Child Care Over the Business Cycle*

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Abstract

We estimate the impact of macroeconomic conditions on the child care market. We find that the industry is substantially more exposed to the business cycle than other low-wage industries and responds more strongly to negative shocks than positive ones. Indeed, child care employment requires more time to recover than the rest of the economy. Although the reduction in supply may pose difficulties for parents, we find evidence that center quality is countercyclical. When unemployment rates are higher, child care workers have on average higher levels of education and experience, turnover rates are lower, and consumer reviews on Yelp.com are higher.

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1 Introduction

The impact of business cycle fluctuations on the child care market has come into sharp focus during the recent pandemic-driven recession. In early 2020, the U.S. unemployment rate increased fourfold, from 3.5% to 14.7%, as the labor market lost over 25 million jobs. The child care industry alone lost nearly 360,000 jobs—or one-third of its pre-pandemic workforce—and it is still far from fully recovered.

This contraction may create long-lasting challenges for child care businesses. Given that providers are not well-capitalized and rely largely on parent fees for revenue, enrollments must be near full capacity at all times to remain in business (Workman and Jessen-Howard, 2018). Indeed, a survey of providers early in the pandemic found that 17% would not survive a closure of any length, and an additional 30% would not survive a closure of more than two weeks (National Association for the Education of Young Children, 2020). In addition, 60% of parents reported in another survey that their child care program had closed at least temporarily (Bipartisan Policy Center, 2020).

Understanding the sensitivity of the child care industry to macroeconomic fluctuations is crucial in light of its size and importance. The provision of child care in the U.S. generally takes place in either center- or home-based settings. Recent estimates suggest that the center-based sector includes 129,000 programs and employs approximately one million teachers (National Survey of Early Care and Education Project Team 2013; 2014). The home-based market consists of one million paid caregivers and an additional three million unpaid caregivers (National Survey of Early Care and Education Project Team, 2013). Altogether, our estimates suggest that approximately two percent of working-age women are employed in the child care industry.[1]

The child care industry is essential not only because it employs a large number of individuals but also because any changes in the market may have implications for the well-being of children and families. Currently, thirteen million preschoolers—or 59% of children ages 0 to 5—regularly attend a non-parental child care arrangement, with the average child spending 33 hours per week in these settings (Cui and Natzke 2020; Herbst 2013). Furthermore, a non-trivial share of families pay out-of-pocket for child care (41%), these expenses can account

[1]For comparison, similar calculations find that 0.9% of working-age women work in clothing stores and five percent work in restaurants.

for a large percentage of monthly income, and policies aimed at subsidizing child care costs have large effects on parental employment (Baker *et al.* 2008; Blau and Tekin 2007; Herbst 2018).

In addition, changes in the macroeconomy may influence the stability of the workforce in ways that affect child development. The child care workforce has traditionally been highly unstable, with some studies showing annual turnover rates close to 25%—four times higher than that within elementary schools (e.g., Bassok *et al.* 2013). It is unclear a priori whether an economic downturn would further aggravate or perhaps improve the stability of the workforce. Some child care providers may respond to a downturn by laying off staff or closing permanently. Those that remain open may experience a reduction in staff turnover because fewer outside employment options are available. Given the well-documented importance of warm and stimulating teacher-child interactions within early education settings (e.g., NICHD ECCRN 2002; Hamre 2014; Hamre *et al.* 2014) as well as the empirical evidence showing negative effects of teacher turnover on child development (e.g., Markowitz 2019), it is critical to understand how child care stability varies over the business cycle.

Macroeconomic fluctuations may also affect the skill composition of the child care workforce, as defined by teachers' work experience and education. Despite the industry's high level of staff turnover, child care teachers have extensive work histories: 45% of assistant teachers and 60% of lead teachers have ten or more years of early education experience (Boyd-Swan and Herbst, 2018). However, education levels among child care teachers tend to be lower than their counterparts employed in other industries. For example, 23% of center-based and 13% of home-based child care workers have a four-year college degree, compared to 34% among all other female workers (authors' calculations). Again, it is unclear how a downturn would influence the composition of the workforce. A downturn may increase average education levels due to a decrease in the availability of outside options. On the other hand, teacher characteristics like experience and education are strongly correlated with wages (Boyd-Swan and Herbst, 2018), and in a downturn, strapped child care centers may shift to less expensive workers. Given that higher-skilled teachers have modest effects on classroom quality (Blau, 2001) and have been shown in some studies to improve child outcomes (e.g., Chetty *et al.* 2011; Felfe and Lalive 2018), it is similarly important to understand how the skill composition of the child care workforce varies over the business cycle.

In this paper, we examine whether and how the U.S. child care market responds to

business cycle fluctuations. Drawing on a variety of data sets that span multiple decades, our empirical work focuses on the impact of the macroeconomy on the supply of child care, including the availability and stability of child care employment as well as the composition of the workforce, leveraging state-year variation in employment and unemployment rates. A key goal of our analysis is to examine changes in child care supply separately during periods of economic growth and contraction, and to compare the child care industry with other service-based industries (e.g., clothing stores and restaurants). We also examine heterogeneity across sectors within the child care industry (e.g., center- versus home-based supply) as well as across teacher characteristics (e.g., education and experience). Although data covering the demand side of the market is much more limited, we provide a preliminary analysis of children's participation in non-parental arrangements, whether families pay for child care, and how much is paid. In addition, we exploit business review data from the website Yelp.com to examine whether consumer satisfaction with child care varies over the business cycle.

Our key findings can be summarized as follows. First, the child care industry is significantly exposed to the macroeconomy. We estimate that a one percentage point increase in the state unemployment rate is associated with a two to three percent decrease in employment in the child care industry and a one percent decrease in the number of child care facilities. Based on these results, we estimate that one-third to one-half of the decline in child care industry employment from December 2019 to December 2020 can be explained by the change in economic conditions alone.

Second, this response is asymmetric, so that a one percent decline in overall state employment is associated with a 1.04% decline in child care sector employment, while a 1% increase in overall state employment is associated with only a 0.75% increase in child care sector employment. In other words, our results show that the child care market recovers more slowly than the rest of the economy after a recession. Additionally, the child care industry is at least as responsive, and by some measures substantially more responsive, to macroeconomic conditions as compared to industries that attract similar workers, including clothing stores and restaurants.

Third, although economic downturns have a negative effect on the availability of child care, there is evidence that the quality of care may increase at the remaining facilities. As the unemployment rate increases, child care workers are more likely to have at least some college education and tend to be older, and therefore more experienced. Turnover of child

care workers also declines, particularly among those with higher levels of education. These positive changes are reflected in Yelp reviews, where we find that on average, consumers give child care facilities higher ratings when the unemployment rate is higher.

This paper contributes to several distinct, though related, literatures. First, it contributes to a rapidly growing body of work studying how the COVID-19 recession influenced the supply and composition of the child care workforce (Ali *et al.*, 2020), changes in job-tasking and the financial well-being of child care teachers (Bassok *et al.*, 2020), and the division of labor (including child care) within households (Del Boca *et al.*, 2020). Research on the child care industry is part of a broader effort to examine the impact of the pandemic on labor demand (e.g., Forsythe *et al.* 2020) and workforce composition (e.g., Campello *et al.* 2020).

Second, this paper contributes to the literature studying the effect of the macroeconomy on other industries (Propper and Van Reenen 2010; Webber 2020; Krueger 1988) as well as a variety of individual-level behaviors such as employment and welfare receipt (Blank 1989; Hoynes 2000; Mueser *et al.* 2009; Herbst and Stevens 2010). Particularly noteworthy is a set of papers examining the effect of macroeconomic conditions on the labor market for elementary and secondary school teachers, which finds that teacher turnover falls during recessions and that teachers who enter the profession during recessions are on average higher quality (Nagler *et al.* 2020; Fraenkel 2018; Falch and Strøm 2005).

Finally, this paper contributes indirectly to papers documenting the long-run evolution in child care worker wages and skills (Blau 1992; 1993; 2001; Herbst 2018); the impact of child care prices and subsidies on parental employment (Anderson and Levine 1999; Baker *et al.* 2008; Blau and Tekin 2007; Herbst 2010; 2017); and the impact of child care quality and teacher characteristics on child development (Auger *et al.* 2014; Blau 1999; 2001; Campbell *et al.* 2014; Early *et al.* 2007; Herbst and Tekin 2016).

The remainder of the paper is organized as follows. Section 2 provides an overview of the organization and characteristics of the U.S. child care market. Section 3 introduces the data sources used to study child care supply and demand, followed by a description of our empirical models in Section 4. The results are presented in Section 5, and Section 6 provides a discussion and interpretation of the results. We end with a discussion of policy implications and directions for future research in Section 7.

2 The Child Care Market

In this section, we provide some background information on the organization and characteristics of the child care market. For children ages zero to four, child care in the U.S. is largely privately provided, taking place in either centers or homes.

