Supplementary Appendix

Supplementary material for the paper "Child Care Subsidies and Child Skill Accumulation in One- and Two-Parent Families"

Not intended for publication – to be made available online

Contents

A Data Sources and Measurement

The primary data source for this study is the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B). I also use the American Time Use Survey (ATUS) to impute time levels per each activity performed by parents in the ECLS-B, and Child Care and Development Fund (CCDF) administrative data to discipline the intensity of the baseline child care subsidy conditional on receipt. For the ECLS-B and CCDF administrative datasets I provide a more extended description of the data structure.[1]

A.1 The Early Childhood Education Longitudinal Study, Birth Cohort

The ECLS-B follows a nationally representative sample of families raising a child who was 9 months old in 2001. It was designed and collected by the United States Department of Education. Using birth-certificate data from the National Center for Health Statistics, over 14,000 births were selected within Primary Sampling Units. Children of mothers younger than 15 were excluded from the sampling frame. There are 5 waves: wave 1 is the 9-month old data collection round, wave 2 occurs at 2 years, wave 3 at 4 years, and waves 4 and 5 at kindergarten entry. If the focal child was not in kindergarten when wave 4 was collected, the surveyors went back and collected data the next year when they were enrolled. In addition, if a child repeated kindergarten, their scores were also collected in wave 5 in addition to wave 4. Each wave contains several instruments; these are different self-administered questionnaires (SAQs) for different people in the child's life, in addition to the child-level data. Table 1 summarizes these instruments in each wave of the survey.

Table 1: The Structure of the ECLS-B

Instrument	Wave 1	Wave 2	Wave 3	Wave 4+5
1.	Parent Interview	Parent Interview + SAQ	Parent SAQ	Parent SAQ
2.	Resident Father	Resident Father SAQ	Resident Father SAQ	ECEP Interview[1]
3.	Nonresident Father	Nonresident Father SAQ	Preschool Center Director SAQ	Teacher
4.		Child Care Provider	Preschool ECEP SAQ[1]	WECEP Interview [2]
5.		Center Director		

[1] Early Care and Education Provider
[2] Wrap-around Care Early Care and Education Provider

A.1.1 Direct Assesments of Child Skill

For each wave of the survey, an age-appropriate assessment of the child's skill is administered (for a detailed overview, see the explanatory slides found at NCES (2020)). In waves 1 and 2, when the child is 9 months and 2 years old, respectively, the Bayley Short Form, Research edition (BSF-R) cognitive direct assessment was administered. This assessment is constructed using a subset of questions from a standard assessment for children from this age group, the Bayley Scales for Infant Development, 2nd Edition (BSID-II). The BSID-II, which was reviewed in detail by Nellis and Gridley (1994), is considered an excellent tool for assessing

[1] I omit such a description for the ATUS because it is more well-known.

children 42 months of age and younger. The BSF-R, in turn, is designed to collect the same information as the BSID-II, but with fewer questions, making it easier to administer and score. This was necessary because, unlike the BSID-II, the BSF-R was administered by interviewers for the ECLS-B who were not experts in child psychology. Next, the results of the BSF-R were mapped into the metric of the BSID-II. There are mental and motor scores assigned to children who completed the test in each wave.

The BSF-R is organized as follows. The child is administered a series of questions, where their performance determines the total set of questions they are ultimately asked. The questions begin with a basal set, where the questions are grouped by the skill that they are meant to measure. The skills in question are those which children in a given age group are expected to demonstrate. If the child performs poorly, they continue through the basal set of questions. If they perform well, they are administered a ceiling set of questions. The mental knowledge and skill of the child are reported in the mental score, which is reported with three metrics: a scale score, a t-score, and a probability score. The scale score can be compared across waves or within a cross-section, but the t-score is better suited to comparing across groups within a cross-section. The probability score measures the probability the child has acquired the skills measured by the test. For the correlations of child skill with family attributes, and the regressions using child skill, I use the mental scale score.

