluent subsample, the p-values from the Canay and Kamat (2018) test of the continuity of the distribution of pre-treatment covariates at the Final FAI thresholds in column 1. In the remaining columns, the p-values are reported for the same test at the Preferred FAI thresholds, both in the Basket 4 universe (column 2) and in the interview sample (column 3). The null hypothesis is that the distribution of the covariate is continuous at the cutoff. Panel A considers pre-treatment covariates, and Panel B the invitation, response, and interview rates. The test is implemented using the `rdperm` package provided by Canay and Kamat (2018) using the default values chosen by these authors for the number of effective observations used from either side of the cutoff and the number of random permutations.

Table A–4: Continuity of the distribution of pre-treatment covariates for children in more affluent households, p-values.

Covariate	Final thresholds, B4 universe	Preferred thresholds, B4 universe	Preferred thresholds, interview sample
Panel A			
FAI	0.140	0.010	0.013
Siblings	0.563	0.006	1
Preferences	0.813	0.238	0.366
Birth day	0.551	0.697	0.976
Neighborhood income	0.249	0.750	0.734
Father's years education			0.076
Mother's years education			0.491
Father's year of birth			0.951
Mother's year of birth			0.968
Father self-employed			1
Mother self-employed			1
Cesarean delivery			1
Joint Test - CvM statistic	0.773	0.124	0.877
Joint Test - Max statistic	0.917	0.014	0.216
Panel B			
Invitation of universe	0.747	0.282	
Response of the invited	0.489	0.785	
Interview of universe	0.485	1	
Joint Test - CvM statistic	0.489	0.785	
Joint Test - Max statistic	0.485	0.801	

Notes: The table reports, for the more affluent subsample, the p-values from the Canay and Kamat (2018) test of the continuity of the distribution of pre-treatment covariates at the Final FAI thresholds in column 1. In the remaining columns, the p-values are reported for the same test at the Preferred FAI thresholds, both in the Basket 4 universe (column 2) and in the interview sample (column 3). The null hypothesis is that the distribution of the covariate is continuous at the cutoff. Panel A considers pre-treatment covariates, and Panel B the invitation, response, and interview rates. The test is implemented using the `rdperm` package provided by Canay and Kamat (2018) using the default values chosen by these authors for the number of effective observations used from either side of the cutoff and the number of random permutations.

Table A–5: Continuity of the distribution of pre-treatment covariates for boys, p-values.

Covariate	Final thresholds, B4 universe	Preferred thresholds, B4 universe	Preferred thresholds, interview sample
<u>Panel A</u>			
FAI	0.731	0.789	0.937
Siblings	0.411	0.660	0.250
Preferences	0.699	0.618	0.244
Birth day	0.686	0.667	0.672
Neighborhood income	1	0.750	0.291
Father's years education			0.084
Mother's years education			0.838
Father's year of birth			0.318
Mother's year of birth			0.043
Father self-employed			0.421
Mother self-employed			0.328
Cesarean delivery			1
Joint Test - CvM statistic	0.776	0.529	0.327
Joint Test - Max statistic	0.886	0.845	0.120
<u>Panel B</u>			
Invitation of universe	0.338	0.021	
Response of the invited	0.879	0.633	
Interview of universe	0.674	0.656	
Joint Test - CvM statistic	0.879	0.633	
Joint Test - Max statistic	0.881	0.622	

Notes: The table reports, for the male subsample, the p-values from the Canay and Kamat (2018) test of the continuity of the distribution of pre-treatment covariates at the Final FAI thresholds in column 1. In the remaining columns, the p-values are reported for the same test at the Preferred FAI thresholds, both in the Basket 4 universe (column 2) and in the interview sample (column 3). The null hypothesis is that the distribution of the covariate is continuous at the cutoff. Panel A considers pre-treatment covariates, and Panel B the invitation, response, and interview rates. The test is implemented using the `rdperm` package provided by Canay and Kamat (2018) using the default values chosen by these authors for the number of effective observations used from either side of the cutoff and the number of random permutations.

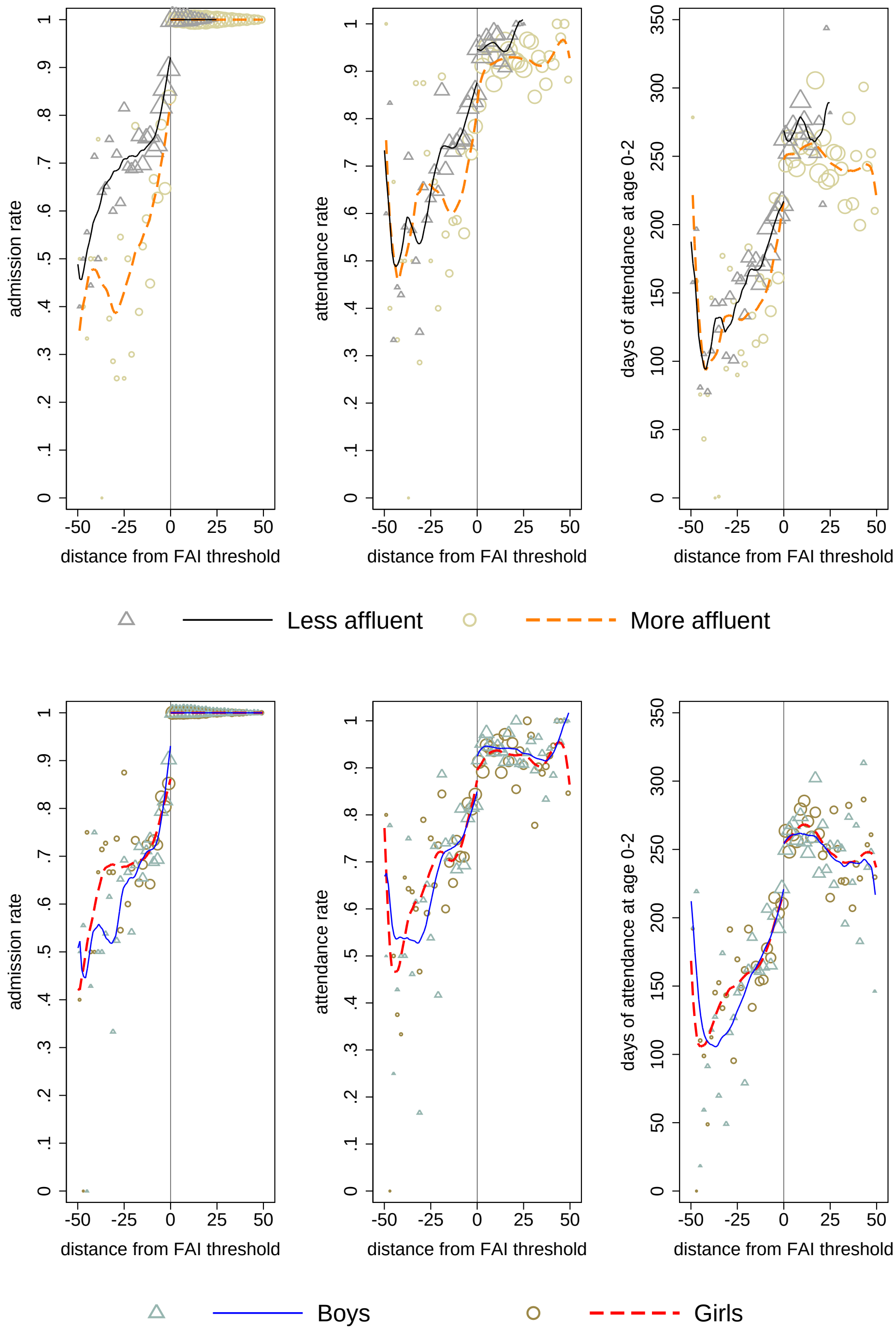
Table A–6: Continuity of the distribution of pre-treatment covariates for girls, p-values.

Covariate	Final thresholds, B4 universe	Preferred thresholds, B4 universe	Preferred thresholds, interview sample
Panel A			
FAI	0.856	0.013	0.208
Siblings	0.903	0.675	0.203
Preferences	0.407	0.245	0.643
Birth day	0.165	0.377	0.608
Neighborhood income	0.899	0.736	0.796
Father's years education			0.899
Mother's years education			0.366
Father's year of birth			0.288
Mother's year of birth			0.560
Father self-employed			1
Mother self-employed			0.496
Cesarean delivery			1
Joint Test - CvM statistic	0.870	0.654	0.758
Joint Test - Max statistic	0.158	0.170	0.869
Panel B			
Invitation of universe	0.804	0.186	
Response of the invited	0.274	1	
Interview of universe	0.281	0.501	
Joint Test - CvM statistic	0.274	1	
Joint Test - Max statistic	0.281	1	

Notes: The table reports, for the female subsample, the p-values from the Canay and Kamat (2018) test of the continuity of the distribution of pre-treatment covariates at the Final FAI thresholds in column 1. In the remaining columns, the p-values are reported for the same test at the Preferred FAI thresholds, both in the Basket 4 universe (column 2) and in the interview sample (column 3). The null hypothesis is that the distribution of the covariate is continuous at the cutoff. Panel A considers pre-treatment covariates, and Panel B the invitation, response, and interview rates. The test is implemented using the `rdperm` package provided by Canay and Kamat (2018) using the default values chosen by these authors for the number of effective observations used from either side of the cutoff and the number of random permutations.

Figure A–7 shows how the admission and attendance rates and total days in daycare 0-2 are discontinuous at the Preferred FAI threshold in the groups defined by level of the Preferred FAI threshold (top panel) and by gender (bottom panel). It is worth noting in this figure that the discontinuity of days in daycare (the first stage of our fuzzy RD) is smaller for relatively affluent households than for less affluent ones, in line with the theoretical model in the main text (specifically, Remark 1). However, the discontinuity is virtually identical for girls and boys.

Figure A–7: Admission offers and attendance around Preferred FAI thresholds, by affluence group and by gender



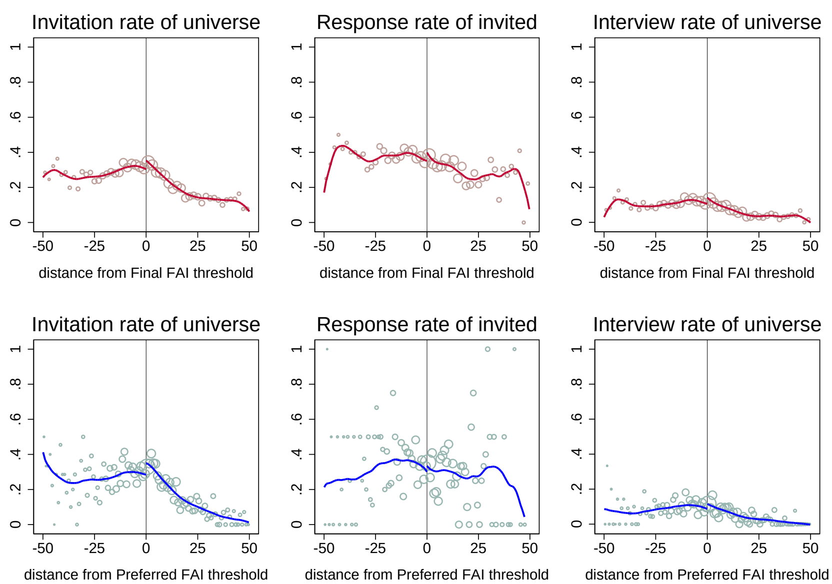
Notes: The circles and triangles represent offer rates (left), attendance rates (middle) and average days of attendance at age 0–2 (right) inside €2k bins, plotted as a function of the distance (thousands of real €) of a child's FAI from her Preferred FAI threshold, by level of the Preferred FAI threshold (top panels) and by gender (bottom panels). "Less affluent" and "More affluent" are observations associated with Preferred FAI thresholds below or above the median Preferred FAI threshold, respectively. The size of a circle or a triangle is proportional to the number of observations in the corresponding €2k bin. The bold lines are LLR on the underlying individual observations, with a triangular kernel and optimal bandwidth selection, from Calonico *et al.* (2014b). FAI stands for Family Affluence Index. Sample: 5,101 children with two working parents, born between 1999 and 2005 who first applied for admission between 2001 and 2005, whose FAI distance from the Preferred FAI threshold is at most €50k and is different from zero.

Appendix to Section 5: The interview sample

Additional figures and tables for Section 5

Figures A–8 shows, for the interview sample, the invitation, response, and interview rates on the two sides of Final and Preferred FAI thresholds. The corresponding Canay and Kamat (2018) tests of the continuity of these rates are in Panel B of Table 2 of the main text.