Programs within the center-based sector are usually licensed and regulated, and they operate out of their own stand-alone building or one that is shared with another organization. Such child care takes place in for- and non-profit centers, places of worship, and community-based organizations. Classrooms within these programs are typically organized by children's age group—so that infants, toddlers, older preschoolers, and school-age children are cared for separately—with most classrooms containing a lead teacher (and sometimes an assistant teacher). The most recent estimates suggest that the center-based sector includes 129,000 programs that employ approximately one million teachers and serve nearly seven million preschool-age children (National Survey of Early Care and Education Project Team 2013; 2014).

Child care that takes place in the provider's home or in the home of the child(ren) is lightly or entirely unregulated. In this paper, we refer to care that takes place in the home of the provider as "home-based" care and care that takes place in the child(ren)'s home as "private household" care. There are three sectors within this market: listed, unlisted but paid, and unlisted and unpaid (National Survey of Early Care and Education Project Team, 2016). The "listed" sector refers to operators of licensed and regulated programs that function as small, independent home-based businesses and that appear on state or national lists of early care and education services. Those within the "unlisted" sector are typically referred to as "informal" child care providers, because they are unlicensed and unregulated and cannot be found on state-maintained lists of providers. Such individuals either work within the home of the family purchasing child care or within his/her own home, and are either unpaid or paid directly by parents at a negotiated rate. In addition, these individuals can be relatives (e.g., grandparents) or friends/neighbors of the children, or they may be nannies, au pairs, and babysitters who are hired through word-of-mouth networks or child care job websites. With 3.8 million workers, the home-based/private household markets are substantially larger than the center-based market (National Survey of Early Care and Education Project Team, 2016). The largest segment of the home-based market is the unlisted, unpaid sector, which includes

2.7 million workers who care for nearly four million children. The unlisted, paid sector is the second largest segment, which includes 919,000 workers who look after 2.3 million children, followed by the listed sector, which includes 118,000 workers who care for 750,000 children. The focus of our analysis is on the paid sector, including both listed and unlisted providers.

Tables 1 and 2 provide a descriptive portrait of individuals employed in the child care industry. Specifically, these tables use pooled American Community Surveys (ACS) from 2000 to 2019 to compare child care workers with all other workers and non-workers (Table 1) and to compare child care workers across various sectors (Table 2). Table 1 shows that child care workers are younger, more likely to be black and Hispanic, and more likely to have preschool-age children than their counterparts employed in other industries. In addition, child care workers have fewer years of education but are equally likely to be English proficient. Fully 23% of child care workers have a four-year college degree (compared to 33% among those employed in other industries), and approximately five percent are not English-proficient (compared to four percent).

Table 2 suggests there is substantial heterogeneity by sector within the child care industry. For example, the center- and home-based sectors are more racially/ethnically diverse than the private household and school-based sectors, and those employed by private households are significantly younger and less likely to be married than their counterparts in other sectors. Most striking, however, is the variation in educational attainment and English proficiency. Fully 44% of school-based child care workers have a four-year college degree, a figure that is substantially higher than that within the center-based (23%), private household (17%), and home-based (13%) sectors. In addition, while virtually all workers within the center- and school-based markets are English-proficient, about eight percent of private household and ten percent of home-based workers are not.

Over the past several decades, the rising demand for child care has been fueled by the dramatic growth in labor force participation among mothers with young children. Indeed, the share of women with preschool-age children in the labor force grew from 39% in 1976 to 65% percent in 2016 (U.S. Department of Labor, 2020), which in turn led to a rise in the number and share of children participating in non-parental child care arrangements (Blau 2001; Herbst 2018).

To examine the demand-side of the market, we pool data from the 2005 and 2012 waves of the National Household Education Survey (NHES), which conducts periodic surveys of

families with young children about their child care use and expenses. Table 3 shows that 64% of preschool-age children regularly attend some form of non-parental care for an average of about 28 hours per week. Among families using a non-parental arrangement, 67% pay for some or all of it out-of-pocket, with median expenditures totaling $3.81 per hour of use. Table 3 also shows that center-based care is the most prominent form of non-parental care used (54%), followed by relatives (28%), home-based care (i.e., listed and paid family home providers) (13%), and other non-relative caregivers (i.e., friends/neighbors, nannies, and au pairs) (5%). Not surprisingly, the share of families paying for child care in the formal market is higher than in the informal market. For example, 92% pay for home-based care and 73% pay for center-based care, while only 25% pay for relative care. In addition, expenditures are higher in the home- ($3.40/hour) and center-based ($4.27) markets than in the relative ($2.58) market. Expenditures on non-relative caregivers is substantially higher ($10.32), most likely because this sector is dominated by high-cost private household caregivers like nannies and au pairs.

3 Data

To estimate the impact of macroeconomic conditions on the child care market, we rely on a variety of data sources, each one covering twenty to thirty years and multiple recessions and each providing data on different dimensions of child care availability, stability, and demand. Below, we briefly discuss each data source used in the paper.

3.1 Quarterly Census of Employment and Wages (QCEW)

Administered through a joint effort by the Bureau of Labor Statistics (BLS) and state Employment Security Agencies, the QCEW is an establishment-level database of employment and wage information for individuals covered by state unemployment insurance laws. The QCEW is a virtual census of monthly employment and quarterly wages, organized by six-digit NAICS industry code, at the national-, state-, and county-levels. In particular, the public release version of the data includes the monthly number of establishments and employees as well as quarterly wages disaggregated by industry, ownership status, and geographic area.

Our analysis focuses on the number of establishments and employees in the Child Day Care Services industry (NAICS code: 624410), measured at the state level, between 1990

and 2019. Thus, the unit of analysis in the QCEW regressions is the state-year combination. Included in the Child Day Care Services industry are individuals working in the public (e.g., Head Start) or private (e.g., for-profit centers and non-profit churches) sector as well as some employed in home-based settings. In addition, this industry includes workers performing a variety of pedagogical (e.g., teachers and teacher assistants) and non-pedagogical (e.g., CEOs and managers of national chains, programs administrators, food preparation workers, and bus drivers) tasks.

We also examine two adjacent industries that employ child care workers, but whose primary function may not be child care provision: Private Household Services (814110) and Elementary/Secondary Schools (611110). The former industry includes any live-in nannies and au pairs, regularly-scheduled child care provided by individuals hired via online services (e.g., Care.com), and babysitters whose wages are reported to the UI system. The latter industry includes school-based pre-kindergarten and Head Start programs as well as before- and after-school child care to accommodate working parents, though it is dominated by teachers and other school employees. Finally, for comparison purposes, we examine several other service-based industries that are comparable to child care provision in terms of wages and skill requirements: Clothing Stores (4481) and Food Services and Drinking Places (722).

3.2 Quarterly Workforce Indicators (QWI)

The QWI provides local labor market indicators disaggregated by industry code, employee characteristics, and firm characteristics. The underlying data for the QWI is the Longitudinal Employer-Household Dynamics (LEHD) microdata, which links employers with its employees across most private-sector jobs. These data connect individual-level earnings data from Unemployment Insurance records, firm-level characteristics from the Quarterly Census of Employment and Wages (QCEW), and demographic information from the Decennial Census, Social Security Administration records, and individual tax returns. Such linkages allow for the analysis of employment and earnings disaggregated by industry and geography as well as by employees' educational attainment, race and ethnicity, and other characteristics. All 50 states and the District of Columbia participate in this data-sharing arrangement with the BLS, although states began participating at different times.

Our analysis focues on four key measures of labor market activity: number of separa-

tions, number of hires, total number of employees, and the turnover rate.[2] Each measure is calcaulated separately for workers in five education categories: college degree or more, some college, high school diploma/GED, less than high school, and education level unavailable (for those under age 25). We also construct a variable denoting the share of employees with various levels of education by summing the number of employees at each level of education and dividing by the total number of employees in a given industry. These variables are constructed at the state level for each calendar quarter between 2000 and 2019.[3] Thus, the unit of analysis for the QWI regressions is the state-year-quarter combination. As with the QCEW, our regressions focus on employees in the Child Day Care Services, Private Household Services, Elementary/Secondary Schools, Clothing Stores, and Food Services and Drinking Places industries.

3.3 American Community Survey (ACS)

We also draw on individual-level data from the ACS over the years 2000 to 2019 to conduct two sets of analyses. The ACS is an annual, nationally representative survey providing detailed data on labor market behavior, school attendance, and demographic characteristics for over three million individuals.

Our first analysis studies the impact of macroeconomic conditions on whether individuals are employed and the usual number of weekly hours worked in four child care sectors: center-, home-, and school-based settings as well as private household settings.[4] The sample for this analysis includes in civilian women ages 18 to 64. Men are not included because over 95 percent of child care workers are female (authors' calculation of the ACS). We measure macroeconomic conditions at the state level in these analyses.