The skills measured by the mental scale score are arranged in ascending order of development:

1. Explores objects (i.e. reaching for and holding objects, manipulating them, and banging them)
2. Explores purposefully
3. Jabbers expressively
4. Early problem solving
5. Names objects
6. Receptive vocabulary
7. Expressive vocabulary
8. Listening/comprehension
9. Matching/discrimination

Because there was no existing single measure of skill that could be used continually to assess child skill during the first five years of life, a transition to a new assessment was necessary for the preschool and kindergarten collections. In addition, no existing assessment was age-appropriate for the third and fourth wave of the ECLS-B while also being straightforward to administer. Therefore, a new cognitive assessment, the cognitive battery, was developed especially for the ECLS-B. The content of this battery included a reading assessment and a mathematics assessment. For the preschool (wave 3) round there was a color knowledge assessment as well, to test for children's knowledge of basic colors. The reading assessment "Examines children's letter recognition, letter sound knowledge, recognition of simple words, phonological

awareness, receptive and expressive vocabulary knowledge, and knowledge of print conventions", while the mathematics assessment "Examines children's number sense, counting, operations (e.g., addition, subtraction, multiplication, division), geometry, pattern understanding, and measurement".

These assessments were administered in a way structured to the child's ability, so that children who did not demonstrate sufficient English-language skill were not administered the literacy portion (for example). That means that not all of the questions in the assessment were asked of each child. The types of scores are provided for the reading assessment are theta scores and overall scale scores. The theta score is normally distributed and ranges from -2 to 2; it estimates the child's score if they had been administered all of the assessment. The scale score estimates the number of items the child would have gotten correct on the entire assessment. Both scores are appropriate for analysis of children's rank within a cross-section and changes in their rank over time. The mathematics assessment is structured similarly to the reading assessment and also reports the theta score and the scale score. I use the scale score for the reading and mathematics assessment and take the average across the two assessments to construct a single score for each child.

A.1.2 Parental Quality Time

In each wave of the survey, the primary care provider (usually the mother) and the resident father fill out detailed questionnaires on the activities they do with their kids and at what frequency (once a week, twice a week, once a month, etc.). The types of activities reported, for each wave, are listed below. Within each wave, each of the activities listed below is asked about on both the primary caregiver questionnaire and the resident father questionnaire. The question which collects this information for each activity begins with "How often do you...?":

1. Wave 1: read to your child, tell your child stories, sing songs with your child, go outside to walk or play with your child, play peekaboo with your child, tickle your child.
2. Wave 2: read to your child, tell your child stories, play games indoors with your child, sing songs with your child, go outside to walk or play with your child, talk with your child about TV programs, play games or activities after watching TV with your child.
3. Wave 3: read to your child, tell your child stories, play games indoors with your child, sing songs with your child, go outside to walk or play with your child, talk with your child about TV programs, play games or activities after watching TV with your child.

I define "quality time" as the total amount of time spent (1) reading to the child, or (2) telling the child stories, or (3) playing indoors with the child. I use this definition because each of these activities involves actively engaging with the child and has a counterpart in the ATUS survey. For example, I exclude playing outdoors because this question does not imply directly interacting with the child. To map from frequencies of activities to levels of quality time supplied by parents, I impute the amount of time per activity using data from the ATUS. Playing peekaboo or tickling your child in wave 1 is not counted as playing with the child because there is not a counterpart in the ATUS and these activities are likely quite brief compared to the general category of playing, so that simply relabelling them "playing" and using the ATUS imputation

would introduce a great deal of measurement error.

A.1.3 Primary Source of Child Care

In the process of sample cleaning, the composition of child care sources shifts. In Table 2 I report the raw sample distribution for primary source of child care over child care type. This sample is only restricted to those families for whom I observe family structure (it is not the same sample as the "Population" sample discussed in the text). I report the same moments in the estimation sample in Table 3. Comparing across these two tables, note that the estimation sample does not include families who do not pay for child care. However, as discussed in section 3 of the main text for the case on non-working parents, I assume that these families still use the same technology to invest in their children, and are incorporating some (unobserved) price of this child care into their cost-minimization problem. The estimation sample also does not include families who claim to not use non-parental child care at all. This group likely does use non-parental care but for brief periods of time; it seems very unlikely that children in these families never interact with anyone other than their parents. For both families who use free child care and those who claim to use no non-parental child care, I do not observe quantities and prices in the data, but I nevertheless assume that if I could I would find that they are still cost-minimizing to finance investment in their child's skill, subject to the same technology as other families with their family structure.