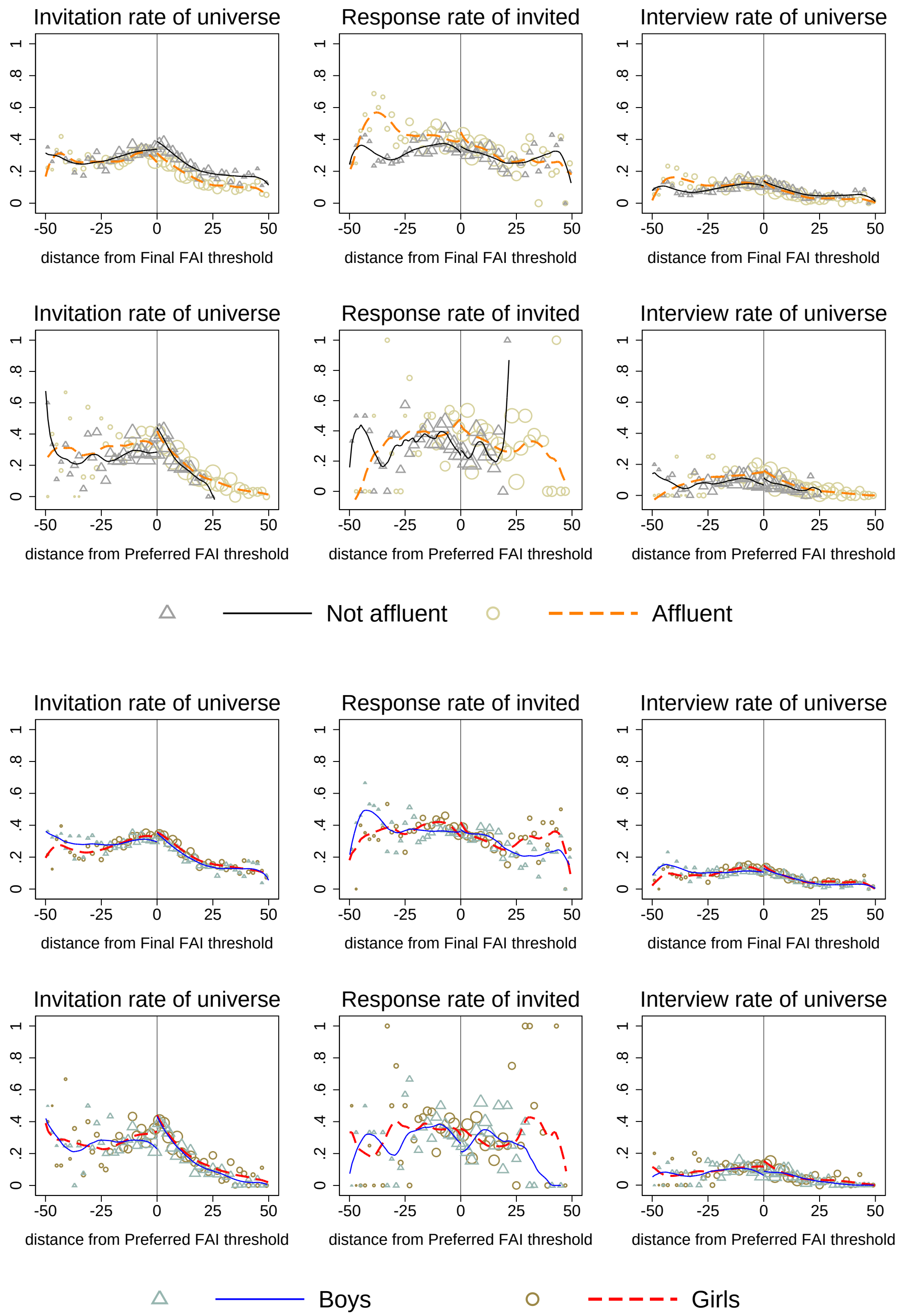
Figure A–8: Invitation, response, and interview rates around Final and Pref. FAI thresholds



Notes: The circles represent the invitation rate for the universe (left), the response rate of the invited (middle), and the interview rate for the universe (right) inside €2k bins, plotted as a function of the distance (thousands of real €) of a child's FAI from either her Final FAI thresholds (top) or her Preferred FAI threshold (bottom). The size of a circle is proportional to the number of observations in the corresponding €2k bin. The bold lines are LLR on the underlying individual observations, with a triangular kernel and optimal bandwidth selection, from Calonico *et al.* (2014b). FAI stands for Family Affluence Index. Sample: 5,937 (top row) and 5,363 (bottom) children with two working parents, born between 1999 and 2005 whose parents first applied for admission between 2001 and 2005 to programs with rationing, whose FAI distance from the Final (top) or Preferred (bottom) FAI thresholds is at most €50k.

Figure A–9 shows, separately by household affluence group and by gender, the invitation, response, and interview rates on the two sides of Final and Preferred FAI thresholds. The p-values from the corresponding Canay and Kamat (2018) tests by affluence and by gender are reported in panel B of Tables A–3, A–4 A–5, and A–6. As already discussed in the main text, only for the distribution of household invitations from the universe we see some evidence of a discontinuity at the Preferred thresholds in the less affluent sample and in the boys sample. However, we never detect a discontinuity in the interview rate in the four subgroups of the Basket 4 universe.

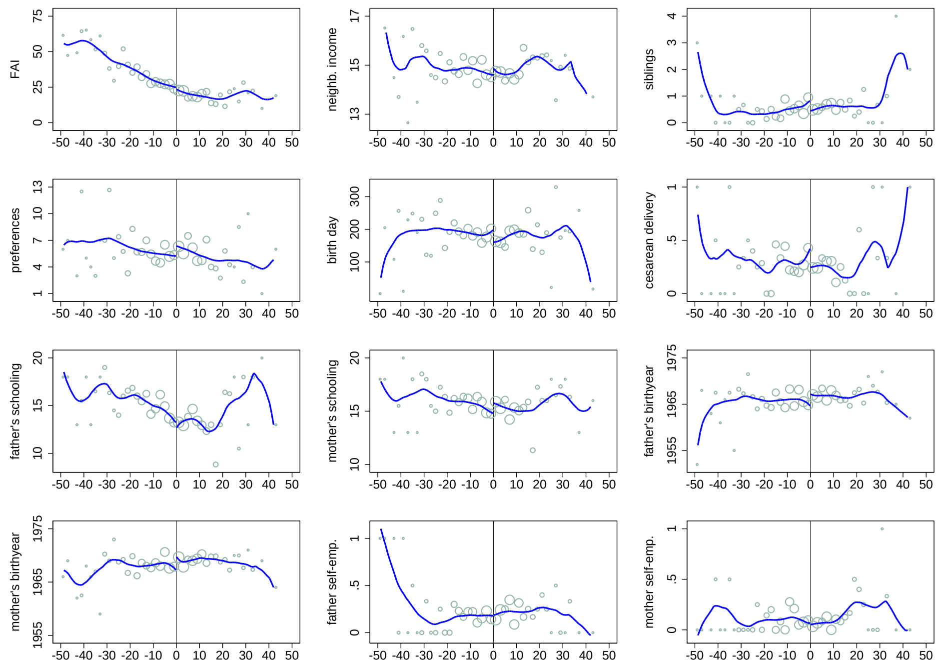
Figure A–9: Invitation, response, and interview rates around Final and Preferred FAI thresholds, by affluence group and by gender



Notes: The circles and the triangles represent the invitation rate for the universe (left), the response rate of the invited (middle), and the interview rate for the universe (right) inside €2k bins, plotted as a function of the distance (thousands of real €) of a child's FAI from either her Final FAI thresholds (first and third rows) or her Preferred FAI threshold (second and fourth rows), by level of the Preferred FAI threshold (first and second rows) and by gender (third and fourth rows). The size of a circle or a triangle is proportional to the number of observations in the corresponding €2k bin. The bold lines are LLR on the underlying individual observations, with a triangular kernel and optimal bandwidth selection, from Calonico *et al.* (2014b). FAI stands for Family Affluence Index. Sample: 5,937 (first and second rows) or 5,363 (third and fourth rows) children with two working parents, born between 1999 and 2005 who first applied for admission between 2001 and 2005, whose FAI distance from the Final (first and third rows) or Preferred (second and fourth rows) FAI thresholds is at most €50k.

Figure A–10 shows, for the whole interview sample, the continuity of the mean of 12 pre-treatment covariates. The results of the associated Canay and Kamat (2018) test are reported in column 3 of panel A of Table 2 in the main text.

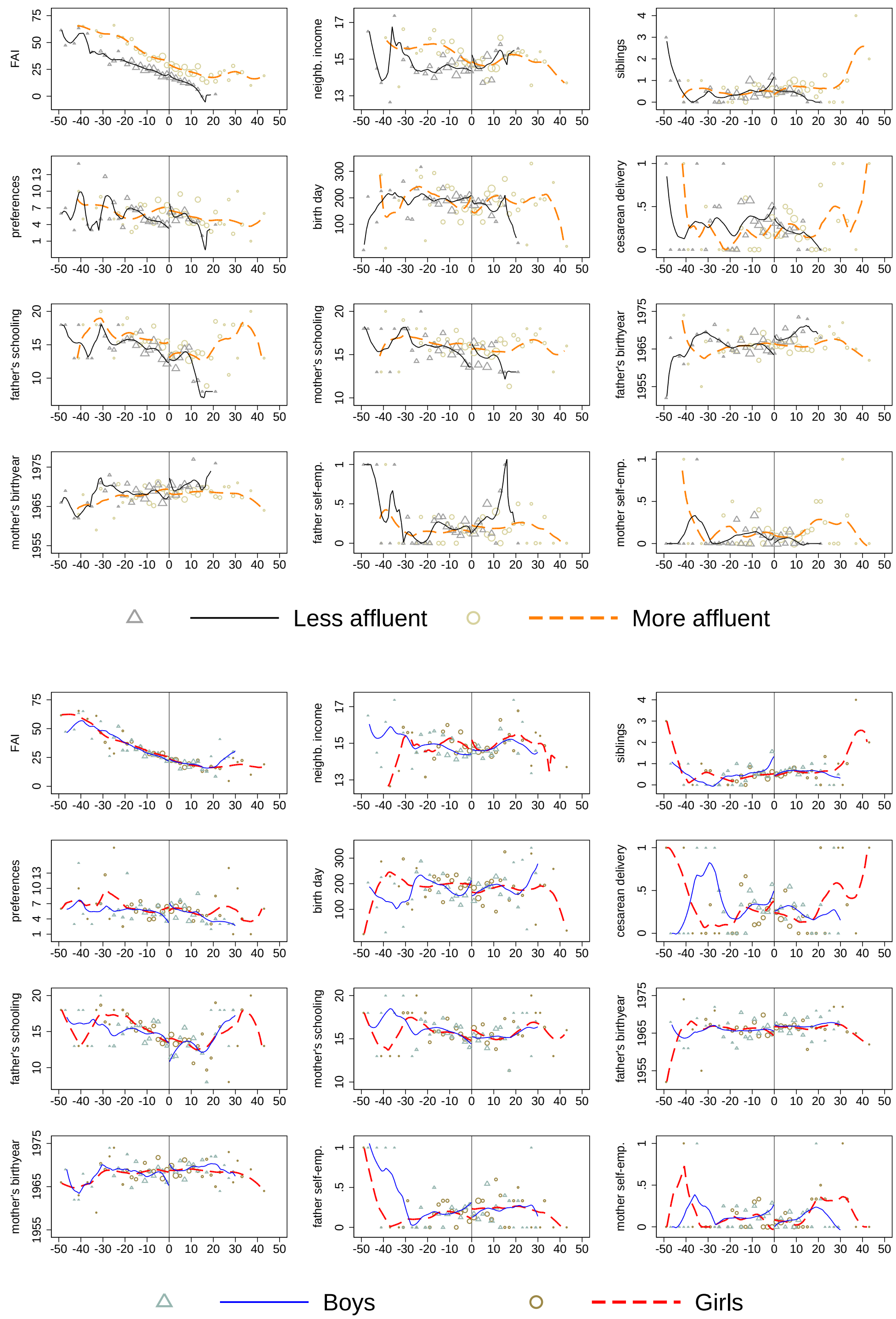
Figure A–10: Continuity of the mean of covariates around Preferred FAI thresholds, interview sample



Notes: The circles represent the average of eight pre-treatment variables inside €2k bins, plotted as a function of the distance (thousands of real €) of a child's FAI from her Preferred FAI threshold. The size of a circle is proportional to the number of observations in the corresponding €2k bin. The bold lines are LLR on the underlying individual observations, with a triangular kernel and optimal bandwidth selection, from Calonico *et al.* (2014b). FAI stands for Family Affluence Index. Sample: 373 interviewed children with two working parents, born between 1999 and 2005 whose parents first applied for admission between 2001 and 2005 to programs with rationing, whose FAI distance from the Final FAI thresholds is at most €50k and different from zero.

Figure A–11 shows, by affluence and by gender in the interview sample, the continuity of the mean the 12 pre-treatment covariates. The associated Canay and Kamat (2018) tests of the continuity of their distribution by affluence and by gender are reported in column 3 of panel A in Tables A–5, A–6, A–3, and A–4. In few cases only, the p-value is smaller than 5%.