To classify women as working in the above-mentioned child care sectors, we rely on the

[2]Separations is defined as the total number of workers whose job with a given firm ended in the specified reference quarter. New hires is defined as the number of workers employed at a given firm in the reference quarter who were not employed there in any of the previous four quarters. The turnover rate is calculated as one-half of the sum of the number of hires and separations in a given quarter divided by the average full-quarter employment.

[3]As of 2000, 80 percent of states participated in the QWI; by 2005, all but one state participated.

[4]The ACS interviews individuals throughout the calendar year for its annual survey. It is important to note that the questions on employment and earnings pertain to the 12 months preceding the time of interview. Unfortunately we cannot ascertain when a given individual was interviewed, which means that the 12-month window differs dramatically across individuals.

industry and occupation codes attached to the most recently held primary job (Herbst, 2018). Center-based workers include non-self-employed individuals who work in the Child Day Care Services industry and whose occupation is a child care worker, preschool (or kindergarten) teacher or assistant teacher, education administrator, or special education teacher. School-based child care workers are not self-employed, work in the Elementary/Secondary Schools industry, and hold an occupation that is a child care worker or pre-kindergarten or kindergarten teacher or assistant teacher. Home-based workers are defined as self-employed individuals working in the Child Day Care Services industry whose occupation is a child care worker or education administrator. Finally, private household child care workers are defined as individuals employed in the Private Household Services industry and whose primary occupation is a child care worker. Based on these definitions, the sample includes 166,550 center-based workers, 62,945 home-based workers, 42,821 school-based workers, and 31,219 private household child care workers. The remaining women in the sample are coded as non-child care workers (N=11,263,458) or non-workers (N=3,899,015).

Our second analysis using the ACS studies the impact of macroeconomic conditions (measured at the state level) on the demand for child care, as proxied by children's participation in early care and education programs. In particular, we exploit the survey question asking individuals ages three and over whether they attended school or college in the last three months. Importantly, the question asks specifically about "nursey school" or "preschool" participation. Thus, this analysis captures only participation in formal, center-based programs. To avoid analyzing children attending kindergarten or elementary school, we limit the sample to children ages three and four. We then attach the labor market and demographic characteristics of the parents to the relevant children. The sample for these analyses include 1,184,806 children.

3.4 National Household Education Survey (NHES)

In addition to using the ACS to study families' child care choices, we draw on the National Household Education Survey (NHES), which is administered by the National Center for Education Statistics (NCES). The NHES is a family of surveys that provide descriptive information on the educational activities undertaken by the U.S. population. One of these surveys covers Early Childhood Program Participation (ECPP), focusing on preschool-aged

children's participation in non-parental child care arrangements, weekly hours spent in those arrangements, and whether and how much families pay. Although the ECPP was administered in 1991, 1995, 2001, 2005, 2012, and 2016, we rely only on the 2005 and 2012 surveys given that the questionnaires in these years are comparable and state identifiers are available. Our pooled analysis sample includes 15,090 children, of which 7,198 come from the 2005 survey and 7,892 come from the 2012 survey.

The ECPP survey provides rich information on families' child care use and expenses. We begin by studying the impact of macroeconomic conditions on whether the focal child regularly participates in any non-parental arrangement as well as the total number of hours per week in non-parental care. We then examine participation in four separate arrangements: relative care (e.g., grandparents and other non-parent family members), non-relative care in the child's home (e.g., babysitters and au pairs), non-relative care in another person's home (e.g., FCCH's), and center-based care (e.g., child care center, preschool, pre-K, and Head Start). We focus on the child's primary arrangement, defined as the one in which the focal child spends the most hours each week. In addition, we examine whether the family makes a payment for child care and its expenditures per hour of child care use (adjusted for inflation). To calculate hourly expenditures, we sum weekly expenses across all arrangements, and divide this amount by the number of weekly hours spent in those arrangements.

3.5 Yelp Consumer Reviews

Finally, we exploit information on consumer reviews of child care businesses in the forty largest U.S. cities from the website Yelp.com (Herbst *et al.*, 2020). Specifically, business and reviewer information was scraped from pages listing "Child Care and Day Care" businesses over the period 2005 to 2017. The firm's physical address was then used to geocode the location of each business so that county-level macroeconomic indicators could be attached. The dataset includes information on 48,675 unique Yelp reviews of 9,761 child care businesses located in 178 counties. The reviews come from 46,182 individuals, and each business received an average of five reviews.

These data are used to examine the impact of macroeconomic conditions on consumer satisfaction with child care. The primary measure of consumer satisfaction is Yelp's star-rating system, which allows consumers to provide businesses with a rating of one to five stars.

The average Yelp rating in our sample of child care businesses is 4.3, and approximately 76 percent of ratings are five-stars. Some previous studies have interpreted businesses Yelp rating as a proxy for product quality (e.g., Anderson and Magruder 2012; Kuang 2017; Luca 2016), while other studies have examined empirically the correlation between ratings and objective quality (e.g., Bardach *et al.* 2013; Ranard *et al.* 2016). Insofar as child care business ratings provide accurate signals of quality, results from this analysis may shed further light on how child care quality varies over the business cycle.

4 Research Design

Our empirical analysis uses two primary strategies. First, we calculate "employment betas" to estimate the exposure of the child care market to changes in aggregate employment and to benchmark its aggregate risk exposure to that of other industries. Second, we estimate regressions with the unemployment rate to estimate the effect of the macroeconomy on the availability, stability, and quality of child care.

4.1 Estimating Exposure to the Business Cycle with Employment Betas

To determine an industry's exposure to aggregate employment risk, we estimate the following equation:

$$\Delta Log(IndEmp_{st}) = \alpha + \beta * \Delta Log(Emp_{st}) + \gamma_s + \tau_t + \epsilon_{st} \quad (1)$$

where $IndEmp_{st}$ is total employment in a given industry in state s at time t, Emp_{st} is total employment across all industries in state s at time t, γ_s are state fixed effects, and τ_t are time fixed effects. The outcome of interest is the first difference of the log employment in the industry. Standard errors are clustered at the state level.

The coefficient of interest is β, which we refer to as the "employment beta", following the work of Guvenen *et al.* (2017), who estimate a similar "worker beta" for wages. Similar to a stock market beta, the employment beta estimates how volatile employment is in a given industry relative to the market as a whole. If β is greater than one, then employment in that industry is more volatile than the market as a whole, and if it is less than one, it is less volatile than the market as a whole. It can be interpreted as a 1% change in overall

employment in a state is associated with a $\beta\%$ change in employment in the industry of interest, controlling for state and year fixed effects.

Equation 1 assumes business cycle exposure is symmetric, i.e., if $\beta = 0.5$, then a 1% increase in aggregate employment is associated with a 0.5% increase in industry employment, and a 1% decrease in aggregate employment is associated with a 0.5% decrease in industry employment. We test this assumption by separating the independent variable into two components: one for when aggregate employment is increasing and one for when it is decreasing. Specifically, we estimate the following equation:

$$\begin{aligned} \Delta Log(IndEmp_{st}) = \alpha + \beta_1 * \Delta Log(Emp_{st}) * \mathbb{1}_{\Delta Log(Emp_{st})>0} \\ +\beta_2 * \Delta Log(Emp_{st}) * \mathbb{1}_{\Delta Log(Emp_{st})\leq 0} + \gamma_s + \tau_t + \epsilon_{st} \end{aligned} \tag{2}$$

where $\mathbb{1}_{\Delta Log(Emp_{st})>0}$ is an indicator variable that takes on a value of one if $Log(Emp_{st})$ is greater than zero (so when overall state employment is growing) and equals zero otherwise, and $\mathbb{1}_{\Delta Log(Emp_{st})\leq 0}$ is an indicator variable that takes on a value of one if $Log(Emp_{st})$ is less than or equal to zero (overall state employment is declining) and equals zero otherwise.

In this specification, β_1 estimates the industry's response to increases in aggregate employment while β_2 estimates the response to decreases in employment. If the child care industry is exposed to aggregate risk and employment does decline during downturns, results from this equation can help shed light on how well the industry recovers from those downturns, a question of potential interest to policymakers.

4.2 Estimating the Response of the Child Care Market to the Unemployment Rate

We also use a variety of data sets to estimate how the availability, stability, and quality of child care varies with the unemployment rate, using regressions that primarily take the following form:

$$Y_{ist} = \alpha + \xi * UR_{st} + X_{ist} + \gamma_s + \tau_t + \epsilon_{ist} \tag{3}$$

where Y_{ist} is the outcome of interest for individual i living in state s at time t, UR_{st} is the unemployment rate in state s at the beginning of period t, X_{ist} are a set of individual-level controls, γ_s are state fixed effects, and τ_t are time fixed effects. ξ is the coefficient of interest, and it measures the association between a one percentage point increase in the

unemployment rate with the outcome of interest, controlling for state and time fixed effects. In particular, note that the time fixed effects control for national macroeconomic conditions so that ξ specifically measures the effect of variation in *local* macroeconomic conditions holding national conditions fixed.