Table 2: Primary Source of Child Care: Percent of Raw Sample

	One-Parent Families	Two-Parent Families
N/A	0.24	0.13
No non-parental care	30.77	43.87
Relative care: in child's home	15.66	7.44
Relative care: in another home	12.33	9.25
Relative care: location varies	1.09	1.07
Non-relative care: in child's home	1.43	3.46
Non-relative care: in another home	9.01	9.18
Non-relative care: location varies	0.25	0.15
Center-based program	21.29	21.72
Equal time in multiple arrangements	1.57	0.90
Head Start program	6.37	2.82
Total	100.00	100.00
Observations	5550	22000

This table: raw population sample, waves 1-3 (only requirement: observe family structure). Moments are weighted with cross-sectional weights from the primary caregiver survey. Data source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), Longitudinal 9- Month-Kindergarten 2007 Restricted-Use Data File. Observations rounded to nearest 50 per NCES requirements.

Table 3: Primary Source of Child Care: Percent of Estimation Sample

	Singles	Couples
Relative care: in child's home	3.70	3.94
Relative care: in another home	7.41	5.75
Relative care: location varies	0.0	0.33
Non-relative care: in child's home	2.22	8.37
Non-relative care: in another home	37.04	35.96
Non-relative care: location varies	0.0	0.33
Center-based program	45.93	44.99
Head Start program	3.70	0.33
Total	100.00	100.00
Observations	150	600

This table: estimation sample, waves 1-3. Moments are weighted with cross-section weights from the primary caregiver survey. Data source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), Longitudinal 9- Month-Kindergarten 2007 Restricted-Use Data File. Observations rounded to nearest 50 per NCES requirements.

A.2 The Child Care and Development Fund

In this section, I first give a broad overview of the child care assistance context in the United States. The CCDF is one of the largest programs which provides such assistance, and it has other attributes which make it the most suitable program for me to include in my model baseline for section 5 of the main text. After outlining those attributes, I next explain the data I use to discipline subsidy intensity for recipients of CCDF aid, and the results of that estimation.

A.2.1 Child Care Assistance in the United States

Historically, sources of child care assistance in the United States are often described as "fragmented," because they are administered through many agencies. In 2012 there were 50 agencies in the United States involved in subsidizing child care: 12 explicitly directed to early learning, 33 without such a purpose, and 5 tax expenditures (GAO (2017)). There is also a great deal of "overlap," in the sense that the target groups for these programs have many attributes in common. Among programs explicitly designed to reach poor families raising young children, the CCDF and Head Start (HS) are the two largest sources of federal funding (GAO (2017)). In fact, the CCDF is the primary federal funding source of means-tested child care subsidies directed to low-income *working* and welfare families (CRS (2003), OCC (2021)), while Head Start is much less focused on flexibility in family choice of hours and providers for child care. In the model of the main text, the baseline child care subsidy is parameterized using the CCDF.

The Child Care and Development Fund The CCDF refers to the combination of Child Care Entitlement to States funds (CCES) and discretionary Child Care and Development Block Grants (CCDBG), and is administered by the Department of Health and Human Services. In existence since 1996, the goal of the CCDF has always been to reduce dependence on public assistance by facilitating work for parents. However, it also earmarks funds for improving the general quality of child care services in the wider market—not just

for participating providers or recipients of aid. States receive federal funds via the CCES and CCDBG, complement it with money from Transfer Aid for Needy Families (TANF) funds and state contributions set according to CCDF rules, and then distribute it according to state-set rules which are restricted by broad guidelines set by the federal government. The funds either go to families in the form of vouchers, or directly to participating care providers in the form of grants to pay for recipient care (CRS (2003), GAO (2017), CRS (2019), OCC (2021)).

There is some variation across states in eligibility criteria, and each state's system has also evolved over time (see Stevens et al. (2017) for an overview of policy differences across states in 2015).[2] Although the specifics have evolved, four important eligibility determinants are commonly used: family income, family size, parent approved activities, and child age. The federal government dictates that family income can be no higher than 85 percent of state median income, but the state may set stricter guidelines if they choose. Family income is corrected for family size before it is used as a determinant of eligibility. Parents must be engaged in an approved activity, such as job training, education, or employment. If employment is the approved activity, there may be a minimum number of working hours required, although the majority of states have no such rule.[3] In 2015, for example, 30 of the 56 US geographic entities (50 states, 5 territories and the District of Columbia) had no minimum work hour requirement for eligibility, 15 required 15-20 hours per week, and the rest required more than 20 hours (Stevens et al. (2017), Figure 3). Finally, only families with children under age 13 are eligibile for CCDF aid, although in practice the majority of children whose families receive these funds are aged 5 or younger (GAO (2017)). Note that a state is not required to finance child care subsidies for every eligibile family, no matter what eligibility cutoff it chooses: this subsidy is not an entitlement. In fact, the fraction of eligible families who receive CCDF subsidies has been quite low (Herbst (2008)).