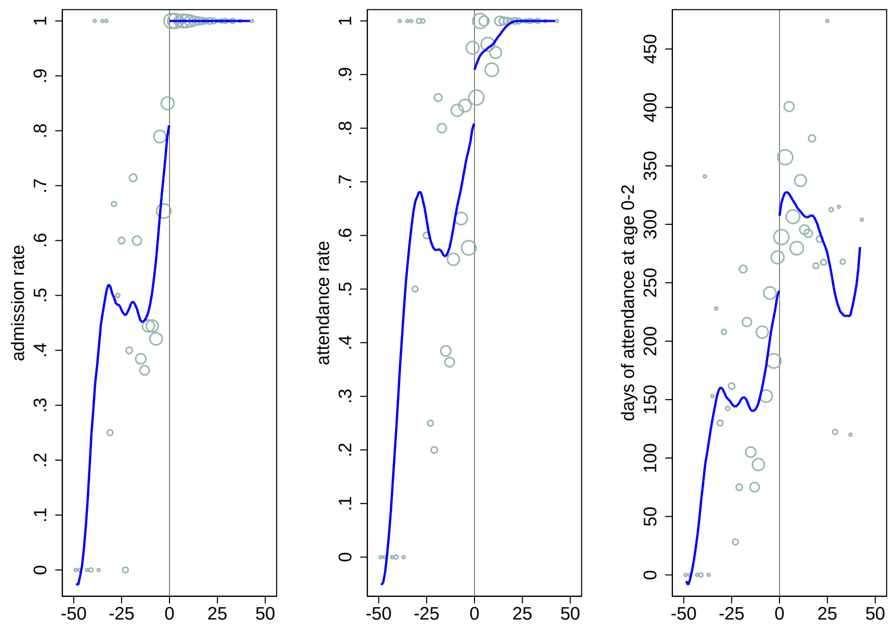
Figure A–11: Continuity of the mean of covariates around Preferred FAI thresholds in the interview sample, by affluence group and by gender



Notes: The circles and the triangles represent the average of eight pre-treatment variables inside €2k bins, plotted as a function of the distance (thousands of real €) of a child's FAI from her Preferred FAI threshold, by level of the Preferred FAI threshold and by gender. The size of a circle or a triangle is proportional to the number of observations in the corresponding €2k bin. "Less affluent" and "More affluent" are observations associated with Preferred FAI thresholds below or above the median Preferred FAI threshold, respectively. The bold lines are LLR on the underlying individual observations, with a triangular kernel and optimal bandwidth selection, from Calonico *et al.* (2014b). FAI stands for Family Affluence Index. Sample: 373 interviewed children with two working parents, born between 1999 and 2005 who first applied for admission between 2001 and 2005, whose FAI distance from the Preferred FAI thresholds is at most €50k and is different from zero.

Figure A–12 shows how the admission and attendance rates and total days in daycare 0-2 are discontinuous at the Preferred FAI threshold in the interview sample.

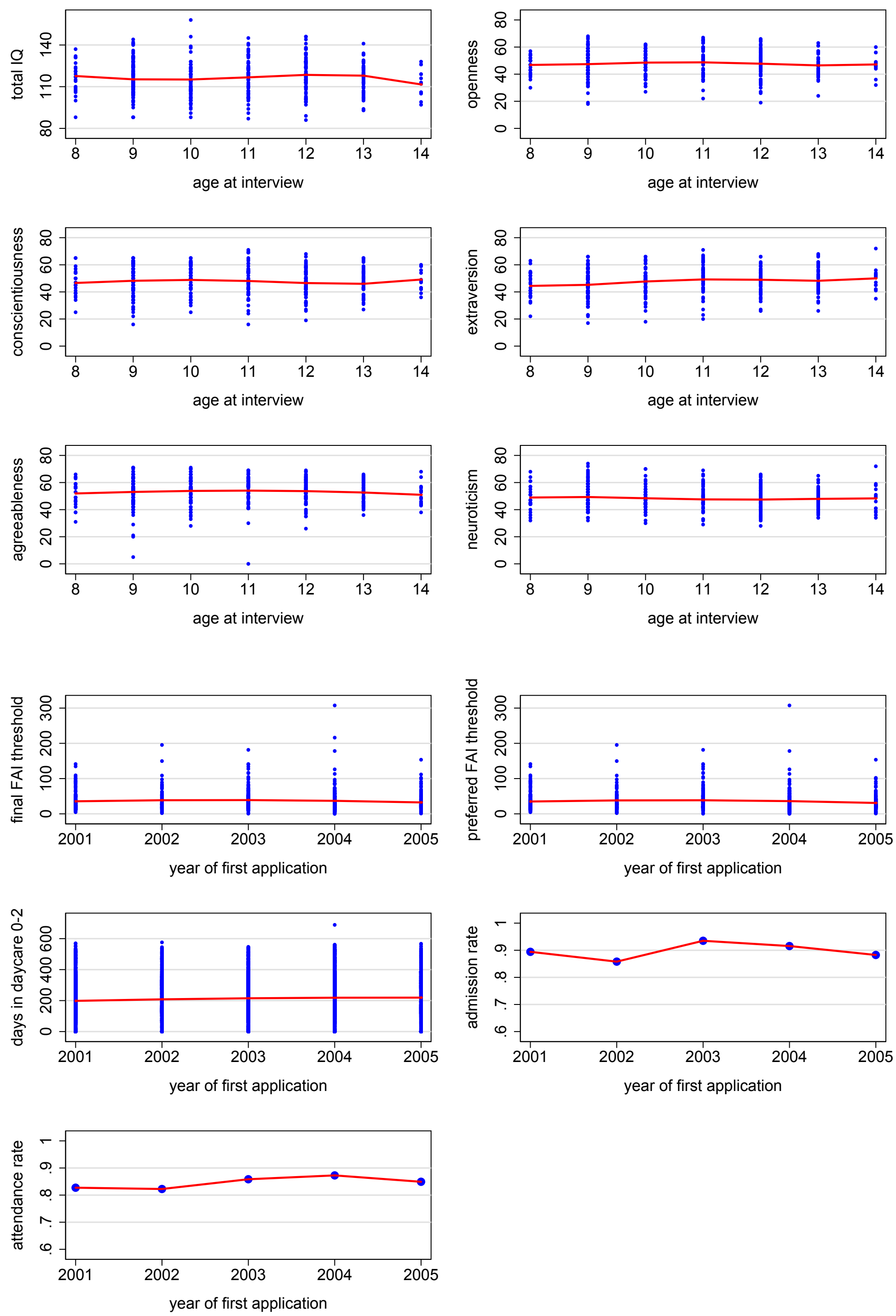
Figure A–12: Admission offers and attendance around Pref. FAI thresholds, interview sample



Notes: The circles represent offer rates (left), attendance rates (middle) and average days of attendance at age 0–2 (right) inside €2k bins, plotted as a function of the distance (thousands of real €) of a child's FAI from her Preferred FAI threshold. The size of a circle is proportional to bin size. The bold lines are LLR on the underlying individual observations, with a triangular kernel and optimal bandwidth selection, from Calonico *et al.* (2014b). FAI stands for Family Affluence Index. Sample: 373 interviewed children with two working parents, born between 1999 and 2005 whose parents first applied for admission between 2001 and 2005 to programs with rationing, whose FAI distance from the Final FAI thresholds is at most €50k and different from zero.

Figure A–13 shows that there are no trends in either IQ or the Big Five scores with respect to the age at which these outcomes are measured in our sample. This is so because the IQ scores produced by the WISC-IV protocol and the Big Five scores produced by the BFQ-C protocol are already normalized by age. The remaining panels of **Figure A–13** show that there is no relevant time trend in FAI thresholds, total days spent in daycare 0–2, or admission and attendance rates either.

Figure A–13: Absence of trends



Notes: The figure shows that there is no trend in IQ or the Big Five scores across age groups, and that there is no trend across years in either Final and Preferred FAI thresholds, total number of days in daycare, the admission rate, or the attendance rate. Samples: 444 interviewed children with non-missing IQ score or covariates (top-left panel), 447 interviewed children with non-missing Big Five scores or covariates (next 5 panels), and 6575 children (i.e., the basket 4 universe, remaining panels) with two working parents, born between 1999 and 2005 who first applied for admission between 2001 and 2005.

Tables A–7 and A–8 report the average characteristics of children in the interview sample by household affluence group and by gender, respectively. When comparing boys and girls, none of the differences in average characteristics are statistically significant at conventional significance levels. When comparing children by household affluence, differences emerge, but these are entirely explained by two facts: first, the FAI is higher (and so parents are more educated) in the more affluent sample; second, more affluent households apply earlier for daycare (lower grade at first application), as predicted by the dynamic model illustrated above.

Table A–9 contains descriptive statistics for the Full Scale IQ and the four underlying sub-scales of the WISC-IV (verbal ability, working memory, perceptual reasoning and processing speed) in the interview sample.

Table A–7: Characteristics of interviewed children by affluence

	Less affl.	More affl.	p-val		Less affl.	More affl.	p-val
FAI	23.6	30.6	0.00	Father education in years	13.9	14.5	0.07
	(1.1)	(1.2)			(0.24)	(0.26)	
N. of preferences	5.46	5.71	0.46	Mother education in years	15.1	15.8	0.02
	(0.22)	(0.25)			(0.22)	(0.20)	
N. of siblings	0.50	0.58	0.25	Father birth year	1966.7	1965.8	0.04
	(0.04)	(0.05)			(0.32)	(0.32)	
Offered admission	0.70	0.80	0.01	Mother birth year	1968.8	1968.3	0.20
	(0.03)	(0.03)			(0.27)	(0.27)	
Waiver	0.05	0.09	0.12	Father self-employed	0.25	0.22	0.37
	(0.01)	(0.02)			(0.03)	(0.03)	
Year of first application	2003.5	2003.5	0.73	Mother self-employed	0.08	0.13	0.08
	(0.10)	(0.09)			(0.02)	(0.02)	
Grade at first application	1.73	1.35	0.00	Cesarean delivery	0.28	0.25	0.46
	(0.05)	(0.04)			(0.03)	(0.03)	
Ever attended	0.75	0.82	0.06	Months breastfed	6.11	6.40	0.51
	(0.03)	(0.03)			(0.34)	(0.29)	
Months at entry	16.0	14.3	0.06	Interviewer: psychologist 1	0.415	0.400	0.75
	(0.6)	(0.5)			(0.03)	(0.03)	
Days of attendance	210.6	250.8	0.01	Interviewer: psychologist 2	0.147	0.195	0.18
	(10.3)	(10.6)			(0.02)	(0.03)	
Year born	2002.5	2002.8	0.08	Interviewer: psychologist 3	0.433	0.400	0.48
	(0.11)	(0.11)			(0.03)	(0.03)	
Day born	182.5	178.5	0.71	Year interviewed	2013.7	2013.8	0.10
	(7.1)	(7.8)			(0.04)	(0.04)	
Age at interview	10.8	10.5	0.12	Month interviewed	7.1	7.0	0.60
	(0.11)	(0.11)			(0.2)	(0.2)	

Notes: The table compares the characteristics of 228 and 216 children in the groups "Less affluent" and "More affluent", respectively, of the interview sample (444 children with two working parents and non-missing IQ score or covariates). For breastfeeding (not used in the empirical analysis in the main text), descriptives are based on 250 observations due to missing information. "Less affluent" and "More affluent" are observations associated with Preferred FAI thresholds below or above the median Preferred FAI threshold, respectively. For each variable and sub-sample the table reports the mean, the standard error of the mean in parenthesis and the p-value of a test that the mean is equal across the two sub-samples. The source for parental background, type of delivery, and breastfeeding are the interviews. For all the other variables the source is the administrative dataset of the BDS. FAI stands for Family Affluence Index.

Table A–8: Characteristics of interviewed boys and girls

	Boys	Girls	p-val		Boys	Girls	p-val
FAI	27.3	26.9	0.82	Father education in years	14.1	14.4	0.49
	(1.3)	(1.1)			(0.26)	(0.24)	
N. of preferences	5.46	5.71	0.46	Mother education in years	15.5	15.4	0.82
	(0.24)	(0.23)			(0.22)	(0.21)	
N. of siblings	1.56	1.53	0.66	Father birth year	1966.3	1966.2	0.81
	(0.05)	(0.05)			(0.32)	(0.32)	
Offered admission	0.76	0.75	0.78	Mother birth year	1968.5	1968.6	0.85
	(0.03)	(0.03)			(0.27)	(0.28)	
Waiver	0.05	0.08	0.18	Father self-employed	0.24	0.23	0.80
	(0.02)	(0.02)			(0.03)	(0.03)	
Year of first application	2003.4	2003.6	0.18	Mother self-employed	0.11	0.10	0.70
	(0.09)	(0.09)			(0.02)	(0.02)	
Grade at first application	1.57	1.52	0.42	Cesarean delivery	0.30	0.24	0.14
	(0.05)	(0.04)			(0.03)	(0.03)	
Ever attended	0.78	0.78	0.99	Months breastfed	6.45	6.12	0.45
	(0.03)	(0.03)			(0.30)	(0.32)	
Months at entry	15.2	15.0	0.79	Interviewer: psychologist 1	0.433	0.384	0.30
	(0.5)	(0.5)			(0.03)	(0.03)	
Days of attendance	229.8	231.1	0.93	Interviewer: psychologist 2	0.163	0.179	0.65
	(10.5)	(10.5)			(0.03)	(0.03)	
Year born	2002.5	2002.7	0.21	Interviewer: psychologist 3	0.400	0.432	0.49
	(0.11)	(0.11)			(0.03)	(0.03)	
Day born	177.4	183.4	0.57	Year interviewed	2013.7	2013.7	0.43
	(7.5)	(7.4)			(0.04)	(0.04)	
Age at interview	10.7	10.6	0.31	Month interviewed	7.1	7.0	0.69
	(0.11)	(0.10)			(0.2)	(0.2)	

Notes: The table compares the 215 boys and 229 girls of the interview sample (444 children with two working parents and non-missing IQ score). For breastfeeding (not used in the empirical analysis in the main text), descriptives are based on 250 observations due to missing information. For each variable and sub-sample the table reports the mean, the standard error of the mean in parenthesis and the p-value of a test that the mean is equal across the two sub-samples. The source for parental background, type of delivery, and breastfeeding are the interviews. For all the other variables the source is the administrative dataset of the BDS. FAI stands for Family Affluence Index.