We begin by using the QCEW to measure the variation of availability and stability of care in the center-based sector, as measured by employment and establishments, with the unemployment rate. In this case, data is at the state-year level, so the subscript i's are dropped, and there are no individual-level characteristics. The unemployment rate is measured as of January 1st of year t. Standard errors are clustered at the state level.

Next, we use the ACS to measure variation in the availability of child care by sector over the business cycle. These regressions are at the individual level, and the outcome of interest Y_{ist} is an indicator that equals one if the individual works in a given sector and equals zero otherwise. The unemployment rate is measured as of July 1st in the year before interview.[5] The individual-level controls included in X_{ist} are a quadratic in age; indicators for black, other non-white, and Hispanic; indicators for highest education completed of high school, some college, or college; indicators for married and any children younger than five years; indicators for having one child and for having two or more children; and an indicator for English fluency. Standard errors are clustered at the state level.

The ACS regressions can be interpreted as a one percentage point increase in the unemployment rate is associated with a 100*ξ percentage point increase in the probability that a woman works in the sector of interest. Later, we test whether these changes in sector participation vary with education, age, and English fluency by adding interactions between these characteristics and the unemployment rate in order to learn something about whether and how quality of care might vary over the business cycle. Based on whether the coefficients on these interaction terms are statistically significant, we can determine whether different groups respond differentially to a change in macroeconomic conditions.

[5]The ACS uses the previous 12 months as the reference period for employment questions, but the survey is administered throughout the year, and the public data does not give any information about the month of survey. If the surveys are spread evenly throughout the year, then July 1st is the average first day of the reference period. Note that an inability to nail down the reference period, and therefore identify the relevant macroeconomic conditions, could cause attenuation, biasing our results toward zero. We have tested robustness to using unemployment rates from different times of year or an average over the previous year, and the results are qualitatively similar. Results available upon request.

In order to further explore changes in quality of child care facilities over the business cycle, we estimate how consumer satisfaction varies using Yelp reviews. The Yelp data is at the review level, and the unemployment rate is the annual average unemployment rate measured at the county level. These regressions include controls for available reviewer characteristics (quadratic in friend count, quadratic in review count, an indicator for whether they have a profile picture, an indicator for whether they attached a photos to their review, an indicator for whether any individual rated the review as "useful", indicators for whether the review contains formal language or slang words, and an indicator for whether the review contains swear words), firm characteristics (an indicator for whether the child care business is claimed and an indicator for whether a given review is the first one received by the firm) as well as year fixed effects and calendar month fixed effects. Some regressions include county fixed effects and the remaining regressions instead control for firm fixed effects. For the regressions with county-level fixed effects, standard errors are clustered at the county level, and for the regressions with firm fixed effects, standard errors are clustered at the firm level.

In the Appendix, we estimate changes in employee turnover in response to changes in the unemployment rate, which is a measure of the stability of care for an individual child. Like the QCEW data, these data are aggregated to the state level, so they do not include individual characteristic controls. These data are at the state-quarter level, and the unemployment rate is measured on the first day of the quarter.[6] Standard errors are clustered at the state level.

Also in the Appendix, we use data from the NHES to understand more about the demand side of the market. In these regressions, the primary outcomes of interest are indicator variables for the child's care arrangement type. All regressions include child controls (gender, age, and race), mother controls (quadratic in age, marital status, education, and employment status), state controls (fixed effects and controls for per capita income and population density), and year fixed effects. Standard errors are clustered at the state-year level.

5 The Effect of the Business Cycle on the Availability, Stability, and Quality of Child Care

Below, we provide a series of estimates of the impact of the macroeconomy on the availability, stability, and quality of child care. Availability is measured by the number of child

[6] In addition, the time fixed effects control for quarter-year instead of year.

care employees, which is a proxy for the number of slots available for children in the child care sector. Changes in the number of child care establishments affect the availability, accessibility, and stability of care. In particular, children who were attending facilities face disruptions when they close, and parents will have fewer nearby child care options. Stability is also measured by changes in turnover rates as the unemployment rate changes. Finally, we assess changes in the quality of care using changes in the education and age (a proxy for experience) composition of the child care workforce as well as Yelp consumer reviews of child care facilities.

5.1 Availability

Figure 1 plots the number of workers in the child care industry from 1990 to 2019 using data from the QCEW. The QCEW data primarily include workers in center-based settings. The figure also plots the national unemployment rate and includes shading to indicate recessions. The child care sector grew from approximately 400,000 employees in 1990 to over 900,000 in 2019. The growth is steady during times of low unemployment but stalls during the recessions in 2001 and 2008. Child care employment does not pick back up again until the employment rate reaches lower levels. This figure provides visual evidence that the child care market is affected by the business cycle.

To determine the degree to which child care is exposed to the business cycle, we calculate employment betas using equation 1. Results for child care and other industries are presented in Table 4. The dependent variable in these regressions is the difference in log employment in a state and year in the given industry, and the table reports coefficients on the difference in log employment in that state and year in all industries. The coefficient for the child care industry is 0.861, as reported in column (1), Panel A, indicating that child care industry employment is significantly exposed to the macroeconomy. Quantitatively, we would expect the change in employment growth in the child care industry to be 86% of the change in employment growth in the economy as a whole.

Comparing the child care industry to other similar industries, point estimates suggest that child care is more exposed to the business cycle than the clothing industry (beta of 0.684) and restaurants (0.751), other industries that may attract similar low-wage workers. Private household employment (column (2)), which would include nannies, exhibits, if anything,

noisy counter-cyclicality, though data for this industry is only available for 2013 and later. With an employment beta of 0.502, the elementary and secondary school industry in column (3) exhibits some pro-cyclicality but to a lesser degree than the child care industry. We estimate that manufacturing moves very closely with the economy as a whole, with an employment beta of 1.015.

The analysis thus far treats upswings and downswings the same, assuming changes are symmetrical. Panel B of Table 4 reports coefficients from equation 2, testing whether responses are truly symmetrical by splitting the employment betas into an employment beta for when overall employment is increasing (first row of Panel B) and one for when overall employment is decreasing (second row of Panel B). We find that the child care industry responds more strongly to economic declines (employment beta = 1.036) and recovers less as the economy improves (0.752). A one-sided test of whether the recovery is greater than the decline has a p-value of 0.12. Schools, clothing, restaurants, and manufacturing all exhibit more symmetrical responses to economic conditions.

Table 5 explores the robustness of this asymmetric response to alternative specifications. Columns (2)-(4) use county-level data instead of state-level data and vary how macroeconomic conditions are measured. Column (2) uses the same state-level change in the log of overall employment as the previous analysis and finds very similar results. In column (3), the change in log overall employment is measured at the county level. The magnitudes of the betas fall substantially, but the asymmetry, where the employment response in the child care sector is stronger in downturns and recovers less in upswings, remains (p=0.07). Using a county-level measure of the change in log employment may introduce additional noise, leading to attenuation bias. Therefore, the final column instruments these county-level changes in log overall employment with the state-level changes. The overall beta in Panel A is very similar to previous results, but in Panel B, the response is estimated to be even more asymmetric than in the previous specifications (p=0.00).

Table 6 reports the sensitivity of employment and establishments in the child care market and other industries to the state unemployment rate, the measure of the macroeconomy that we will use for the remainder of the paper, using equation 3. We estimate that a one percentage point increase in the state unemployment rate is associated with a three percent decline in child care industry employment (Panel A) and one percent decline in child care industry establishments (Panel B). The child care industry again appears to be more

strongly affected than comparison industries, where coefficients are imprecisely estimated and sometimes wrong-signed.

The analysis so far has focused primarily on workers in center-based child care facilities. Table 7 reports estimates on the relationship between the unemployment rate and the probability that a woman works in one of four child care sectors: center-based, private household, home-based, or school-based using data from the ACS.[7] Overall, column (2) reports that the probability of working in any child care sector declines by 0.016 percentage points (p=0.11). As a percent of the mean, the decline in the probability of working in child care is slightly larger than the decline in the probability of working in any industry seen in column (1). The decline is concentrated in the center-based market, where there is an estimated two percent decline in employment, slightly smaller than the three percent decline estimated in the QCEW. The home-based and household sectors actually see positive, though imprecisely-estimated, point estimates.[8][9][10]

[7]Another difference between the QCEW and the ACS is that the QCEW analysis includes all workers in the child care industry, while in the ACS, we are able to restrict to only child care teachers by using occupation codes in addition to industry.

[8]These results estimate the extensive margin of whether a woman works in child care, and if so, which sector. Estimates of the intensive margin, as measured by the log of usual hours of work per week, are available in Table A.1 in the Appendix. In Panel A, we find small but statistically-significant declines in usual weekly hours of work for child care workers. The largest decline is for school-based workers, whose usual hours decline 1.85%. Hours for center-based workers decline 0.7% and for home-based workers decline 1.2%.