A family receiving CCDF aid must finance a co-payment for child care; this co-payment is increasing in family income. Parents have a broad choice of child care providers on which they can spend their aid. Although these providers have to meet basic health and safety criteria to participate and receive CCDF money, in practice they reflect the distribution of care available in the wider child care market for unsubusidized families, in terms of pre-subsidy cost and quality of care. Child care providers who provide services to CCDF recipients do not solely serve CCDF recipients.

Head Start and Early Head Start Like the CCDF, HS is a large program explicitly directed to poor families with young children, and is administered by the Department of Health and Human Services.[4] The goals of HS are wide-ranging compared to those of the CCDF: programs aim to address child development

[2] Similar reports for other years are available here: https://ccdf.urban.org/resources.

[3] These requirements generally apply to both parents of a two-parent household, although there are exceptions. In light of this, one might wonder whether families in the model who are eligible for subsidies are simply those with non-working mothers. In the model baseline equilibrium, only 1 percent of all families eligible for child care aid have a non-working mother. Of these families, 96 percent are couples where only one spouse does work (the rest are single female families). Thus, the CCDF subsidy I incorporate in the baseline is not counterfactually going to families with non-working parents, despite work requirements not being modelled directly.

[4] In this Appendix, I use "Head Start" (HS) to refer to both Head Start, which serves primarily 3 and 4 year-olds, and Early Head Start, which is much smaller and serves children under 3 and pregnant women.

in many areas, as well as actively engage the family and community, foster family health and nutrition, and raise other aspects of well-being (CRS (2003), CRS (2014), GAO (2017)).

HS provides federal grants directly to care providers (HS programs) who are then required to meet stringent quality requirements. Families are eligible for HS if they are below the poverty line and have children 5 years old or younger, with few exceptions. Not all eligible families receive a spot in HS for their child, and if they do, care is often only for part of the day and during the school year, so that families must find some additional source of child care if parents are working longer hours than HS care is available (NHSA (2021)). For example, before 2016, the minimum required time for service at Head Start programs was 3.5 hours per day. This constraint appears to be a binding one for many providers: when this minimum was raised in 2016 it proved difficult for care providers to finance the change without a large increase in funding from Congress (which was not forthcoming). This prompted a pause in the requirement in 2018 (HHS (2018)).

To summarize, a family receiving HS aid receives free child care at a local Head Start program of their choosing, for at least part of the day. These programs differ substantially from what is available on the general child care market and they serve only Head Start recipients. However, because hours of operation may not be sufficient to cover demand, many families may also have their child enrolled in another form of child care at the same time. Recipient families also receive aid with respect to education on parenting skills, family physical and mental health, and even prenatal care.

Choice of CCDF for the Model Baseline In the model of the main text, the baseline child care subsidy is based on the CCDF because of that program's attributes. The CCDF is a subsidy to the cost of child care services which are available in the wider market. Thus, the CCDF is similar to the proportional subsidy I consider in the policy analysis, where recipient families buy the same child care service that is being purchased by non-recipient families, but at a lower price. By contrast, HS provides a completely free service to recipient families which is not otherwise available on the market. This service is broader than child care: it includes help with health and nutrition for the entire family. In addition, the quantity of child care time that is available through HS is also often capped, because the programs are not always full-day. Despite having some important differences, the presence of income eligibility thresholds and the fact that the subsidy is not an entitlement are two aspects that HS does share with the CCDF, and in that sense takeaways from the policy analysis of the main text is informative for reforms of HS as well.