Table A–9: Descriptive statistics of IQ indexes

IQ index	Mean	St. dev.	Min	Max
		Full sample		
Total IQ	116.4	12.5	75	158
Verbal Comprehension	118.3	13.2	74	154
Perceptual Reasoning	115.5	14.4	74	154
Working Memory	108.1	14.0	73	154
Processing Speed	103.6	12.9	71	144
		Less affluent households		
Total IQ	116.2	12.3	75	141
Verbal Comprehenson	117.4	13.8	74	154
Perceptual Reasoning	115.7	14.7	80	148
Working Memory	107.7	13.3	73	145
Processing Speed	104.1	12.7	71	138
		More affluent households		
Total IQ	116.7	12.7	87	158
Verbal Comprehenson	119.2	12.5	86	152
Perceptual Reasoning	115.2	14.1	74	154
Working Memory	108.6	14.8	76	154
Processing Speed	103.1	13.1	71	144
		Girls		
Total IQ	117.2	12.3	87	158
Verbal Comprehenson	118.5	12.5	86	154
Perceptual Reasoning	115.9	14.4	74	154
Working Memory	107.9	13.7	76	154
Processing Speed	105.6	13.4	71	141
		Boys		
Total IQ	115.7	12.6	75	146
Verbal Comprehenson	118.1	13.9	74	150
Perceptual Reasoning	114.9	14.4	76	148
Working Memory	108.4	14.4	73	145
Processing Speed	101.5	12.0	74	144

Notes: The table reports descriptive statistics for the child IQ scores produced by the application of the WISC-IV protocol to our interview sample, for the full sample, by level of the Preferred FAI thresholds, and by gender. "Less affluent" and "More affluent" are observations associated with Preferred FAI thresholds below or above the median Preferred FAI threshold, respectively. Full scale IQ and the four underlying sub-scales are represented in the table.

Appendix to Section 6: A RD design for the effect of daycare 0-2

The estimand

In this Appendix we show how the RDD estimand in equation (20) of the main text identifies the weighted average of the causal effects of interest in equation (21). The result follows from Proposition 2 and Remark 3 in Card *et al.* (2015), for the fuzzy RDD case. Specifically, we adapt to our setting the Appendix A.2 of the Supplement to their article.[12] Note that, differently from Card *et al.* (2015), in our context we can assume the absence of measurement error in the running variable y_{-1} and in the treatment exposure τ_d: our administrative data source gives us precisely the information on these variables that is relevant for the application and admission process at the BDS.

We first describe the version of assumptions 1a, 2, 3a, 4a, and 6 of Card *et al.* (2015) that we need in our context, following the numbering adopted by these authors for easier reference. In some instances, only a weaker version of these assumptions is needed for our purposes. Then we show how these assumptions allow us to derive equation (21) starting from equation (20).

Assumption 1a implies two regularity conditions that, in line with our theoretical model, are assumed to hold locally at each Preferred threshold $\mathcal{Y}^P$. First, $\ln\theta(\tau_d, y_{-1}, u)$ is assumed to be continuous and differentiable with respect to its first and second argument. Second, the marginal effect $\frac{\partial \ln\theta(\tau_d, y_{-1}, u)}{\partial \tau_d}$ is continuous. Different from Card *et al.* (2015), we do not need to assume that (Ω, E, U) has a bounded support. In their RKD setting they need this assumption to exchange the integral and the derivative in some steps of their analysis, but this is not needed in our (or in their) RDD setting. Moreover, as explained below, we do not need to assume boundedness of (Ω, E, U) to invoke the Dominant Convergence Theorem to exchange the limit operator and the integral.

Assumption 2 posits, again in line with our theoretical model, that the effect of y_{-1} on $\ln\theta$ is continuous around the Preferred threshold $\mathcal{Y}^P$.

Assumption 3a requires that the offer of the most preferred daycare program induces at least some individuals to change (effectively increase, given assumption 6 below) their daycare attendance. Remark 1 in Section 3 of the main text says that this assumption holds in both cases (L) and (N) for a given child. Moreover, the first-stage estimates discussed in Section 6.3 (Tables 6) of the main text support this assumption. Assumption 3a also requires

[12] https://www.econometricsociety.org/sites/default/files/ECTA11224SUPP.pdf

a non negligible population at the cutoff $\mathcal{Y}^P$ and that $\tau_d(y_{-1},\omega,e)$ is a smooth function on the support of Y_{-1} excluding $\mathcal{Y}^P$. Finally, defining $\lim_{y_{-1}\to\mathcal{Y}^{P,r}} \tau_d(y_{-1},\omega,e) = \tau_d^r(\mathcal{Y}^P,\omega,e)$ and $\lim_{y_{-1}\to\mathcal{Y}^{P,l}} \tau_d(\mathcal{Y}^P,\omega,e) = \tau_d^l(\mathcal{Y}^P,\omega,e)$, where $\tau_d^r(\mathcal{Y}^P,\omega,e) \neq \tau_d^l(\mathcal{Y}^P,\omega,e)$, Assumption 3a requires these limits to exist and be different.[13]

Assumption 4a posits that $f_{Y_{-1}|\omega,e,u}(y_{-1})$ is continuous in y_{-1}, which is sufficient for identification in a RD design. This assumption is supported in our context by the right panel of Figure 1 in the main text and by the results of the McCrary test reported in the comment to this Figure. Different from Card *et al.* (2015), we do not need to assume that the partial derivative of $f_{Y_{-1}|\omega,e,u}(y_{-1})$ with respect to y_{-1} is continuous, which is instead needed in the RKD case. However, we need to assume that the support of Y_{-1} is bounded and that, for all the values of its bounded support, $f_{Y_{-1}}(y_{-1}) \geq \underline{\nu} > 0$ and $f_{Y_{-1}|\omega,e,u}(y_{-1}) \leq \bar{\nu} < \infty$. These two assumptions are needed, as explained below, to rely on the Dominated Convergence Theorem to interchange the limit operator and the integral in Eq. A–15. Given that the running variable Y_{-1} is the FAI, they are also plausible. For example, there is no reason to expect that the density of the FAI is equal to zero at any value of its support; nor there are reasons to expect that, for some realization of the heterogeneity variables ω, e, u, the density of the FAI goes to infinity.

Assumption 6 requires monotonicity, i.e., $\tau_{d,r}(y_{-1},\omega,e) - \tau_{d,l}(y_{-1},\omega,e) \geq 0 \quad \forall(\omega,e)$ or $\tau_{d,r}(y_{-1},\omega,e) - \tau_{d,l}(y_{-1},\omega,e) \leq 0 \quad \forall(\omega,e)$. The first inequality holds in our setting in both cases (L) and (N), as illustrated by Remark 1 in Section 3 of the main text. It is also supported by the evidence in Figure 4 in the main text and by the results of the formal test of Barrett and Donald (2003) reported in Table A–10 of this Online Appendix.

We follow the same notational convention used in the paper to denote conditional distribution functions. Under these assumptions, the numerator $\mathbb{N}$ in equation (20) of the main text, reported here for convenience,

$$\beta(\mathcal{Y}^P) = \frac{\lim_{y_{-1}\to\mathcal{Y}^{P,r}} \mathbb{E}\left[\ln\theta(\tau_d(y_{-1},\omega,e),y_{-1},u)|y_{-1}\right] - \lim_{y_{-1}\to\mathcal{Y}^{P,l}} \mathbb{E}\left[\ln\theta(\tau_d(y_{-1},\omega,e),y_{-1},u)|y_{-1}\right]}{\lim_{y_{-1}\to\mathcal{Y}^{P,r}} \mathbb{E}\left[\tau_d(y_{-1},\omega,e)|y_{-1}\right] - \lim_{y_{-1}\to\mathcal{Y}^{P,l}} \mathbb{E}\left[\tau_d(y_{-1},\omega,e)|y_{-1}\right]},$$

[13]Superscripts r and l in $\mathcal{Y}^{P,r}$ and $\mathcal{Y}^{P,l}$ are chosen so to be consistent with the convention adopted in the RD figures, where we assume that y_{-1} is ordered from higher values on the left to lower values on the right, so that admission to the Preferred program occurs to the *right* of the cutoff $\mathcal{Y}^P$. Note that $\tau_d(.)$ in equation (20) of the main text also depends on what is offered to the parent on the two sides of the cutoff, i.e., $z = 1$ on the right ($y_{-1} \to \mathcal{Y}^{P,r}$) and $z = \ell$ or no offer on the left ($y_{-1} \to \mathcal{Y}^{P,l}$). To simplify the notation we do not make this dependence explicit in $\tau_d(\cdot)$, although it is taken into account in the derivations that follow, as indicated by the notation $\tau_d^r(\cdot)$ and $\tau_d^l(\cdot)$ defined above.

can be written as

$$\mathbb{N} = \lim_{y_{-1} \to \mathcal{Y}^{P,r}} \int \ln \theta(\tau_d(y_{-1}, \omega, e), y_{-1}, u) \frac{f_{Y_{-1}|\omega,e,u}(y_{-1})}{f_{Y_{-1}}(y_{-1})} dF_{\Omega,E,U}(\omega, e, u) - \lim_{y_{-1} \to \mathcal{Y}^{P,l}} \int \ln \theta(\tau_d(y_{-1}, \omega, e), y_{-1}, u) \frac{f_{Y_{-1}|\omega,e,u}(y_{-1})}{f_{Y_{-1}}(y_{-1})} dF_{\Omega,E,U}(\omega, e, u), \quad \text{(A–15)}$$

where we have used the following decomposition:

$$dF_{\Omega,E,U|y_{-1}}(\omega, e, u) = \frac{f_{Y_{-1}|\omega,e,u}(y_{-1})}{f_{Y_{-1}}(y_{-1})} dF_{\Omega,E,U}(\omega, e, u). \quad \text{(A–16)}$$

Given that our measures of child ability are bounded (specifically, $0 < \underline{\theta} \leq \theta \leq \bar{\theta} < \infty$) and given Assumption 4a (specifically, $f_{Y_{-1}}(y_{-1}) \geq \underline{\nu} > 0$ and $f_{Y_{-1}|\omega,e,u}(y_{-1}) \leq \bar{\nu} < \infty$), we can then claim the existence of a constant κ such that

$$\left| \ln \theta(\tau_d(y_{-1}, \omega, e), y_{-1}, u) \frac{f_{Y_{-1}|\omega,e,u}(y_{-1})}{f_{Y_{-1}}(y_{-1})} \right| \leq \kappa. \quad \text{(A–17)}$$

Since

$$\int \kappa dF_{\Omega,E,U}(\omega, e, u) = \kappa < \infty, \quad \text{(A–18)}$$

and given the continuity of the function $\ln \theta(\cdot, \cdot, \cdot)$, we can rely on the Dominated Convergence Theorem to interchange the limit operator and the integral in Eq. A–15, obtaining

$$\mathbb{N} = \int \ln \theta(\tau_d^r(\mathcal{Y}^P, \omega, e), \mathcal{Y}^P, u) \frac{f_{Y_{-1}|\omega,e,u}(\mathcal{Y}^P)}{f_{Y_{-1}}(\mathcal{Y}^P)} dF_{\Omega,E,U}(\omega, e, u) - \int \ln \theta(\tau_d^l(\mathcal{Y}^P, \omega, e), \mathcal{Y}^P, u) \frac{f_{Y_{-1}|\omega,e,u}(\mathcal{Y}^P)}{f_{Y_{-1}}(\mathcal{Y}^P)} dF_{\Omega,E,U}(\omega, e, u), \quad \text{(A–19)}$$

and therefore

$$\mathbb{N} = \int (\ln \theta(\tau_d^r(\mathcal{Y}^P, \omega, e), \mathcal{Y}^P, u) - \ln \theta(\tau_d^l(\mathcal{Y}^P, \omega, e), \mathcal{Y}^P, u)) \frac{f_{Y_{-1}|\omega,e,u}(\mathcal{Y}^P)}{f_{Y_{-1}}(\mathcal{Y}^P)} dF_{\Omega,E,U}(\omega, e, u). \quad \text{(A–20)}$$

The denominator $\mathbb{D}$ can instead be written as

$$\mathbb{D} = \int (\tau_d^r(\mathcal{Y}^P, \omega, e) - \tau_d^l(\mathcal{Y}^P, \omega, e)) \frac{f_{Y_{-1}|\omega,e}(\mathcal{Y}^P)}{f_{Y_{-1}}(\mathcal{Y}^P)} dF_{\Omega,E}(\omega, e). \quad \text{(A–21)}$$

Dividing and multiplying the numerator (N) in Eq. A–20 by $(\tau_d^r(\mathcal{Y}^P, \omega, e) - \tau_d^l(\mathcal{Y}^P, \omega, e))$ and replacing into equation (20) of the main text we obtain,

$$\beta(\mathcal{Y}^P) = \frac{\int \frac{\ln\theta(\tau_d^r(\mathcal{Y}^P,\omega,e),\mathcal{Y}^P,u)-\ln\theta(\tau_d^l(\mathcal{Y}^P,\omega,e),\mathcal{Y}^P,u)}{\tau_d^r(\mathcal{Y}^P,\omega,e)-\tau_d^l(\mathcal{Y}^P,\omega,e)}(\tau_d^r(\mathcal{Y}^P,\omega,e)-\tau_d^l(\mathcal{Y}^P,\omega,e))\frac{f_{Y_{-1}|\omega,e,u}(\mathcal{Y}^P)}{f_{Y_{-1}}(\mathcal{Y}^P)}dF_{\Omega,E,U}(\omega,e,u)}{\int(\tau_d^r(\mathcal{Y}^P,\omega,e)-\tau_d^l(\mathcal{Y}^P,\omega,e))\frac{f_{Y_{-1}|\omega,e}(\mathcal{Y}^P)}{f_{Y_{-1}}(\mathcal{Y}^P)}dF_{\Omega,E}(\omega,e).} \tag{A–22}$$

To simplify this expression, define

$$\psi(\omega,u,e,\mathcal{Y}^P) = \frac{(\tau_d^r(\mathcal{Y}^P,\omega,e)-\tau_d^l(\mathcal{Y}^P,\omega,e))\frac{f_{Y_{-1}|\omega,e,u}(\mathcal{Y}^P)}{f_{Y_{-1}}(\mathcal{Y}^P)}}{\int(\tau_d^r(\mathcal{Y}^P,\omega,e)-\tau_d^l(\mathcal{Y}^P,\omega,e))\frac{f_{Y_{-1}|\omega,e}(\mathcal{Y}^P)}{f_{Y_{-1}}(\mathcal{Y}^P)}dF_{\Omega,E}(\omega,e)} \tag{A–23}$$

These weights imply that the only individuals who contribute to the estimand are the treated whose attendance changes at the cutoff when they are offered their most preferred program.