[9]With the number of child care workers declining, a natural question is what is happening to children who otherwise would have been in their care. The data for answering this question is much more limited, but we are able to use two waves of the NHES to provide some suggestive evidence on changes in child care participation in Table A.5 in the Appendix. We estimate that a one percentage point increase in the unemployment rate is associated with a 1.3 percentage point decrease in center-based care participation and a 0.9 percentage point increase in relative care participation. Point estimates for home day care participation are positive but not statistically-significant. In Table A.6, we find that higher-educated mothers are less likely to pay for care when then economy worsens, consistent with the increase in relative care. On the other hand, lower-educated mothers are more likely to pay for care and have higher hourly expenditures when they do.

[10]In Table A.7 in the Appendix, we estimate whether changes in the unemployment rate are associated with changes in preschool enrollment for 3 and 4 year olds in the ACS. Preschool enrollment may be less sensitive than child care enrollment more generally. Column (1) shows a small and statistically insignificant decline in preschool enrollment associated with an increase in the unemployment rate. Column (2) shows countercyclical pattern of preschool enrollment for children of parents with less than a high school education, perhaps because they become newly eligible for free preschool programs, while Column (3) estimates procyclical enrollment for children with at least one parent with a college degree. Finally, in column (4), we restrict to children whose mothers worked for the full year in the previous year, who may be more likely to be using preschool as

5.2 Stability

Figure 2 presents turnover rates by industry from 2000 to 2019 for a balanced panel of 36 states that are in the QWI as of the first quarter of 2000. Turnover is defined as one-half of hires plus separations divided by employment. Child care is a high turnover industry, with turnover rates several percentage points higher than the average and currently around twelve percent per quarter. Turnover in the clothing and restaurant industries is consistently even higher than in child care by about four to five percentage points throughout the period. Elementary and secondary schools experience much lower turnover, with turnover rates that hover around five percent throughout the last two decades. For the time period where it is available, turnover in the private household sector is very similar to that in child care. Turnover in child-facing industries like child care, schools, and potentially household employees, can have real consequences for children, who benefit from stable environments (Markowitz, 2019).

We see that employee turnover declined sharply during the Great Recession in the clothing, restaurant, and child care industries. The decline was somewhat permanent, with turnover only gradually increasing from 2010 to 2019 and never reaching its pre-recession levels.[11] The already-low turnover in the elementary and secondary schools industry remains approximately the same during and after the recession.

5.3 Quality

Table 8 explores how the change in the probability of working in child care over the business cycle varies by a woman's education, age, and English fluency. For comparison, column (1) runs the same regressions for employment in any industry. In Panel A, we find that having

childcare and so for whom the enrollment decision may be more sensitive to the macroeconomy, and find that a one percentage point increase in the unemployment rate is associated with a 0.3 percentage point (or 0.6%) decline in preschool enrollment. Notably, these results may suffer from attentuation bias due to a difficulty in measuring the relevant macroeconomic conditions since the ACS does not include information on the month of survey. Therefore, the unemployment rate used is from July of the previous calendar year since those are the relevant conditions for the enrollment decision made for most of the year.

[11] Changes in turnover can be due to changes in hires and/or separations. We explore the driving factors in Table A.2 in the Appendix and find that both hires and separations decline when the unemployment rate increases, and for the child care industry, the decline in the hire rate is a bit larger than the decline in the separation rate.

at least some college education mediates the decline in the probability of working in child care. Overall, women with some college or more have no difference in their probability of employment in child care over the business cycle, and the entire decline is concentrated among women with some high school or less.[12] There is some heterogeneity across child care sectors. Some college or more reduces the negative impact of a higher unemployment rate on employment in the center-based sector but does not wipe it out entirely.[13] And women with some college or more are actually more likely to run a home-based daycare when unemployment rates are higher than when they are lower, with a one percentage point increase in the unemployment rate associated with an approximately two percent increase in the probability of working in the home-based sector. They also appear slightly more likely to work in the household sector when the unemployment rate is higher.

Panel B presents heterogeneity in the response of child care employment to the unemployment rate by age, where age can be thought of as a proxy for experience. The oldest group, made up of women ages 50 to 64 years, is used as the reference group. The entire decline in child care employment is concentrated in the youngest, and least experienced, group, made up of women ages 18 to 34 years. These women are about three percent less likely to be employed in child care for every one point increase in the unemployment rate. Women in the youngest group also account for the entire decline in employment in the center-based sector. The youngest workers also experience a decline in employment in school-based child care, while women ages 35 and older do not. Younger workers also experience a decrease in probability of working in the home-based sector when the unemployment rate is higher, while older workers are actually more likely to work in that sector when economic conditions worsen.

Finally, in Panel C, we explore heterogeneity by English fluency.[14] We find that women

[12] In fact, using data from the QWI, we find that the fraction of child care workers with some college or more is about 0.2 percentage points higher for a one percentage point increase in the unemployment rate. This increase is larger than that seen in the restaurant and clothing industries. Results can be found in Table A.3 in the Appendix.

[13] In Table A.4 in the Appendix, we use the QWI to explore changes in center-based employment by four education groups and find declines in the number of workers with a college degree of 1.1%, with some college 1.2%, high school 1.7%, and less than high school 2.1%. The reduction in hires by education group increases monotonically, with the greatest declines in new hires among those with less than a high school degree.

[14] A woman is defined as not fluent in English if she either does not speak English or speaks English but not well.

who are not fluent in English are actually more likely to work in child care when the economy is worse. There is some heterogeneity in this result across sectors. For women who are not fluent in English, a one percentage point increase in the unemployment rate is associated with an approximately six percent increase in employment in the home-based child care sector. In the center-based sector, lack of fluency in English seems to mediate the negative overall effect so that for women not fluent in English, there is little change in center-based child care employment over the business cycle. In the other direction, women who are not fluent in English experience a decline in the probability of being employed as a household child care worker when the economy worsens.[15]

Table 9 reports the association between the unemployment rate and consumer satisfaction with their child care facility using Yelp ratings. A one percentage point higher unemployment rate at the time of review is associated with a 0.031 increase in rating on a five-point scale (column 1) and a 1.06 percentage point increase in the probability of giving the highest rating when controlling for county fixed effects. These results hold and are actually slightly larger when controlling for firm fixed effects, indicating that the higher Yelp reviews are not due to changes in the composition of child care facilities. From column 2, a one percentage point increase in the unemployment rate is associated with a within-firm 0.048 increase in the rating and 1.5 percentage point increase in the probability of receiving the highest rating. Columns (3) and (7) estimate heterogeneity by county median income and do not find statistically-significant differences in average rating by county but do find a slightly smaller increase in the probability of receiving the highest rating. Columns (4) and (8) consider heterogeneity by the fraction of non-white residents and do not find any statistically-significant differences in the effect.

6 Discussion

Our analysis has established five main facts. First, in the formal, center-based market, employment falls substantially when economic conditions worsen, and estimates suggest that

[15]This table presents results for the extensive margin. For changes on the intensive margin, see Table A.1 in the Appendix, which estimates the relationship between the unemployment rate and log usual hours worked for workers in each child care sector, including heterogeneity by education, age, and English fluency. Broadly, we find that on the intensive margin, the reduction in hours when the unemployment rate is higher is smaller for those more education, larger for younger workers, and larger for workers who are not fluent in English.

these declines are larger than those experienced by other similar sectors. Second, the center-based market responds asymmetrically to economic changes, demonstrating greater sensitivity to negative shocks. Third, if anything, employment in the home-based market increases during economic downturns. Fourth, child care teacher turnover falls during recessions, and the decline is of the same magnitude as that experienced in similar sectors. Fifth, average child care teacher quality increases as the unemployment rate rises. The employment of more highly educated and older, more experienced, workers in the child care sector is less sensitive to the business cycle than that of less educated and younger workers.

In this section, we briefly discuss potential mechanisms underlying these changes and implications for children and families. Due to data constraints, this discussion is mostly speculative, but it provides some potential avenues for future research. We conclude with a back-of-the-envelope calculation estimating what fraction of the reduction in the child care workforce during the current coronavirus-induced recession can be accounted for due to the change in economic conditions alone.

6.1 Mechanisms for the Impact of the Macroeconomy on Child Care Facilities

Given that most center-based child care facilities are operated as private businesses, it is perhaps unsurprising that they negatively impacted when the economy worsens. However, the size of the impact, both absolutely and relative to other similar industries, as well as whether the industry would respond symmetrically to downturns and upswings, was unknown ex ante. The finding that child care facilities seem to be more sensitive to the unemployment rate than the restaurant and clothing industries and that the response is not symmetric may be surprising. Here, we discuss a few potential mechanisms.