The size of the CCDF, in terms of number of children receiving aid, has historically been very similar to the size of Head Start. For example, in the 2001 fiscal year (close to when the ECLS-B begins), the average monthly number of children aged 5 and under receiving aid through the CCDF was 1,151,445.[5] In that same fiscal year, the number of children served by Head Start was 952,666 (Matthews (2014)). Currently, the enrollment figures are still very similar: in the 2018 fiscal year, the most recent data available for the CCDF, the CCDF had a monthly average of 858,715 enrolled children who were aged 5 and under, and Head

[5]This statistic combines Table 1 and the percent of children served by age group in the CCDF, available here: https://www.acf.hhs.gov/media/13923

Start enrolled 1,039,500 children age 5 and under.[6] When interpreting these numbers, keep in mind that children may receive both Head Start aid and CCDF aid if they qualify for both, so that these figures do not imply that the true number of children receiving aid from either program is the sum of the two enrollment counts (NHSA (2021)). This is related to the "overlap" of Head Start and the CCDF, which is widely acknowledged in government reports on these programs: these two programs target very similar groups. In fact, agencies charged with allocating CCDF funds historically make a concerted effort to co-ordinate with Head Start, and this process has recently become more formalized (CRS (2003), GAO (2017), GAO (2019), NHSA (2021)).

A.2.2 CCDF Administrative Data

CCDF administrative data is available in the Child & Family Data Archive (ICPSR (2009)). This data contains information reported by US states to the Child Care Bureau of the federal government about how CCDF dollars are being distributed at the case level. States make this report each fiscal year.[7] Within a fiscal year, there are several files:

1. Summary Records file: state-level data (number of families served).
2. Family Records file: family-level data (whether household head is a single parent, monthly co-payment amount for child care, date on which child care assistance began, reasons for care (e.g., employment, training/education, protective services, etc.), monthly family income, source of income (work, etc), and the family size). Family income and family size are the inputs used to determine eligibility; some states may use this information differently than others to determine eligibility.
3. Child Records file: child-level data (ethnicity, race, gender, date of birth).
4. Setting Records file: child-level data (type of child care provided, total amount paid to provider, number of hours of care received by the child).
5. Pooling Factor file: state-level data (percent of funds provided through CCDF, since some funds received through Temporary Assistance for Needy Families can be reallocated to subsidizing child care).

A family may have more than one child receiving aid from the CCDF, so the observation unit is the child in this set of files and more than one child can be associated with a family/state observation from the family records file or summary records/pooling factor files, respectively.

I use these data to discipline the average level of the child care subsidy in relation to family income in the data. I emphasize that this is an average because states may differ in the family income cutoff for eligibility, as already noted. I use the set of files for the 2002 fiscal year, because the other child care policy parameters come from estimates in Herbst (2008), who uses the 2002 National Survey of America's Families. For each

[6] For FY 2018, CCDF enrollment is computed using the tabulations available here: https://www.acf.hhs.gov/occ/data/fy-2018-ccdf-data-tables-preliminary. Head Start enrollment counts are available here: https://eclkc.ohs.acf.hhs.gov/about-us/article/head-start-program-facts-fiscal-year-2018.

[7] For an overview of the CCDF administrative data, see Appendix 4 of Goerge (2009).

child, I associate the child's unique ID (which combines the ID variable and state of residence), state of residence, and date of birth (age) from the Child Records file with an observation from the Family Records file, thus incorporating family income, size, copay for child care, family structure, and reason for care. The Family Records file also contains an adjusted weight variable, which corrects for sampling and for the fraction of child care subsidies funded directly with CCDF money in the state of residence. In addition, I link the child with their Settings Records observation, to incorporate the total amount paid to the child care provider and the number of hours it purchased. I do not incorporate information from the Pooling Factor file because that information is already contained in the adjusted weight variable from the Family Records file.

After combining datasets in this way, I observe the intensity of the subsidy and family income at the child level, as well as family size (number of children) and state of residence. For a state of residence, the adjusted weight associated with a child observation incorporates both the pooling factor and a sampling weight (see documentation for ICPSR (2009)). The estimation then proceeds in 4 steps.

First, I take the ratio of monthly family income multiplied by 12, and the yearly state median income multiplied by 0.85 (the maximum statutory cutoff for CCDF eligibility). To assign the median income at the state level, I associate each state of residence in the CCDF administrative data with the 2000 US Census state level median income.[8] In what follows, I will refer to this as the "relative income ratio".