Then, by the mean value theorem,

$$\frac{\ln\theta(\tau_d^r(\mathcal{Y}^P,\omega,e),\mathcal{Y}^P,u)-\ln\theta(\tau_d^l(\mathcal{Y}^P,\omega,e),\mathcal{Y}^P,u)}{\tau_d^r(\mathcal{Y}^P,\omega,e)-\tau_d^l(\mathcal{Y}^P,\omega,e)} = \frac{\partial\ln\theta(\widetilde{\tau}_d,\mathcal{Y}^P,u)}{\partial\tau_d}, \tag{A–24}$$

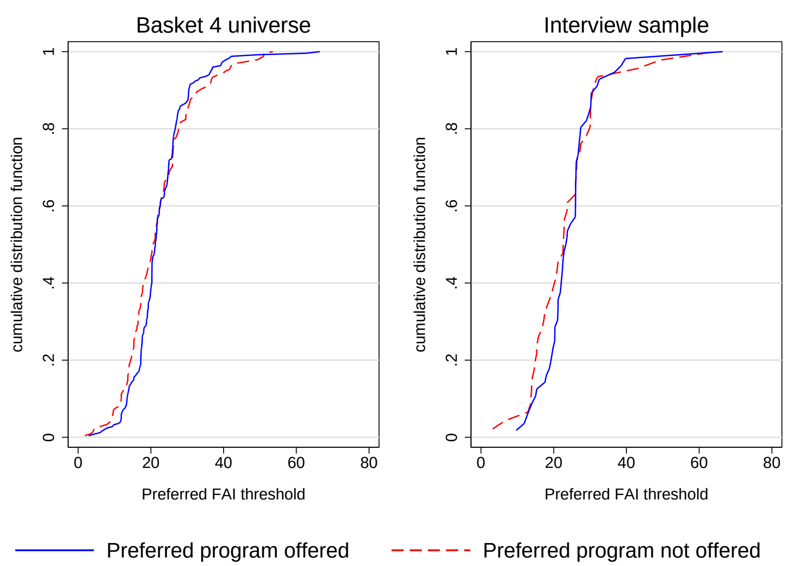
where $\widetilde{\tau}_d$ is a value between $\tau_d^r(\mathcal{Y}^P,\omega,e)$ and $\tau_d^l(\mathcal{Y}^P,\omega,e)$. This leads to equation (21) of the main text:

$$\beta(\mathcal{Y}^P) = \int \frac{\partial\ln\theta(\widetilde{\tau}_d(\mathcal{Y}^P,\omega,e),\mathcal{Y}^P,u)}{\partial\tau_d}\psi(\omega,e,u,\mathcal{Y}^P)dF_{\Omega,E,U}(\omega,e,u).$$

Additional figures and tables for Section 6

The two panels of **Figure A–14** show the empirical distribution functions of the preferred FAI thresholds in the first bin to the right (i.e., those who just qualify for the preferred program, solid line) and the first bin to the left (i.e., those who just do not qualify for the preferred program, dashed line) in the Basket 4 universe and in the interview sample. The similarity of the two distributions in each panel corroborates the hypothesis that the observations immediately at the right and at the left of each Preferred FAI threshold come from the same distribution. We formally test this hypothesis using the Wilcoxon rank-sum test and we cannot reject the null (p-values: 0.21 in the Basket 4 universe and 0.41 in the interview sample). We are thus confident that the aggregation of different cutoffs in our analysis does not pose any particular identification problem.

Figure A–14: Distribution of FAI thresholds by offer of the Preferred program

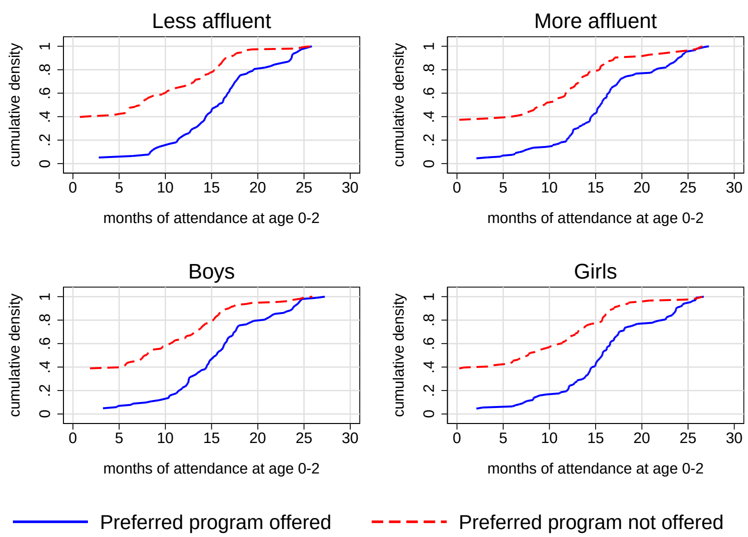


Notes: The figure shows the empirical distribution function of the preferred FAI thresholds in the first bin to the right (i.e., those who just qualify for the preferred program, solid line) and the first bin to the left (i.e., those who just do not qualify for the preferred program, dashed line). Bin size is €2k in the left panel (Basket 4 universe) and €4k in the right panel (interview sample). Sample: 488 children (left panel) or 102 children (right panel) with two working parents, born between 1999 and 2005 who first applied for admission between 2001 and 2005 to programs with rationing, whose FAI distance from the Preferred FAI thresholds is at most €2k (left panel) or €4k (right panel) and different from zero.

It is important that this test is successful not only in the Basket 4 universe but also in the smaller interview sample. Suppose for example that at the Preferred cutoffs with a high FAI, households were disproportionately frequent on the left (where they would not be offered their preferred program), while at the Preferred cutoffs with a low FAI, households were disproportionately frequent on the right (where they would be offered their preferred program). In this case, the distribution to the right would first-order stochastically dominate the distribution to the left. Since income and ability are positively correlated, the estimand β could be negative even if the skill effects of qualifying for the preferred program were positive for all households. The result of the test stands in contrast to this possibility.

Figure A–15 shows that there is a strong case in favor of the monotonicity of the instrument also after splitting the sample by household affluence group or by gender.

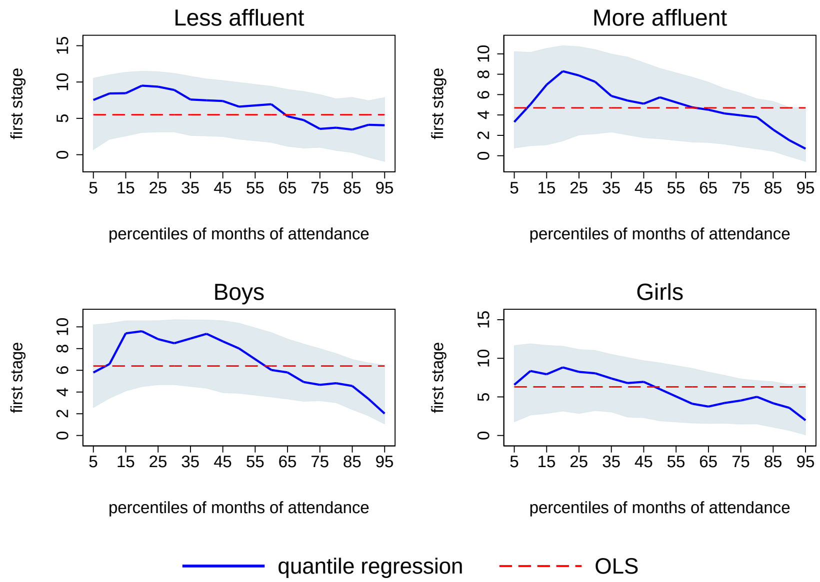
Figure A–15: Monotonocity of the instrument, by affluence group and by gender



Notes: The figure shows the c.d.f. of months in daycare 0-2 by level of the preferred FAI threshold, by gender, and by whether the child was offered the preferred daycare program or not. "Less affluent" and "More affluent" are observations associated with Preferred FAI thresholds below or above the median Preferred FAI threshold, respectively. Sample: 444 interviewed children with two working parents, non-missing IQ score or covariates, born between 1999 and 2005 who first applied for admission between 2001 and 2005.

Figure A–16 further corroborates the monotonicity assumption, again separately by household affluence group and by gender, by showing that the first-stage coefficients (effect of being offered the preferred program on time spent in daycare) are positive along the entire distribution of months of attendance, conditional on the same controls and polynomial in FAI employed in the empirical specification of the RD model in the main text.

Figure A–16: Effect of the instrument on quantiles of the distribution of months in daycare, by affluence group and by gender



Notes: The figure plots the coefficients from quantile regressions of total days of attendance in daycare 0–2 on the instrument (whether the child qualifies for the preferred program) and the same controls included in the estimation of equation (38) of the main text, by level of the preferred FAI threshold, by gender. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. The shaded areas represent the 95% percentile confidence intervals based on 1,000 block-bootstrap replications (so to preserve dependence withing program). Each coefficient is obtained by running a separate quantile regression for the 19 quantiles from 0.05 to 0.95. The dashed, horizontal lines are the corresponding first-stage OLS estimates. Sample: 444 interviewed children with two working parents, non-missing IQ score or covariates, born between 1999 and 2005 who first applied for admission between 2001 and 2005.

Table A–10 reports details of the test performed to further support the monotonicity assumption, for the whole sample and separately by household affluence group and gender. Following Fiorini and Stevens (2014), we use the test statistic developed by Barrett and Donald (2003): we never reject stochastic dominance and we can reject that the two distributions coincide. These conditions approximately hold in our setting on the common support of the two empirical distributions. See the note to the table for further details. Note that the test by Barrett and Donald (2003) requires common and bounded support for the two cumulative distribution functions and continuity of both cumulative distribution functions. In addition, it relies on the assumption that data come from independent samples from the two distributions, with possibly different sample sizes, and the sampling scheme is such that "the ratio of sample sizes is finite and bounded away from zero" (Barrett and Donald, 2003).

Table A–10: Barrett and Donald (2003) first order stochastic dominance test.

Thresholds Gender	All All	$\leq$ median All	$>$ median All	All Girls	All Boys
Number of observations					
with $z = 0$ (n_0)	241	151	83	123	118
with $z = 1$ (n_1)	215	76	131	109	105
test value $\widehat{S_{10}}$	-0.0098	0.0000	0.0646	0.0618	-0.0065
test p-value	0.9998	1.0000	0.9917	0.9923	0.9999
test value $\widehat{S_{01}}$	4.8662	3.3495	3.0846	3.4931	3.4837
p-value	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: n_0 is the number of observations in the sample with $z < 1$, on the common support of the empirical distribution of days in daycare for those not eligible for the preferred program $z < 1$ and for those eligible for the preferred program $z = 1$; n_1 is the number of observations in the sample with $z = 1$ on the common support of the empirical distribution of days in daycare for those not eligible for the preferred program $z < 1$ and for those eligible for the preferred program $z = 1$. The values of the tests are computed, as

$$\widehat{S_{10}} = \sqrt{\frac{n_0 \times n_1}{n_0 + n_1}} \quad sup_{\tau_d \in \mathcal{D}}(\widehat{F}^D_{z=1}(\tau_d) - \widehat{F}^D_{z<1}(\tau_d))$$

and

$$\widehat{S_{01}} = \sqrt{\frac{n_0 \times n_1}{n_0 + n_1}} \quad sup_{\tau_d \in \mathcal{D}}(\widehat{F}^D_{z<1}(d) - \widehat{F}^D_{z=1}(\tau_d)),$$

where $\mathcal{D}$ denotes the common support of the two empirical distributions of days spent in daycare and $\widehat{F}^D_{z=1}$, $\widehat{F}^D_{z<1}$ denote the non parametric estimates of the cumulative distribution function of days spend in day care by level of the instrument, i.e. by whether the child is assigned to the preferred program $z = 1$ or not $z < 1$ respectively. The p-value of the test is computed as p-value$= exp(-2(\widehat{S})^2)$ where $\widehat{S}$ is the observed value of the test.

Tables A–11 to A–16 report nonparametric estimates of the effect of additional daycare time on IQ and the Big Five personality traits, using the Calonico *et al.* (2014b) methodology. Estimates are based on a triangular kernel and a local polynomial of degree zero with optimal bandwith selection. For IQ, these nonparametric results are in line with the parametric ones reported in the main text, although less statistically significant given the smaller sample size. For the Big Five, the general pattern produced by the parametric estimates reported in the main text is by and large reproduced here although estimates are less precise.

Table A–11: Effects of daycare 0–2 attendance on IQ: nonparametric estimates.