First, the child care market is primarily made up of small businesses, and small businesses may be more sensitive to economic conditions in general. Over half of center-based programs are not part of a chain or franchise, about 22% of centers enroll fewer than 25 children, and another 27% enroll 25 to 50 children (National Survey of Early Care and Education Project Team, 2014). Most center-based child care facilities also operate with narrow profit margins that require them to remain at nearly full capacity in order to stay afloat (Workman and Jessen-Howard, 2018). Therefore, they may be very sensitive to just a few children no longer

requiring care.

Second, the asymmetry in the child care market's response may be due to the high fixed costs to opening a new facility coupled with low expected profits. New facilities may be expensive to establish and need to jump through regulatory hoops in order to become licensed. Another contributing factor could be that parent care decisions may be sticky so that shifts from center-based care to relative care or home-based care during a recession may become permanent for the affected children, though we do not have the longitudinal data to test this hypothesis.

The impact of the macroeconomy on employment in the home-based sector is theoretically ambiguous. On the one hand, decreased demand from parents for child care may reduce the number of home day cares. On the other hand, if women or their partners experience a decrease in wages or job loss during a downturn, caring for children in their home may be the most readily-available way to earn some extra income. Such a shift would be consistent with Katz and Krueger (2017), who find that unemployed workers are more likely to enter alternative work arrangements. Parents may also be looking for a less expensive or more flexible child care option if their hours are cut due to an economic downturn. Overall, we do find a positive but not statistically-significant correlation between the unemployment rate and home-based daycare employment. The increase in home daycare employment is statistically significant for some subgroups, including for women ages 50 to 65, women with at least some college education, and women who are not fluent in English. Therefore, at least for these subgroups, the decreased availability of outside employment options as the unemployment rate increases may push them into this sector.

6.2 Mechanisms for the Impact of the Macroeconomy on Child Care Workers

The equilibrium composition of child care worker skill depends on both changes and constraints on the supply and demand of workers. We will discuss each briefly.

On the supply side, when the economy worsens, workers have fewer outside options. Therefore, workers of all education and experience levels may be more willing to accept a job at a child care facility, which may increase the supply of higher quality workers.

On the demand side, facilities may be trying to balance competing objectives. Centers

facing financial pressure from decreased revenues may decide to reduce costs by employing less expensive, lower quality workers. However, centers are also highly regulated, which in most states includes minimum education requirements, so they may not have much scope for hiring lower-educated, less expensive workers.

We find that average education and age of workers increases when the economy declines. Therefore, it seems that any concerns about hiring less expensive workers are outweighed by a need to comply with regulations or by the increased supply of higher-educated workers willing to work at lower wages during an economic downturn.

6.3 Implications for Children and Families

Changes in the child care market affect the availability of care to families and the quality and stability of care for children. In this section, we will briefly discuss some of the implications of our results for each.

We find that economic downturns reduce the availability and accessibility of child care through reducing the number of center-based child care facilities. Parents may need to travel farther to access center-based care or find care in a different sector, such as a home day care. The asymmetry of the child care market's response raises concerns that even when the economy improves, parents looking to return to employment may have difficulty finding care for their children.

Our findings also indicate that stability of a children's care arrangement may increase or decrease during a recession. The contraction of the child care market suggests that some children are likely switching care types, perhaps when their parents stop sending them to a child care program they no longer need or can no longer afford, creating disruption for the affected children and families. Additionally, children currently attending any child care facilities that close also face disruption and parents need to find new care arrangements. But children who are able to remain in the same arrangements may benefit from lower caregiver turnover.

We also find evidence of increased quality at child care centers that remain open when the economy worsens, with both higher average education and experience among workers and better ratings by consumers on Yelp.com. Child development likely benefits from access to this increased quality of care. The flip side is that as the economy improves, average

education and experience of workers declines, with possible negative implications for child development. We do also find some evidence of a shift in availability by sector within the child care market, with a reduction in employment in the center-based market but possible increases in the home-based market. Center-based facilities are more highly regulated and are on average higher quality than home-based facilities (Bassok *et al.*, 2016), so this shift may have negative consequences for child development. However, the negative effects may be mediated by the fact that the workers who shift into home-based care employment during economics downturns tend to be more highly educated and older.

6.4 Application to the COVID-19 Recession

Child care providers have faced unique obstacles during the COVID-19 pandemic and recession relative to the recessions studied in this paper. Like other businesses, many were forced to close in the early days of the pandemic (Raifman *et al.*, 2020). When they reopened, they had to implement costly new health and safety protocols and were sometimes required to reduce ratios (Child Care Aware of America, 2021). Additionally, parents may have withdrawn children due to safety concerns or because parents are now working from home. However, many of the same pressures from a typical recession remain. In this section, we estimate what fraction of the decline in employment in the child care sector during the COVID-19 recession can be attributed to economic conditions.

Employment in the Child Day Care Services industry declined 16% (17.4 log points) from December 2019 to December 2020, compared to a 6% (6.2 log points) decline in overall employment (authors' calculations). Over the same period, the national unemployment rate rose from 3.5% to 6.7%, a 3.2 percentage point increase. Our estimates from the ACS and QWI suggest that a one percentage point increase in the unemployment rate is associated with a two percent decrease in child care employment (Tables 7 and A.4, respectively), while the estimate from the QCEW is three percent (Table 6). Therefore, in a recession of this magnitude in the absence of COVID-19, we would estimate a decrease in child care employment of 6.4% to 9.6%, or 39% to 58% of the observed decline in child care employment.

We can also use the employment betas to estimate what fraction of the decline in child care employment is due to economic conditions. Here, we estimate a one log point decline in overall employment is associated with a 1.036 to 1.945 log point decline in child care

employment (Table 4).[16] By this measure, we would estimate a 6.4 to 12.0 log point decline in child care employment due to overall employment conditions, or 37% to 69% of the observed decline.

By both measures, economic conditions account for more than a third, and possibly more than half, of the decline in child care employment during the COVID-19 recession. Even once the economy improves, our finding that the child care market responds asymmetrically to economic shocks suggests that it could take some time for the child care market to recover.

7 Conclusion

In this paper, we estimate the impact of macroeconomic conditions on the child care market using a variety of data sources. We find that the child care market is very sensitive to the macroeconomy. During periods of economic contraction, the supply of child care—as measured by employment and the number of firms—decreases substantially, both in absolute terms and relative to the economy as a whole. Furthermore, the drop in supply experienced during economic downturns does not fully recover with the rest of the economy. On the other hand, at facilities that remain open, we find that average worker quality increases when the unemployment rate increases, with more educated and older workers relatively insulated from changing economic conditions. The flip side of this finding on worker quality is that as conditions improve, the average quality of workers decreases, most likely because higher-wage options outside of the child care industry become more plentiful.

Our findings have a number of important policy implications. That the child care industry requires more time to recover than the rest of the economy suggests that recoveries might be hastened if child care providers are more readily available immediately following a recession. In particular, maintaining the supply of child care during and after a recession would enable parents to quickly reenter the labor force. An impediment to making supply less sensitive to economic shocks is that providers rely largely on private funding—via parent fees—to maintain operations, which is itself likely to be sensitive to economic conditions. One option, therefore, is to increase the share of public funding within the child care industry, either through subsidizing program slots or consumers. Another option, and one that is currently

[16] We exclude the estimate using county-level data and county-level employment changes not instrumented by state since we believe it suffers from attenuation bias.

being undertaken, is to include child care providers among the recipients of Congressionally-enacted stimulus payments during recessions. Although it is unclear whether such policies would reduce the exposure of child care providers to macroeconomic conditions, our results suggest that, if successful, they may benefit child care employees, parents, and children.

There are also multiple directions for future research on this topic. Given that our analysis of the demand-side of the market is quite preliminary, future work should focus on how families' child care preferences vary over the business cycle. It seems particularly important to understand whether children experience more instability in their child care arrangements during periods of contraction or growth, whether growing instability translates into changes in quality, and whether those changes in quality have developmental implications. Critical to these questions is the extent to which children shift between parental and non-parental settings as well as between informal and formal arrangements. Another promising avenue for future research is to estimate the impact of the availability of outside employment options on the decision to work—and remain employed—as a child care teacher. As previously noted, staff turnover within the child care industry is comparatively high, but the reasons for this are not well understood. Therefore, examining the role of outside options, which may be both higher-paying and physically less taxing, seems important as a potential explanation.