Second, I construct the subsidy rate at the family level by computing the fraction of total payments to the child care provider which are made by the government, as opposed to being made by the family in their co-payment. This is $\hat{\tau}_n = \frac{\text{total payments} - \text{family co-pay}}{\text{total payments}}$.

Third, I run an OLS regression of the estimated subsidy rate, $\hat{\tau}_n$, on the relative income ratio and the square of the relative income ratio, as well as a set of dummies for state of residence and for the number of children in the family. In this estimation, I only include observations for children whose families live in a state that reports more than 10 families, where the child is less than 5 years old, the family has at most 4 children, the family reports income at least partially earned from employment, the family structure is reported, the reason for receiving the CCDF aid is so that the parent can work, and the number of hours the child reportedly spends in child care does not exceed 100 hours per week. I also restrict attention to observations that receive a positive subsidy in the observation period, where the level of the subsidy is measured as described above. There are 49,128 observations in the resulting estimation sample. Summary statistics of the estimation sample are described in Table 4. In the regression, I use the adjusted weight associated with each observation, which puts larger emphasis on children residing in states that use more CCDF funds to finance child care subsidies. However, I do not drop observations of children from states where it is common for supporting funds to be provided at the state level to finance these subsidies. Results of this estimation are presented in Table 5.[9]

Finally, I evaluate the model setting the number of children equal to two, which is the family size that I model and the median family in the ECLS-B. This gives me the intercept: $\hat{\beta}_0^{CC} = 0.98$. The slope coefficient on

[8] This was downloaded from Social Explorer. It is an aggregation of the Summary File 3 of the US Census at the state level.

[9] I do not include a control for one-parent families because, in an exercise where I interacted a an indicator for one-parent families with all of the independent variables, I found that coefficients were not significantly different across family structures.

the income ratio is $\hat{\beta}_1^{CC} = -0.29$, and the slope coefficient on the squared income ratio is $\hat{\beta}_2^{CC} = 0.03$.

Table 4: CCDF Estimation Sample Moments

	mean	p50	sd
Subsidy rate	0.85	0.91	0.18
Income ratio	0.50	0.44	0.50
Number of kids	1.98	2.00	0.94
Family income	1456.81	1300.00	1387.39
Observations	49128		

Data source: CCDF Administrative Data, Fiscal Year 2002 FY. Family income is monthly.

Table 5: Subsidy Level by Family Income

	$\hat{\tau}_n$
Income ratio	-0.287
	(0.0141)
Income ratio^2	0.0314
	(0.00250)
$\mathbb{I}_{No.\_kids=2}$	0.0145
	(0.00227)
$\mathbb{I}_{No.\_kids=3}$	0.0337
	(0.00284)
$\mathbb{I}_{No.\_kids=4}$	0.0559
	(0.00369)
Constant	0.963
	(0.00513)
N	49128
$\mathbb{R}^2$	0.29

Data source: CCDF Administrative Data, Fiscal Year 2002 FY. Standard errors in parentheses.

A.3 The American Time Use Survey

Summary statistics for the ATUS sample are reported in Table 6. Time spent in each activity, by family structure, parent gender, and labor force status, is reported in Table 7.

Table 6: ATUS Imputation Sample (Unweighted)

	mean
Parent age	33.81
Male parent	0.46
Number of own children (lt 18)	1.95
Two-Parent Family	0.93
Part-Time	0.18
Full-Time	0.82
Hours reading	0.47
Hours talking/listening	0.54
Hours playing	1.82
Observations	30439

Data source: ATUS survey pooled 2003-2016 sample, respondents who are older than 18 and less than 55 years old, who have a child 3 or younger.

Table 7: ATUS Time per Activity Averages by Demographic Bins

Family Structure	Parent Gender	FT/PT	Hrs. reading	Hrs. tlk/lstng	Hrs. playing	Obs. reading	Obs. tlk/lstng	Obs. playing
One-Parent	Female	Part-Time	0.706	0.633	1.507	62	37	184
One-Parent	Female	Full-Time	0.459	0.795	1.613	161	75	397
Two-Parent	Male	Part-Time	0.600	0.498	1.716	65	28	272
Two-Parent	Male	Full-Time	0.451	0.458	1.804	1858	588	5220
Two-Parent	Female	Part-Time	0.504	0.642	1.860	954	356	1784
Two-Parent	Female	Full-Time	0.418	0.512	1.588	1536	464	3011

Data source: ATUS survey pooled 2003-2016 sample, respondents who are older than 18 and less than 55 years old, who have a child 3 or younger. Average times are conditional on reporting any time spent in that activity, so observation counts do not sum to the total in Table 6.