Preferred thresholds Gender	All All	≤ median All	> median All	All Girls	All Boys
ITT of just qualifying	-0.0246 (0.0212)	0.0313 (0.0332)	-0.0811* (0.0335)	-0.0360 (0.0267)	-0.0056 (0.0458)
First stage	4.1** (1.4)	3.9* (1.7)	4.6+ (2.5)	3.0 (1.9)	6.2* (2.7)
robust p-value	0.053	0.193	0.297	0.487	0.064
Effect of 1 month (conventional)	-0.006 (0.006)	0.008 (0.009)	-0.018+ (0.011)	-0.011 (0.012)	-0.002 (0.007)
Effect of 1 month (bias-corrected)	-0.006 (0.006)	0.013 (0.009)	-0.025* (0.011)	-0.015 (0.011)	-0.001 (0.007)
Effect of 1 month (robust)	-0.006 (0.007)	0.013 (0.012)	-0.025+ (0.013)	-0.015 (0.014)	-0.001 (0.009)
Bandwith for Loc. Poly (h)	4.929	3.788	5.877	5.292	4.707
Bandwith for bias (b)	19.011	7.807	18.046	18.652	9.958
Number of observations	115	51	62	73	44

Notes: The table reports nonparametric estimates of the effect of one month of daycare 0–2 on the log of IQ, with related ITT and first stage. The methodology used is detailed in Calonico *et al.* (2014b), and it is implemented using the software described in Calonico *et al.* (2014a). The grade of local polynomials is zero and the kernel is triangular. Since these estimates are obtained stacking thresholds, for the reasons discussed in the main text, observations at zero distance are excluded. The table also reports the optimal bandwidths for the local polynomial (h) and for the bias (b) as well as the p-value from a test for the null hypothesis that the first stage coefficient is zero, obtained using a robust and bias corrected estimator for the first stage. For these reasons, the sample size is smaller than the one reported in the main text for the parametric estimates. The ITT and first stage estimates are obtained using the conventional nonparametric estimator. The effects of one month of daycare 0–2 are obtained using three distinct RD estimators: the local polynomial estimator (conventional), the bias-corrected estimator proposed by Calonico *et al.* (2014b) and the bias-corrected estimator with robust standard errors. The running variable is the Family Affluence Index (FAI). Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and whose parents first applied for admission to daycare between 2001 and 2005. + significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–12: Effects of daycare 0–2 attendance on Openness: nonparametric estimates.

Preferred thresholds	All	≤ median	> median	All	All
Gender	All	All	All	Girls	Boys
ITT of just qualifying	0.0098	0.0704	-0.0627	-0.0093	0.025
	(0.0373)	(0.0695)	(0.0509)	(0.0463)	(0.062)
First stage	4.0**	4.1**	4.5+	2.7	6.3**
	(1.5)	(1.6)	(2.6)	(1.9)	(2.6)
robust p-value	0.065	0.135	0.304	0.574	0.056
Effect of 1 month	0.004	0.014	-0.012	0.002	0.004
(conventional)	(0.0100)	(0.013)	(0.014)	(0.019)	(0.010)
Effect of 1 month	0.009	0.025	-0.010	0.010	0.008
(bias-corrected)	(0.0100)	(0.013)	(0.014)	(0.019)	(0.010)
Effect of 1 month	0.009	0.025	-0.010	0.010	0.008
(robust)	(0.0100)	(0.016)	(0.017)	(0.023)	(0.014)
Bandwith for Loc. Poly (h)	4.564	5.056	5.727	4.964	4.759
Bandwith for bias (b)	17.306	15.345	17.545	17.799	9.972
Number of observations	114	61	62	70	55

Notes: The table reports nonparametric estimates of the effect of one month of daycare 0–2 on the log of Openness, with related ITT and first stage. The methodology used is detailed in Calonico *et al.* (2014b), and it is implemented using the software described in Calonico *et al.* (2014a). The grade of local polynomials is zero and the kernel is triangular. Since these estimates are obtained stacking thresholds, for the reasons discussed in the main text, observations at zero distance are excluded. The table also reports the optimal bandwidths for the local polynomial (h) and for the bias (b) as well as the p-value from a test for the null hypothesis that the first stage coefficient is zero, obtained using a robust and bias corrected estimator for the first stage. For these reasons, the sample size is smaller than the one reported in the main text for the parametric estimates. The ITT and first stage estimates are obtained using the conventional nonparametric estimator. The effects of one month of daycare 0–2 are obtained using three distinct RD estimators: the local polynomial estimator (conventional), the bias-corrected estimator proposed by Calonico *et al.* (2014b) and the bias-corrected estimator with robust standard errors. The running variable is the Family Affluence Index (FAI). Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and whose parents first applied for admission to daycare between 2001 and 2005. + significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–13: Effects of daycare 0–2 attendance on Conscientiousness : nonparametric estimates.

Preferred thresholds Gender	All All	$\leq$ median All	$>$ median All	All Girls	All Boys
ITT of just qualifying	0.025 (0.043)	0.047 (0.084)	0.043 (0.061)	0.030 (0.058)	0.004 (0.043)
First stage	4.1** (1.5)	4.1* (1.6)	4.5^{+} (2.6)	3.5^{+} (1.8)	6.3* (2.7)
robust p-value	0.056	0.139	0.304	0.270	0.068
Effect of 1 month (conventional)	0.010 (0.012)	0.007 (0.016)	0.007 (0.014)	0.011 (0.019)	0.000 (0.006)
Effect of 1 month (bias-corrected)	0.015 (0.012)	0.011 (0.016)	0.017 (0.013)	0.020 (0.019)	-0.002 (0.006)
Effect of 1 month (robust)	0.015 (0.014)	0.011 (0.016)	0.017 (0.017)	0.020 (0.022)	-0.002 (0.009)
Bandwith for Loc. Poly (h)	4.691	5.074	5.668	6.277	4.323
Bandwith for bias (b)	18.161	14.275	18.034	22.547	9.235
Number of observations	114	61	62	82	55

Notes: The table reports nonparametric estimates of the effect of one month of daycare 0–2 on the log of Conscientiousness, with related ITT and first stage. The methodology used is detailed in Calonico *et al.* (2014b), and it is implemented using the software described in Calonico *et al.* (2014a). The grade of local polynomials is zero and the kernel is triangular. Since these estimates are obtained stacking thresholds, for the reasons discussed in the main text, observations at zero distance are excluded. The table also reports the optimal bandwidths for the local polynomial (h) and for the bias (b) as well as the p-value from a test for the null hypothesis that the first stage coefficient is zero, obtained using a robust and bias corrected estimator for the first stage. For these reasons, the sample size is smaller than the one reported in the main text for the parametric estimates. The ITT and first stage estimates are obtained using the conventional nonparametric estimator. The effects of one month of daycare 0–2 are obtained using three distinct RD estimators: the local polynomial estimator (conventional), the bias-corrected estimator proposed by Calonico *et al.* (2014b) and the bias-corrected estimator with robust standard errors. The running variable is the Family Affluence Index (FAI). Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and whose parents first applied for admission to daycare between 2001 and 2005. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–14: Effects of daycare 0–2 attendance on Extraversion: nonparametric estimates.

Preferred thresholds Gender	All All	$\leq$ median All	$>$ median All	All Girls	All Boys
ITT of just qualifying	0.004 (0.038)	0.002 (0.076)	0.019 (0.047)	-0.014 (0.045)	0.031 (0.094)
First stage	4.1** (1.4)	4.1* (1.6)	4.5^{-} (2.6)	1.9 (2.1)	6.4* (2.6)
robust p-value	0.051	0.142	0.301	0.968	0.057
Effect of 1 month (conventional)	0.000 (0.010)	-0.002 (0.014)	0.003 (0.011)	-0.009 (0.026)	0.004 (0.011)
Effect of 1 month (bias-corrected)	0.003 (0.010)	0.003 (0.014)	0.005 (0.011)	-0.007 (0.026)	0.009 (0.011)
Effect of 1 month (robust)	0.003 (0.010)	0.003 (0.014)	0.005 (0.014)	-0.007 (0.032)	0.009 (0.016)
Bandwith for Loc. Poly (h)	4.809	5.024	5.824	4.049	4.770
Bandwith for bias (b)	18.366	13.052	17.547	12.694	9.892
Number of observations	115	61	62	61	55

Notes: The table reports nonparametric estimates of the effect of one month of daycare 0–2 on the log of Extraversion, with related ITT and first stage. The methodology used is detailed in Calonico *et al.* (2014b), and it is implemented using the software described in Calonico *et al.* (2014a). The grade of local polynomials is zero and the kernel is triangular. Since these estimates are obtained stacking thresholds, for the reasons discussed in the main text, observations at zero distance are excluded. The table also reports the optimal bandwidths for the local polynomial (h) and for the bias (b) as well as the p-value from a test for the null hypothesis that the first stage coefficient is zero, obtained using a robust and bias corrected estimator for the first stage. For these reasons, the sample size is smaller than the one reported in the main text for the parametric estimates. The ITT and first stage estimates are obtained using the conventional nonparametric estimator. The effects of one month of daycare 0–2 are obtained using three distinct RD estimators: the local polynomial estimator (conventional), the bias-corrected estimator proposed by Calonico *et al.* (2014b) and the bias-corrected estimator with robust standard errors. The running variable is the Family Affluence Index (FAI). Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and whose parents first applied for admission to daycare between 2001 and 2005. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–15: Effects of daycare 0–2 attendance on Agreeableness: nonparametric estimates.

Preferred thresholds Gender	All All	$\leq$ median All	$>$ median All	All Girls	All Boys
ITT of just qualifying	-0.016 (0.027)	0.025 (0.043)	-0.063 (0.038)	-0.024 (0.038)	-0.003 (0.041)
First stage	3.9^{**} (1.5)	4.1^{*} (1.7)	4.5^{+} (2.6)	2.1 (2.0)	6.4^{*} (2.6)
robust p-value	0.086	0.191	0.298	0.852	0.056
Effect of 1 month (conventional)	-0.004 (0.007)	0.005 (0.010)	-0.013 (0.011)	-0.011 (0.024)	-0.001 (0.006)
Effect of 1 month (bias-corrected)	0.000 (0.007)	0.010 (0.010)	-0.013 (0.011)	-0.011 (0.024)	0.001 (0.006)
Effect of 1 month (robust)	0.000 (0.009)	0.010 (0.013)	-0.013 (0.014)	-0.011 (0.030)	0.001 (0.009)
Bandwith for Loc. Poly (h)	4.370	3.940	5.766	4.261	4.721
Bandwith for bias (b)	15.060	8.960	18.273	14.572	10.019
Number of observations	112	53	62	64	55

Notes: The table reports nonparametric estimates of the effect of one month of daycare 0–2 on the log of Agreeableness, with related ITT and first stage. The methodology used is detailed in Calonico *et al.* (2014b), and it is implemented using the software described in Calonico *et al.* (2014a). The grade of local polynomials is zero and the kernel is triangular. Since these estimates are obtained stacking thresholds, for the reasons discussed in the main text, observations at zero distance are excluded. The table also reports the optimal bandwidths for the local polynomial (h) and for the bias (b) as well as the p-value from a test for the null hypothesis that the first stage coefficient is zero, obtained using a robust and bias corrected estimator for the first stage. For these reasons, the sample size is smaller than the one reported in the main text for the parametric estimates. The ITT and first stage estimates are obtained using the conventional nonparametric estimator. The effects of one month of daycare 0–2 are obtained using three distinct RD estimators: the local polynomial estimator (conventional), the bias-corrected estimator proposed by Calonico *et al.* (2014b) and the bias-corrected estimator with robust standard errors. The running variable is the Family Affluence Index (FAI). Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and whose parents first applied for admission to daycare between 2001 and 2005. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–16: Effects of daycare 0–2 attendance on Neuroticism: nonparametric estimates.

Preferred thresholds Gender	All All	≤ median All	> median All	All Girls	All Boys
ITT of just qualifying	-0.008 (0.033)	-0.065 (0.067)	0.001 (0.045)	0.012 (0.040)	-0.065 (0.069)
First stage	4.1** (1.5)	4.1* (1.7)	4.5+ (2.6)	2.5 (1.9)	6.3* (2.7)
robust p-value	0.067	0.152	0.316	0.703	0.057
Effect of 1 month (conventional)	-0.003 (0.009)	-0.006 (0.012)	0.000 (0.010)	0.009 (0.021)	-0.010 (0.012)
Effect of 1 month (bias-corrected)	-0.006 (0.009)	-0.008 (0.012)	-0.003 (0.010)	0.013 (0.021)	-0.011 (0.012)
Effect of 1 month (robust)	-0.006 (0.011)	-0.008 (0.015)	-0.003 (0.010)	0.013 (0.026)	-0.011 (0.017)
Bandwith for Loc. Poly (h)	4.649	4.779	5.730	4.682	4.667
Bandwith for bias (b)	16.438	10.779	16.310	16.046	9.965
Number of observations	114	60	62	69	55

Notes: The table reports nonparametric estimates of the effect of one month of daycare 0–2 on the log of Neuroticism, with related ITT and first stage. The methodology used is detailed in Calonico *et al.* (2014b), and it is implemented using the software described in Calonico *et al.* (2014a). The grade of local polynomials is zero and the kernel is triangular. Since these estimates are obtained stacking thresholds, for the reasons discussed in the main text, observations at zero distance are excluded. The table also reports the optimal bandwidths for the local polynomial (h) and for the bias (b) as well as the p-value from a test for the null hypothesis that the first stage coefficient is zero, obtained using a robust and bias corrected estimator for the first stage. For these reasons, the sample size is smaller than the one reported in the main text for the parametric estimates. The ITT and first stage estimates are obtained using the conventional nonparametric estimator. The effects of one month of daycare 0–2 are obtained using three distinct RD estimators: the local polynomial estimator (conventional), the bias-corrected estimator proposed by Calonico *et al.* (2014b) and the bias-corrected estimator with robust standard errors. The running variable is the Family Affluence Index (FAI). Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and whose parents first applied for admission to daycare between 2001 and 2005. $^+$ significant at 10%; * significant at 5%; ** significant at 1% or better.