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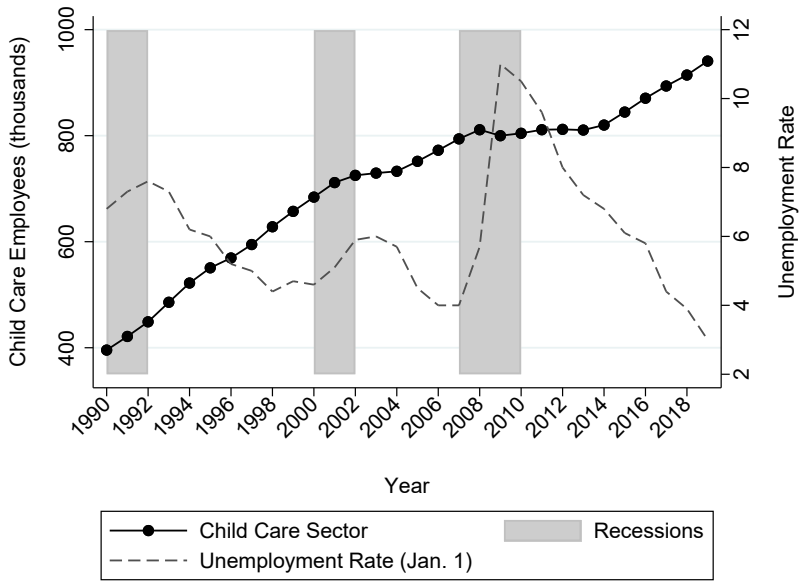
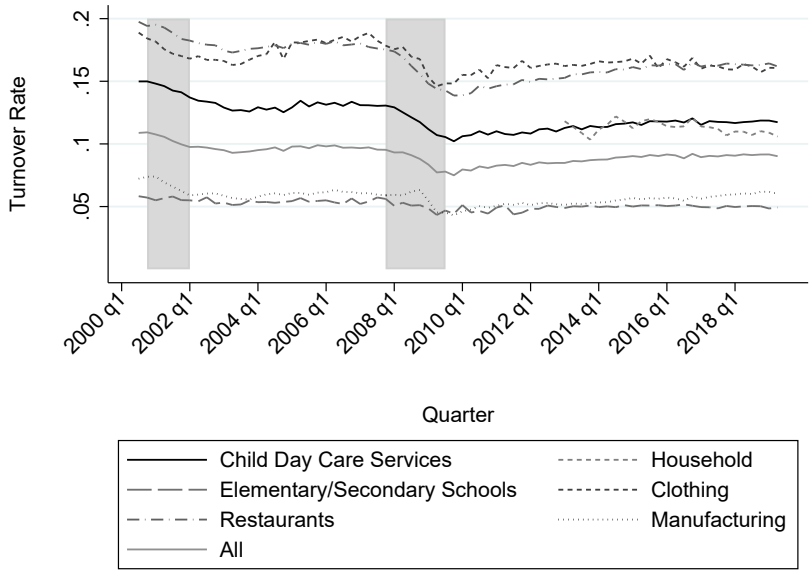
Figure 1: Growth in the Child Care Market Over Time



Notes: The solid black line plots the number of employees in the child care industry in the United States for the years 1990-2019, based on data from the QCEW (NAICS code 624410). NBER recessions are shaded, and the national unemployment rate as of January 1st using data from the St. Louis Federal Reserve is plotted with the dashed line.

Figure 2: Turnover in Child Care and Other Industries Over Time



Notes: This graph plots seasonally-adjusted employee turnover rates by calendar quarter and industry. Data is from the QWI and is restricted to a balanced panel of 36 states that are in the data as of the first quarter of 2000. Data for private household workers is only available beginning in 2013 due to a classification change.

Table 1: Summary statistics for ACS Sample

	Child Care Workers	Other Workers	Non-workers
Demographic Characteristics:			
White	0.72	0.75	0.71
Black	0.16	0.13	0.13
Hispanic	0.17	0.14	0.19
Age (Mean)	37.23	40.08	43.13
Age 18-34 years	0.47	0.37	0.31
Age 35-49 years	0.32	0.36	0.29
Age 50-64 years	0.22	0.27	0.40
Family Characteristics:			
Married	0.51	0.51	0.58
Number of Children	1.06	0.86	1.00
Any Children under 5 years	0.18	0.13	0.18
Education:			
Less than High School	0.10	0.08	0.22
High School	0.27	0.25	0.31
Some College	0.40	0.34	0.28
College or More	0.23	0.33	0.18
English Fluency:			
Does not speak English well	0.05	0.04	0.10
Fraction of sample	0.020	0.728	0.252
Observations	303,535	11,263,458	3,899,015

Notes: This table reports descriptive statistics for the women in the ACS sample. All columns report means for women in the given employment category. Observations are at the person-year level and cover women ages 18 to 64 in surveys for years 2000 to 2019. Means are calculated using person weights.

Table 2: Summary statistics of Child Care Workers by Sector

	Center-based	Household	Home-based	School-based
Demographic Characteristics:				
White	0.71	0.75	0.71	0.78
Black	0.18	0.09	0.14	0.12
Hispanic	0.15	0.23	0.22	0.16
Age (Mean)	35.74	31.66	41.82	40.73
Age 18-34 years	0.52	0.67	0.31	0.33
Age 35-49 years	0.30	0.18	0.40	0.39
Age 50-64 years	0.19	0.15	0.29	0.28
Family Characteristics:				
Married	0.48	0.28	0.63	0.64
Number of Children	1.00	0.48	1.45	1.16
Any Children under 5 years	0.19	0.10	0.22	0.13
Education:				
Less than High School	0.07	0.15	0.17	0.05
High School	0.26	0.29	0.33	0.21
Some College	0.43	0.40	0.37	0.29
College or More	0.23	0.17	0.13	0.44
English Fluency:				
Does not speak English well	0.03	0.08	0.10	0.02
Fraction of sample	0.549	0.103	0.207	0.141
Observations	166,550	31,219	62,945	42,821

Notes: This table reports descriptive statistics for the women in the ACS sample who work in child care. All columns report means for women who work in the given child care sector. Observations are at the person-year level and cover women ages 18 to 64 in surveys for years 2000 to 2019. Means are calculated using person weights.

Table 3: Child Care Participation and Expenditures

	Any Participation	Relative Care	Non-relative informal care	Home-Based Care	Center-based Care
Participation Rate	0.64	0.28	0.05	0.13	0.54
Weekly Hours of Use	27.66	24.49	25.38	29.70	24.43
Fraction Paying	0.67	0.25	0.81	0.92	0.73
Hourly Expenditures	$3.81	$2.58	$10.32	$3.40	$4.27

Notes: This table provides descriptive statistics for the pooled 2005 and 2012 waves of the National Household Education Survey (NHES), which has a total of 15,090 observations. The column "Any Participation" describes the share of preschool-age children regularly attending any form of non-parental child care ("Participation Rate"), the total number of hours spent in non-parental care across all arrangements conditional on using child care ("Weekly Hours of Use"), the share of families paying for non-parental care across all arrangements ("Paying"), and median hourly expenditures on non-parental care across all arrangements conditional on paying ("Hourly Expenditures"). The participation rates in the remaining columns are calculated using the subset of children using any form of non-parental care. Thus, the numbers in these columns sum to one (100%). The remaining characteristics are calculated in the same way as in the first column, and pertain only to the hours of use and expenditures for the relevant arrangement.

Table 4: Employment Betas: Business Cycle Exposure by Industry

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\Delta Log(Emp)$ in Industry:	Child Care	Household	Schools	Clothing	Restaurants	Manufacturing	All
Panel A: Employment Betas							
$\Delta Log(Emp)$	0.861***	-0.385	0.502***	0.684***	0.751***	1.015***	1.000***
	(0.0870)	(0.524)	(0.103)	(0.104)	(0.0585)	(0.127)	(.)
Panel B: Employment Betas Split by whether Total Employment is Increasing or Decreasing							
$\Delta Log(Emp) * [\Delta Log(Emp) > 0]$	0.752***	0.329	0.476***	0.682***	0.720***	1.068***	1.000***
	(0.104)	(1.208)	(0.173)	(0.162)	(0.103)	(0.189)	(.)
$\Delta Log(Emp) * [\Delta Log(Emp) < 0]$	1.036***	-1.348*	0.541***	0.686***	0.801***	0.933***	1.000***
	(0.194)	(0.699)	(0.138)	(0.219)	(0.0986)	(0.140)	(.)
One-sided p-val	0.12	0.18	0.40	0.50	0.32	0.29	
Dep. Var. Mean	0.0308	-0.00546	0.0145	-0.00134	0.0199	-0.00856	0.0112
Mean Level	13,886	5,558	135,521	19,428	177,148	287,802	2,508,445
N	1,475	306	1,449	1,479	1,458	1,477	1,479