B Empirical Motivation for Model Specification

In this section I document empirical motivation for several aspects of my model specification. I either provide my own empirical results or cite studies in the literature on whose empirical results I rely.

B.1 Fertility Extensive Margin

I assume that all families have children. There is a sizeable literature on how policy affects fertility decisions. This literature has not reached a definitive conclusion: results tend to be country-specific, and for those that do find an effect, the magnitude is small. One important margin of response to these policies seems to be the timing of birth over the mother's life, rather than the total number of births (total lifetime fertility). For surveys of the literature on this topic, see Gauthier (2007).[10] By contrast, there is sizeable evidence documenting a responsiveness of child skill (quality) to child care subsidies —especially for poor and one-parent families, the majority of evidence points to a positive response (see the citations in the introduction for relevant studies on this last point).

B.2 Fertility Intensive Margin

I make the assumption of two children per family in order to achieve replacement rates for the population. This aligns with moments from both the population sample and the estimation sample in the ECLS-B, which are reported in Table 8. Both in the raw population and in the estimation sample, the average number of children is very close to 2, and the median is equal to 2. Note that these raw sample moments are from a sample where I only requires that the number of children and family structure be reported.

I could also achieve a stable population across generations, as I do in the current framework, by instead allocating the same total number of children asymmetrically across family structures. I do not consider the heterogeneity in number of children that I see in the data sufficient to justify doing this.

[10] An interdisciplinary review of studies on the determinants of fertility is provided in Balbo et al. (2013).

Table 8: Distribution of Number of Children

	Raw Population Sample						
	mean	p10	p50	p90	sd	min	max
One-Parent Families	1.97	1.00	2.00	3.00	1.18	1.00	11.00
Obs. One-Parent Families	4850						
Two-Parent Families	2.22	1.00	2.00	4.00	1.12	1.00	10.00
Obs. 2-Parent Families	20100						
	Estimation Sample						
	mean	p10	p50	p90	sd	min	max
One-Parent Families	1.75	1.00	2.00	3.00	0.94	1.00	5.00
Obs. One-Parent Families	150						
Two-Parent Families	1.87	1.00	2.00	3.00	0.79	1.00	5.00
Obs. 2-Parent Families	600						

This table: waves 1-3, weighted with cross-sectional primary caregiver weights. Data source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), Longitudinal 9- Month-Kindergarten 2007 Restricted-Use Data File.Observations rounded to nearest 50 per NCES requirements.

B.3 One-Shot Marriage Market

In the general equilibrium framework presented in the main text of this paper, families are formed on a one-shot marriage market. In addition, in the estimation of the skill investment technologies I impose that valid observations must have the same family structure for the first three waves of the survey. I claim that both the modelling assumption and the estimation restriction are good approximations of the data and represent the majority of families parenting young children in the ECLS-B. In Table 9, I present transition matrices for family structure across waves of the ECLS-B. This table shows that family structure is extremely persistent, especially marriage, when children are very young. The categories for marital status are Married, Never Married, and Separated/Divorced/Widowed, abbreviated as Sep./Div./Wid.. The observations are restricted to those for which I observe family structure for each of the first three waves of thes survey. Weights are wave 3 weights from the primary caregiver survey.

In Panel A, I report the probability that a family which is married, never married, or previously married in wave 1 is in any of those statuses in wave 3. The states of being married or never married are extremely persistent: 93% of married couples remain married until their child is 4 years old, and 80% of single females remain single females over the same period. A more volatile category is being previously married, which means that you are divorced or separated in wave 1. For that category, 31% have become married by the time their child is 4 years old. Despite this, for each of the marital status categories, the portion that persists in that category through wave 3 is by far the majority.

Note that, in the criteria for samples of Tables 1 to 3 of the main text, I impose that a family must be a single female family (never married *or* seperated/divorced/widowed) or a couple (cohabiting or married) for every wave of the survey. So, although the criteria for single females that I use does include women who were previously cohabiting, they do not transition into that state in the time interval over which I use their choices

to estimate the investment technology for the one-parent family structure.