Tables A–17 to A–28 replicate the econometric analysis of the main text for the four sub-scales and separately by affluence group and by gender. With different degrees of intensity, the results for the full scale hold similarly for the sub-scales.

Table A–21 reports the characteristics of interviewed children in case (L), i.e., $\mathcal{Y}^P \neq \mathcal{Y}^M$ (the Preferred and Maximum thresholds are different), or in case (N), i.e., $\mathcal{Y}^P = \mathcal{Y}^M$ (the Preferred and Maximum thresholds coincide). The number of preferences is higher for children in case (L), as one should expect, which is why our econometric analysis conditions on this number. Most of the other differences between the two cases in this table follow from this crucial difference and are in any case negligible in size even if statistically significant. For instance, age at entry in daycare is higher and days of attendance are less in case (N) than in case (L) because in case (N) many children are not offered any program at first application and can only attend daycare after one year, if at all.

Table A–17: Effects of daycare 0–2 on the verbal ability subscale of IQ, for all children and by level of the Preferred FAI threshold

	Dependent variable: ln(**verbal ability** IQ subscale)								
	All FAI thresholds (mean threshold: €24.7k)			FAI thresholds $\leq$ median (mean threshold: €16.4k)			FAI thresholds $>$ median (mean threshold: €33.0k)		
ITT effect of qualifying for the preferred program	-0.013	-0.015	-0.014	-0.016	-0.024	-0.021	-0.025	-0.026	-0.030^{+}
	(0.011)	(0.011)	(0.011)	(0.021)	(0.019)	(0.020)	(0.017)	(0.016)	(0.015)
First stage: effect of qualifying on months of attendance	6.3**	6.4**	5.9**	5.9**	5.8**	5.8**	4.6**	4.8**	4.6**
	(0.9)	(0.9)	(0.9)	(1.3)	(1.4)	(1.4)	(1.3)	(1.4)	(1.3)
IV effect of one month of daycare attendance	-0.002	-0.002	-0.002	-0.003	-0.004	-0.004	-0.005	-0.005	-0.006*
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
F-stat on excluded instruments	49.1	46.9	44.8	22.0	18.0	13.8	12.9	12.3	12.3
Number of observations	444	444	444	228	228	228	216	216	216
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Appl. set controls		Yes	Yes		Yes	Yes		Yes	Yes
Pre-treat. controls			Yes			Yes			Yes

Notes: The table reports parametric estimates of the effect of one month of daycare 0–2 on the log verbal ability index (one of the four subscales of IQ as measured by the WISC-IV), and the associated ITT and first stage, at all levels of the Preferred FAI threshold and separately for Preferred FAI thresholds below or above the median Preferred FAI threshold. ITT coefficients are from regressions of log IQ on the instrument (whether the child qualifies for the preferred program) and controls. First-stage coefficients are from regressions of months (1 month = 20 days of attendance) spent in daycare 0–2 on the instrument and controls. IV coefficients are from regressions of log IQ on months of attendance and controls using a dummy for qualification in the preferred program as the instrument. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and who first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–18: Effects of daycare 0–2 on the working memory subscale of IQ, for all children and by level of the Pref. FAI threshold

	Dependent variable: ln(**working memory** IQ subscale)								
	All FAI thresholds (mean threshold: €24.7k)			FAI thresholds $\leq$ median (mean threshold: €16.4k)			FAI thresholds $>$ median (mean threshold: €33.0k)		
ITT effect of qualifying	-0.018	-0.024	-0.025	0.013	0.011	0.012	-0.047^{+}	-0.049^{+}	-0.053*
for the preferred program	(0.015)	(0.016)	(0.016)	(0.021)	(0.022)	(0.022)	(0.024)	(0.025)	(0.026)
First stage: effect of qualifying	6.3**	6.4**	5.9**	5.9**	5.8**	5.8**	4.6**	4.8**	4.6**
on months of attendance	(0.9)	(0.9)	(0.9)	(1.3)	(1.4)	(1.4)	(1.3)	(1.4)	(1.3)
IV effect of one month	-0.003	-0.004	-0.004	0.002	0.002	0.002	-0.010^{+}	-0.010*	-0.011^{+}
of daycare attendance	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)
F-stat on excluded instruments	49.1	46.9	44.8	22.0	18.0	13.8	12.9	12.3	12.3
Number of observations	444	444	444	228	228	228	216	216	216
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Appl. set controls		Yes	Yes		Yes	Yes		Yes	Yes
Pre-treat. controls			Yes			Yes			Yes

Notes: The table reports parametric estimates of the effect of one month of daycare 0–2 on the log working memory index (one of the four subscales of IQ as measured by the WISC-IV), and the associated ITT and first stage, at all levels of the Preferred FAI threshold and separately for Preferred FAI thresholds below or above the median Preferred FAI threshold. ITT coefficients are from regressions of log IQ on the instrument (whether the child qualifies for the preferred program) and controls. First-stage coefficients are from regressions of months (1 month = 20 days of attendance) spent in daycare 0–2 on the instrument and controls. IV coefficients are from regressions of log IQ on months of attendance and controls using a dummy for qualification in the preferred program as the instrument. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and who first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–19: Effects of daycare 0–2 on the perceptual reasoning subscale of IQ, all children and by level of the Pref. FAI threshold

	Dependent variable: ln(**perceptual reasoning** IQ subscale)								
	All FAI thresholds (mean threshold: €24.7k)			FAI thresholds ≤ median (mean threshold: €16.4k)			FAI thresholds > median (mean threshold: €33.0k)		
ITT effect of qualifying for the preferred program	-0.021^{+}	-0.022^{+}	-0.021^{+}	0.015	0.011	0.012	-0.066**	-0.069**	-0.072**
	(0.012)	(0.012)	(0.012)	(0.020)	(0.019)	(0.017)	(0.021)	(0.022)	(0.020)
First stage: effect of qualifying on months of attendance	6.3**	6.4**	5.9**	5.9**	5.8**	5.8**	4.6**	4.8**	4.6**
	(0.9)	(0.9)	(0.9)	(1.3)	(1.4)	(1.4)	(1.3)	(1.4)	(1.3)
IV effect of one month of daycare attendance	-0.003^{+}	-0.003^{+}	-0.004^{+}	0.002	0.002	0.002	-0.014**	-0.014**	-0.016**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)
F-stat on excluded instruments	49.1	46.9	44.8	22.0	18.0	13.8	12.9	12.3	12.3
Number of observations	444	444	444	228	228	228	216	216	216
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Appl. set controls		Yes	Yes		Yes	Yes		Yes	Yes
Pre-treat. controls			Yes			Yes			Yes

Notes: The table reports parametric estimates of the effect of one month of daycare 0–2 on the log perceptual reasoning index (one of the four subscales of IQ as measured by the WISC-IV), and the associated ITT and first stage, at all levels of the Preferred FAI threshold and separately for Preferred FAI thresholds below or above the median Preferred FAI threshold. ITT coefficients are from regressions of log IQ on the instrument (whether the child qualifies for the preferred program) and controls. First-stage coefficients are from regressions of months (1 month = 20 days of attendance) spent in daycare 0–2 on the instrument and controls. IV coefficients are from regressions of log IQ on months of attendance and controls using a dummy for qualification in the preferred program as the instrument. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and who first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–20: Effects of daycare 0–2 on the processing speed subscale of IQ, all children and by level of the Pref. FAI threshold

	Dependent variable: ln(**processing speed** IQ subscale)								
	All FAI thresholds (mean threshold: €24.7k)			FAI thresholds $\leq$ median (mean threshold: €16.4k)			FAI thresholds > median (mean threshold: €33.0k)		
ITT effect of qualifying for the preferred program	-0.033* (0.012)	-0.037** (0.013)	-0.038** (0.012)	-0.029 (0.020)	-0.034^{+} (0.018)	-0.032 (0.019)	-0.039 (0.024)	-0.047* (0.023)	-0.053* (0.023)
First stage: effect of qualifying on months of attendance	6.3** (0.9)	6.4** (0.9)	5.9** (0.9)	5.9** (1.3)	5.8** (1.4)	5.8** (1.4)	4.6** (1.3)	4.8** (1.4)	4.6** (1.3)
IV effect of one month of daycare attendance	-0.005** (0.002)	-0.006** (0.002)	-0.006** (0.002)	-0.005 (0.003)	-0.006^{+} (0.003)	-0.006 (0.004)	-0.008 (0.005)	-0.010* (0.005)	-0.012* (0.005)
F-stat on excluded instruments	49.1	46.9	44.8	22.0	18.0	13.8	12.9	12.3	12.3
Number of observations	444	444	444	228	228	228	216	216	216
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Appl. set controls		Yes	Yes		Yes	Yes		Yes	Yes
Pre-treat. controls			Yes			Yes			Yes

Notes: The table reports parametric estimates of the effect of one month of daycare 0–2 on the log processing speed index (one of the four subscales of IQ as measured by the WISC-IV), and the associated ITT and first stage, at all levels of the Preferred FAI threshold and separately for Preferred FAI thresholds below or above the median Preferred FAI threshold. ITT coefficients are from regressions of log IQ on the instrument (whether the child qualifies for the preferred program) and controls. First-stage coefficients are from regressions of months (1 month = 20 days of attendance) spent in daycare 0–2 on the instrument and controls. IV coefficients are from regressions of log IQ on months of attendance and controls using a dummy for qualification in the preferred program as the instrument. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and who first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–21: Characteristics of interviewed children in case (L), i.e., $\mathcal{Y}^P \neq \mathcal{Y}^M$, or in case (N), i.e., $\mathcal{Y}^P = \mathcal{Y}^M$

	case (L)	case (N)	p-val		case (L)	case (N)	p-val
FAI	27.6	25.8	0.31	Father education in years	14.4	13.9	0.14
	(1.1)	(1.1)			(0.21)	(0.31)	
N. of preferences	6.36	3.87	0.00	Mother education in years	15.5	15.3	0.49
	(0.20)	(0.24)			(0.18)	(0.27)	
N. of siblings	1.48	1.66	0.01	Father birth year	1966.4	1965.9	0.30
	(0.04)	(0.06)			(0.28)	(0.38)	
Offered admission	0.78	0.68	0.02	Mother birth year	1968.8	1968.1	0.09
	(0.02)	(0.04)			(0.23)	(0.35)	
Waiver	0.06	0.08	0.33	Father self-employed	0.21	0.30	0.04
	(0.01)	(0.02)			(0.02)	(0.04)	
Year of first application	2003.6	2003.2	0.00	Mother self-employed	0.10	0.11	0.74
	(0.08)	(0.12)			(0.02)	(0.02)	
Grade at first application	1.41	1.81	0.00	Cesarean delivery	0.28	0.23	0.28
	(0.03)	(0.06)			(0.03)	(0.04)	
Ever attended	0.82	0.70	0.01	Months breastfed	6.4	5.99	0.39
	(0.02)	(0.04)			(0.28)	(0.35)	
Months at entry	14.5	16.8	0.00	Interviewer: psychologist 1	0.41	0.38	0.42
	(0.4)	(0.7)			(0.03)	(0.04)	
Days of attendance	245.2	199.2	0.00	Interviewer: psychologist 2	0.17	0.18	0.65
	(8.8)	(13.5)			(0.02)	(0.03)	
Year born	2002.8	2002.2	0.00	Interviewer: psychologist 3	0.41	0.44	0.56
	(0.08)	(0.11)			(0.03)	(0.04)	
Day born	183.1	175.0	0.48	Year interviewed	2013.7	2013.7	0.71
	(6.5)	(9.0)			(0.03)	(0.05)	
Age at interview	10.5	11.1	0.00	Month interviewed	7.0	7.1	0.73
	(0.09)	(0.14)			(0.2)	(0.2)	

Notes: The table compares the the 141 (32%) children who fall in case (N) and the 306 (68%) children who fall in case (L) among the 447 children born between 1999 and 2005, with two working parents, with non-missing Big Five scores or covariates and whose parents first applied for admission to daycare between 2001 and 2005. For breastfeeding (not used in the empirical analysis in the main text), descriptives are based on 250 observations due to missing information, 169 in case (L) and 81 in case (N). For each variable and sub-sample the table reports the mean, the standard error of the mean in parenthesis and the p-value of a test that the mean is equal in cases (L) and (N). FAI stands for Family Affluence Index.

Appendix to Section 7: Suggestions from the psychological literature

Additional figures and tables for Section 7

Tables A–22 to A–30 report the full set of tables for the results by gender described in Section 7 of the main text.

Table A–22: Gender heterogeneity in the IQ effects of daycare 0–2

	Dependent variable: ln(IQ)					
	Boys			Girls		
ITT effect of qualifying for the preferred program	-0.013 (0.016)	-0.018 (0.016)	-0.023 (0.016)	-0.040** (0.015)	-0.043** (0.016)	-0.039** (0.016)
First stage: effect of qualif. on months of attendance	6.11** (0.98)	6.68** (0.93)	6.32** (0.89)	6.54** (1.12)	6.42** (1.19)	5.60** (1.19)
IV effect of one month of daycare attendance	-0.002 (0.003)	-0.003 (0.002)	-0.004 (0.002)	-0.006* (0.002)	-0.007* (0.003)	-0.007** (0.003)
F-stat on excluded instrum.	38.9	51.1	50.6	33.9	29.0	22.1
Number of observations	215	215	215	229	229	229
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes
Appl. set controls		Yes	Yes		Yes	Yes
Pre-treat. controls			Yes			Yes

Notes: The table reports parametric estimates of the effect of one month of daycare 0–2 on log IQ and the associated ITT and first stage by gender. ITT coefficients are from regressions of log IQ on the instrument (whether the child qualifies for the preferred program) and controls. First-stage coefficients are from regressions of months (1 month = 20 days of attendance) spent in daycare 0–2 on the instrument and controls. IV coefficients are from regressions of log IQ on months of attendance and controls using a dummy for qualification in the preferred program as the instrument. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: 444 interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and who first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. * significant at 5%; ** significant at 1% or better.

Table A–23: ITT effect of qualifying for the preferred program on personality, by gender and by level of the Preferred threshold

	All FAI thresholds (mean threshold: €24.7k)		FAI thresholds ≤ median (mean threshold: €16.4k)		FAI thresholds > median (mean threshold: €33.0k)	
	Boys	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*
Openness	-0.019	-0.029	-0.026	0.038	-0.046	-0.105^{+}
	(0.026)	(0.039)	(0.045)	(0.049)	(0.038)	(0.053)
Conscientiousness	0.008	0.016	0.034	0.037	-0.014	-0.034
	(0.035)	(0.038)	(0.067)	(0.047)	(0.059)	(0.046)
Extraversion	-0.016	-0.072*	-0.092^{+}	-0.018	0.036	-0.114^{+}
	(0.028)	(0.033)	(0.055)	(0.047)	(0.045)	(0.062)
Agreeableness	-0.026	-0.014	-0.013	0.009	-0.048	-0.052
	(0.029)	(0.028)	(0.052)	(0.033)	(0.062)	(0.035)
Neuroticism	0.012	0.001	-0.022	-0.037	0.061	0.025
	(0.023)	(0.038)	(0.043)	(0.062)	(0.039)	(0.064)
Number of observations	218	229	110	115	108	114
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes
Application set controls	Yes	Yes	Yes	Yes	Yes	Yes
Pre-treatment controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports parametric estimates of the effect of qualifying for the most preferred daycare program on the log of scores in the Big Five Questionnaire for Children, by gender of the child, at all levels of the Preferred FAI threshold and separately for Preferred FAI thresholds below or above the median Preferred FAI threshold. The coefficients are from distinct regressions of each outcome on a dummy for qualification in the preferred program and controls. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: 447 interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and whose parents first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–24: Effects of daycare 0–2 attendance on personality, by gender and by level of the Preferred FAI threshold

	All FAI thresholds (mean threshold: €24.7k)		FAI thresholds $\leq$ median (mean threshold: €16.4k)		FAI thresholds $>$ median (mean threshold: €33.0k)	
	Boys	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*
Openness	-0.003	-0.005	-0.004	0.006	-0.009	-0.018^{+}
	(0.004)	(0.007)	(0.007)	(0.008)	(0.006)	(0.010)
Conscientiousness	0.001	0.003	0.005	0.006	-0.003	-0.006
	(0.005)	(0.006)	(0.010)	(0.007)	(0.010)	(0.008)
Extraversion	-0.003	-0.012*	-0.015^{+}	-0.003	0.007	-0.020^{+}
	(0.004)	(0.006)	(0.008)	(0.007)	(0.008)	(0.012)
Agreeableness	-0.004	-0.003	-0.002	0.001	-0.009	-0.009
	(0.004)	(0.005)	(0.007)	(0.005)	(0.010)	(0.007)
Neuroticism	0.002	0.000	-0.004	-0.006	0.011^{+}	0.004
	(0.003)	(0.006)	(0.006)	(0.009)	(0.007)	(0.011)
Number of observations	218	229	110	115	108	114
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes
Application set controls	Yes	Yes	Yes	Yes	Yes	Yes
Pre-treatment controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports parametric estimates of the effect of one month (20 days of attendance) of daycare 0–2 on the log of scores in the Big Five Questionnaire for Children, by gender of the child, at all levels of the Preferred FAI threshold and separately for Preferred FAI thresholds below or above the median Preferred FAI threshold. The coefficients are from distinct regressions of each outcome on months of attendance and controls using a dummy for qualification in the preferred program as the instrument. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: 447 interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and whose parents first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1% or better.

Table A–25: Effect of daycare 0–2 on the verbal ability subscale of IQ by gender.

	Dependent variable: ln(**verbal ability** IQ subscale)					
	Boys			Girls		
ITT effect of qualifying for the preferred program	-0.006 (0.019)	-0.007 (0.020)	-0.004 (0.019)	-0.023 (0.015)	-0.025 (0.016)	-0.023 (0.017)
First stage: effect of qualif. on months of attendance	6.11** (0.98)	6.68** (0.93)	6.32** (0.89)	6.54** (1.12)	6.42** (1.19)	5.60** (1.19)
IV effect of one month of daycare attendance	-0.001 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.003 (0.002)	-0.004^{+} (0.002)	-0.004 (0.003)
F-stat on excluded instrum.	38.9	51.1	50.6	33.9	29.0	22.1
Number of observations	215	215	215	229	229	229
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes
Appl. set controls		Yes	Yes		Yes	Yes
Pre-treat. controls			Yes			Yes

Notes: The table reports parametric estimates of the effect of one month of daycare 0–2 on the log verbal ability index (one of the four subscales of IQ as measured by the WISC-IV), and the associated ITT and first stage, by gender. First-stage coefficients are from regressions of months (1 month = 20 days of attendance) spent in daycare 0–2 on the instrument and controls. IV coefficients are from regressions of log IQ on months of attendance and controls using a dummy for qualification in the preferred program as the instrument. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and who first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. * significant at 5%; ** significant at 1% or better.

Table A–26: Effect of daycare 0–2 on the working memory subscale of IQ by gender.

	Dependent variable: ln(**working memory** IQ subscale)					
	Boys			Girls		
ITT effect of qualifying for the preferred program	-0.007 (0.022)	-0.014 (0.024)	-0.022 (0.022)	-0.029 (0.018)	-0.037^{+} (0.020)	-0.034^{+} (0.020)
First stage: effect of qualif. on months of attendance	6.11** (0.98)	6.68** (0.93)	6.32** (0.89)	6.54** (1.12)	6.42** (1.19)	5.60** (1.19)
IV effect of one month of daycare attendance	-0.001 (0.004)	-0.002 (0.003)	-0.003 (0.003)	-0.004 (0.003)	-0.006^{+} (0.003)	-0.006 (0.004)
F-stat on excluded instrum.	38.9	51.1	50.6	33.9	29.0	22.1
Number of observations	215	215	215	229	229	229
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes
Appl. set controls		Yes	Yes		Yes	Yes
Pre-treat. controls			Yes			Yes

Notes: The table reports parametric estimates of the effect of one month of daycare 0–2 on the log working memory index (one of the four subscales of IQ as measured by the WISC-IV), and the associated ITT and first stage, by gender. First-stage coefficients are from regressions of months (1 month = 20 days of attendance) spent in daycare 0–2 on the instrument and controls. IV coefficients are from regressions of log IQ on months of attendance and controls using a dummy for qualification in the preferred program as the instrument. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and who first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. * significant at 5%; ** significant at 1% or better.

Table A–27: Effect of daycare 0–2 on the perceptual reasoning subscale of IQ by gender.

	Dependent variable: ln(**perceptual reasoning** IQ subscale)					
	Boys			Girls		
ITT effect of qualifying for the preferred program	-0.017 (0.018)	-0.020 (0.019)	-0.025 (0.018)	-0.025 (0.019)	-0.025 (0.019)	-0.021 (0.018)
First stage: effect of qualif. on months of attendance	6.11** (0.98)	6.68** (0.93)	6.32** (0.89)	6.54** (1.12)	6.42** (1.19)	5.60** (1.19)
IV effect of one month of daycare attendance	-0.003 (0.003)	-0.003 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)
F-stat on excluded instrum.	38.9	51.1	50.6	33.9	29.0	22.1
Number of observations	215	215	215	229	229	229
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes
Appl. set controls		Yes	Yes		Yes	Yes
Pre-treat. controls			Yes			Yes

Notes: The table reports parametric estimates of the effect of one month of daycare 0–2 on the log perceptual reasoning index (one of the four subscales of IQ as measured by the WISC-IV), and the associated ITT and first stage, by gender. First-stage coefficients are from regressions of months (1 month = 20 days of attendance) spent in daycare 0–2 on the instrument and controls. IV coefficients are from regressions of log IQ on months of attendance and controls using a dummy for qualification in the preferred program as the instrument. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and who first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. * significant at 5%; ** significant at 1% or better.

Table A–28: Effect of daycare 0–2 on the processing speed subscale of IQ by gender.

	Dependent variable: ln(**processing speed** IQ subscale)					
	Boys			Girls		
ITT effect of qualifying for the preferred program	-0.008 (0.015)	-0.014 (0.016)	-0.024 (0.015)	-0.056** (0.019)	-0.057** (0.019)	-0.055** (0.019)
First stage: effect of qualif. on months of attendance	6.11** (0.98)	6.68** (0.93)	6.32** (0.89)	6.54** (1.12)	6.42** (1.19)	5.60** (1.19)
IV effect of one month of daycare attendance	-0.001 (0.002)	-0.002 (0.002)	-0.004 (0.002)	-0.009** (0.003)	-0.009** (0.003)	-0.010** (0.004)
F-stat on excluded instrum.	38.9	51.1	50.6	33.9	29.0	22.1
Number of observations	215	215	215	229	229	229
Polynomial in FAI	Yes	Yes	Yes	Yes	Yes	Yes
Appl. set controls		Yes	Yes		Yes	Yes
Pre-treat. controls			Yes			Yes

Notes: The table reports parametric estimates of the effect of one month of daycare 0–2 on the log processing speed index (one of the four subscales of IQ as measured by the WISC-IV), and the associated ITT and first stage, by gender. First-stage coefficients are from regressions of months (1 month = 20 days of attendance) spent in daycare 0–2 on the instrument and controls. IV coefficients are from regressions of log IQ on months of attendance and controls using a dummy for qualification in the preferred program as the instrument. The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and who first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. * significant at 5%; ** significant at 1% or better.

Table A–29: IV effects of daycare 0–2 attendance on IQ, by cases (L) and (N) and by gender

	All children	Boys	Girls
Daycare attendance	-0.007*	-0.004	-0.013*
	(0.003)	(0.003)	(0.006)
Daycare attendance $\times \mathbb{I}(\mathcal{Y}^P = \mathcal{Y}^M)$	0.004	-0.001	0.009^+
	(0.003)	(0.005)	(0.005)
$\mathbb{I}(\mathcal{Y}^P = \mathcal{Y}^M)$	-0.028	0.026	-0.093
	(0.040)	(0.054)	(0.067)
Number of observations	444	215	229

Notes: The table reports parametric IV estimates of the effect of one month of daycare 0–2 on log IQ for all children and separately for boys and girls. Coefficients are from regressions of log IQ on months of attendance, months of attendance interacted with $\mathbb{I}(\mathcal{Y}^P = \mathcal{Y}^M)$ and the full set of controls A_i and X_i using the dummy P_i for qualification in the preferred program and the same dummy interacted with $\mathbb{I}(\mathcal{Y}^P = \mathcal{Y}^M) = 1 - \Omega$ as the instruments (see 47 of the main text). The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: 444 interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and whose parents first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. * significant at 5%; ** significant at 1% or better.

Table A–30: IV effects of daycare 0–2 attendance on personality, by cases (L) and (N) and by gender

	All children		Boys		Girls	
	β_L	$\beta_N - \beta_L$	β_L	$\beta_N - \beta_L$	β_L	$\beta_N - \beta_L$
Openness	-0.004	0.000	-0.003	-0.000	-0.003	-0.003
	(0.006)	(0.007)	(0.005)	(0.000)	(0.012)	(0.011)
Conscientiousness	-0.001	0.002	-0.001	0.005	0.003	-0.001
	(0.006)	(0.006)	(0.006)	(0.008)	(0.011)	(0.010)
Extraversion	-0.007	-0.000	0.001	-0.011	-0.019	0.011
	(0.007)	(0.007)	(0.012)	(0.008)	(0.012)	(0.012)
Agreeableness	-0.006	0.003	-0.004	-0.000	-0.007	0.008
	(0.006)	(0.008)	(0.010)	(0.008)	(0.010)	(0.010)
Neuroticism	0.002	-0.001	0.003	-0.001	0.000	-0.000
	(0.006)	(0.007)	(0.004)	(0.006)	(0.013)	(0.012)
N	447	447	218	218	229	229

Notes: The table reports parametric IV estimates of the effect of one month of daycare 0–2 on the log scores in the Big Five Questionnaire for Children, for the entire interview sample and separately for boys and girls. Coefficients are from regressions of each outcome on months of attendance, months of attendance interacted with $\mathbb{I}(\mathcal{Y}^P = \mathcal{Y}^M)$ and the full set of controls A_i and X_i, using the dummy P_i for qualification in the preferred program and the same dummy interacted with $\mathbb{I}(\mathcal{Y}^P = \mathcal{Y}^M) = 1 - \Omega$ as the instruments (see footnote 45 in the main text). The running variable is the Family Affluence Index (FAI), and the polynomial in the running variable is of second order. Sample: 447 interviewed children with two working parents, born between 1999 and 2005, with non-missing outcome or covariates and whose parents first applied for admission to daycare between 2001 and 2005. Robust standard errors in parentheses, clustered at the facility level. $^+$ significant at 10%; * significant at 5%; ** significant at 1% or better.

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