In Panel B, I report the same statistics as Panel A, except that they refer to the transition probabilities from wave 1 to wave 2. Panel C reports these statistics for the transition from wave 2 to wave 3. In both Panel B and Panel C, the pattern is very similar to Panel A. There is by far more churn for those previously married, although the majority persist in their marital status category. In addition, there is very high persistence for other marital statuses.

Table 9 tells a consistent story: for the duration of early childhood (before age 5) family structure is extremely persistent.

Table 9: Mother's Marital Status Over Time in the ECLS-B (Weighted)

Panel A: Wave 3 (rows) vs. Wave 1 (columns)			
	Married	Never Married	Sep./Div./Wid.
Married	0.93	0.17	0.31
Never Married	0	0.80	0
Sep./Div./Wid.	0.07	0.03	0.69
Panel B: Wave 2 (rows) vs. Wave 1 (columns)			
	Married	Never Married	Sep./Div./Wid.
Married	0.98	0.07	0.15
Never Married	0	0.92	0.01
Sep./Div./Wid.	0.02	0.01	0.84
Panel C: Wave 3 (rows) vs. Wave 2 (columns)			
	Married	Never Married	Sep./Div./Wid.
Married	0.95	0.11	0.18
Never Married	0	0.87	0
Sep./Div./Wid.	0.05	0.01	0.82
Observations: 7650			

Data source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), Longitudinal 9- Month-Kindergarten 2007 Restricted-Use Data File. Observations rounded to nearest 50 per NCES requirements.

B.4 Investment Inputs: Child Care vs. Total Spending in the PSID CDS

In the literature on estimating skill accumulation technologies during early childhood, it is common practice to include money spent on goods as one of the components of investment (examples include Lee and Seshadri (2019), Daruich (2020) and Abbott (2021)). By contrast, my specification includes time spent in child care instead of money spent on the child. In this section, I use tabulations from the 2001 PSID and 2002 PSID CDS to show how child care expenses contribute to total expenditures on the child. To do this, I construct four different measures of total expenditures on the child (Definitions 1 to 4 in the tables below, with each definition specified in the table footnote). Next, I find the fraction of each measure of total expenditures that comes from spending on child care. I report these fractions in Tables 10. My conclusion from this exercise is that child care represents the main component of the expenditures on children in the PSID, in particular before age 5, as long as expenditure on food is not included as part the definition of expenditures on children (definition 4). In my model, I do not think of money spent on feeding the child as investment

expenditure. Instead, these expenses are reflected in the consumption equivalence scales being higher for families raising children. Thus, definitions 1,2, or 3 are more suitable for the model lens I apply in this paper. Using time in non-parental child care as an input, and including expenditures on child care in the budget constraint of parents, can therefore be viewed as focusing on the main component of expenditures on children and being specific about how it contributes to child skill accumulation: through the activities and environments that children experience.

Table 10: Share of expenditures by definition of total expenditure

	Definition 1		Definition 2		Definition 3		Definition 4		
	mean	sd	mean	sd	mean	sd	mean	sd	Obs.
Ages [0,3]	0.672	0.293	0.540	0.290	0.481	0.277	0.386	0.267	86
Ages [0,5]	0.673	0.293	0.555	0.289	0.498	0.281	0.400	0.259	153
Ages [0,7]	0.709	0.268	0.597	0.272	0.534	0.266	0.443	0.253	234
Ages [0,9]	0.695	0.278	0.584	0.277	0.519	0.267	0.426	0.250	274
Ages [0,11]	0.695	0.277	0.579	0.277	0.515	0.266	0.421	0.248	289

This table: averages by age group for the fraction of total expenditure on children spent on child care. Definition 1 of total expenditures on children includes child care, money spent on toys, and money spent on school supplies. Definition 2 of total expenditures on children includes child care, money spent on toys, and money spent on school supplies, and money spent on clothes. Definition 3 of total expenditures on children includes child care, money spent on toys, money spent on school supplies, money spent on clothes, money spent on vacations. Definition 4 of total expenditures on children includes child care, money spent on toys, money spent on school supplies, money spent on clothes, money spent on vacations, and money spent on food.

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