Notes: Employment betas indicate how exposed employment in the given industry is to the business cycle, where the business cycle is measured as changes in log employment in all industries combined. Observations are at the state-year level and regressions include state and year fixed effects, and each column represents a separate regression. Data is from the QCEW, and due to a classification change, data for household employees is restricted to years 2013 and later. Specifically, Panel A reports the coefficient β from the following regression: $\Delta Log(IndEmp_{st}) = \alpha + \beta * \Delta Log(Emp_{st} + \gamma_s + \tau_t + \epsilon_{st}$, where in each column, $IndEmp_{st}$ is employment in the indicated industry in state s at time t, $AllEmp_{st}$ is total employment across all industries in state s at time t, and γ_s and τ_t are state and year fixed effects, respectively. Panel B reports coefficients β_1 and β_2 from the regression: $\Delta Log(IndEmp_{st}) = \alpha + \beta_1 * \Delta Log(Emp_{st}) * \mathbb{1}_{\Delta Log(Emp_{st})>0} + \beta_2 * \Delta Log(Emp_{st}) * \mathbb{1}_{\Delta Log(Emp_{st})<0} + \gamma_s + \tau_t + \epsilon_{st}$, where this regression adds indicator variables for whether overall employment is increasing or decreasing in a state. Standard errors are clustered at the state level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Employment Betas: Child Care Business Cycle Exposure Robustness

	(1)	(2)	(3)	(4)
Panel A: Employment Betas				
$\Delta Log(Emp)$	0.861***	0.901***	0.554***	0.906***
	(0.0870)	(0.0767)	(0.0691)	(0.0759)
Panel B: Employment Betas Split by whether Total Employment is Increasing or Decreasing				
$\Delta Log(Emp) * [\Delta Log(Emp) > 0]$	0.752***	0.742***	0.443***	0.440***
	(0.104)	(0.0848)	(0.0438)	(0.132)
$\Delta Log(Emp) * [\Delta Log(Emp) < 0]$	1.036***	1.123***	0.727***	1.945***
	(0.194)	(0.152)	(0.172)	(0.320)
One-sided p-val	0.12	0.02	0.07	0.00
Level of Data	State-level	County-level	County-level	County-level
Level of RHS Variable	State-level	State-level	County-level	County-level
Instrumented with State?	N/A	N/A	No	Yes
Dep. Var. Mean	0.0308	0.0298	0.0298	0.0298
Mean Level	13886	292	292	292
N	1,475	42,598	42,598	42,598

Notes: Employment betas indicate how exposed employment in the given industry is to the business cycle, where the business cycle is measured as changes in log employment in all industries combined. Observations in column (1) are at the state-year level and regressions include state and year fixed effects. Observations in columns (2)-(4) are at the county-year level and include county and year fixed effects as well as county population weights based on the 1990 Census. Data is from the QCEW, and due to a classification change, data for household employees is restricted to years 2013 and later. Specifically, Panel A reports the coefficient β from the following regression: $\Delta Log(IndEmp_{st}) = \alpha + \beta * \Delta Log(Emp_{st} + \gamma_s + \tau_t + \epsilon_{st}$, where in each column, $IndEmp_{st}$ is employment in the indicated industry in state s at time t, $AllEmp_{st}$ is total employment across all industries in state (column 1) or county (columns 2-4) s at time t, and γ_s and τ_t are state/county and year fixed effects, respectively. Panel B reports coefficients β_1 and β_2 from the regression: $\Delta Log(IndEmp_{st}) = \alpha + \beta_1 * \Delta Log(Emp_{st}) * \mathbb{1}_{\Delta Log(Emp_{st})>0} + \beta_2 * \Delta Log(Emp_{st}) * \mathbb{1}_{\Delta Log(Emp_{st})<0} + \gamma_s + \tau_t + \epsilon_{st}$, where this regression adds indicator variables for whether overall employment is increasing or decreasing in a state or county, depending on the level of the right-hand side variable. In column (4), the county-level change in log employment is instrumented with the state-level change in log employment to correct attenuation due to measurement error. Standard errors are clustered at the state level in column (1) and at the county level in columns (2)-(4).
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Employment and Establishment Responses to the Unemployment Rate by Industry

	(1) Child Care	(2) Household	(3) Schools	(4) Clothing	(5) Restaurants	(6) Manufacturing	(7) All
Panel A: Log(Employment)							
Unemployment Rate	-0.0308***	-0.0363	-0.0140	0.0108	0.0032	-0.0144	-0.0120**
	(0.0071)	(0.0220)	(0.0241)	(0.0116)	(0.0143)	(0.0094)	(0.0045)
Dep. Var. Mean	9.071	7.882	11.13	9.271	11.58	11.94	14.26
Mean Level	14,124	5,599	138,430	19,447	179,143	286,394	2,521,512
Panel B: Log(Establishments)							
Unemployment Rate	-0.0112*	-0.0183	-0.0287	0.0100	0.0152	0.0006	0.0024
	(0.0065)	(0.0262)	(0.0398)	(0.0101)	(0.0154)	(0.0077)	(0.0057)
Dep. Var. Mean	6.688	7.685	6.498	6.893	8.731	8.354	11.55
Mean Level	1,237	4,814	1,293	1,619	10,251	7,307	164,603
N	1,475	306	1,438	1,479	1,458	1,475	1,479

Notes: This table reports OLS estimates of the relationship between the unemployment rate and the log of employment (Panel A) and the log of establishments (Panel B) by industry using data from the QCEW. Observations are at the state-year level and regressions include state and year fixed effects. Standard errors are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Child Care Employment by Sector

	(1) Any Employment	(2) Any Child Care	(3) Center-based	(4) Household	(5) Home-based	(6) School-based
Unemployment Rate	-0.00463***	-0.00016	-0.00023***	0.00002	0.00005	-0.00001
	[-0.62%]	[-0.81%]	[-2.09%]	[1.11%]	[1.20%]	[-0.23%]
	(0.00034)	(0.00010)	(0.00006)	(0.00002)	(0.00005)	(0.00002)
Dep. Var. Mean	0.748	0.0204	0.0112	0.00220	0.00424	0.00271
N	15,466,008	15,466,008	15,466,008	15,466,008	15,466,008	15,466,008

Notes: This table reports OLS estimates of the relationship between the unemployment rate and employment of women ages 18-65 in the previous 12 months. The dependent variable is a binary variable that in column (1) equals one if the woman was employed, in column (2) equals one if she primarily worked in child care, and in columns (3)-(6) equals one if she primarily worked in the specified child care sector and equals zero otherwise. Unemployment rates are measured at the state level. All models include state and year fixed effects and individual-level controls (age, race, ethnicity, educational attainment, marital status, number of children, children younger than five years, and English fluency). Effect sizes in brackets report the point estimate as a percent of the mean. Standard errors in parentheses are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Child Care Employment by Sector and the Business Cycle: Heterogeneity

	(1) Any Employment	(2) Any Child Care	(3) Center-based	(4) Household	(5) Home-based	(6) School-based
Panel A: Education						
Unemployment Rate	-0.00812***	-0.00042***	-0.00043***	0.00001	-0.00002	0.00002
	[-1.09%]	[-2.06%]	[-3.84%]	[0.45%]	[-0.47%]	[0.74%]
	(0.00081)	(0.00014)	(0.00009)	(0.00002)	(0.00006)	(0.00004)
UR*Some College or more	0.00563***	0.00041***	0.00032***	0.00003*	0.00011**	-0.00005
	[0.75%]	[2.01%]	[2.86%]	[1.36%]	[2.59%]	[-1.85%]
	(0.00105)	(0.00011)	(0.00006)	(0.00001)	(0.00005)	(0.00005)
Panel B: Age						
Unemployment Rate	-0.00173**	0.00013	-0.00003	-0.00000	0.00015**	0.00000
	[-0.23%]	[0.64%]	[-0.27%]	[0.00%]	[3.54%]	[0.00%]
	(0.00081)	(0.00014)	(0.00008)	(0.00002)	(0.00006)	(0.00003)
UR*Age<35	-0.00693***	-0.00077***	-0.00058***	0.00007	-0.00021***	-0.00005*
	[-0.93%]	[-3.77%]	[-5.18%]	[3.18%]	[-4.95%]	[-1.85%]
	(0.00161)	(0.00014)	(0.00011)	(0.00005)	(0.00007)	(0.00003)
UR*Age 35-49	-0.00122	-0.00006	-0.00000	0.00000	-0.00008**	0.00002
	[-0.16%]	[-0.29%]	[0%]	[0%]	[-1.89%]	[0.74%]
	(0.00092)	(0.00005)	(0.00003)	(0.00001)	(0.00004)	(0.00002)
Panel C: English Fluency						
Unemployment Rate	-0.00492***	-0.00021**	-0.00026***	0.00003	0.00003	-0.00001
	[-0.66%]	[-1.03%]	[-2.32%]	[1.36%]	[0.71%]	[-0.37%]
	(0.00035)	(0.00010)	(0.00006)	(0.00002)	(0.00005)	(0.00002)
UR*Not Fluent	0.00374***	0.00055***	0.00033***	-0.00009*	0.00029***	0.00002
	[0.50%]	[2.70%]	[2.95%]	[-4.09%]	[6.84%]	[0.74%]
	(0.00119)	(0.00013)	(0.00008)	(0.00005)	(0.00008)	(0.00003)
Dep. Var. Mean	0.748	0.0204	0.0112	0.00220	0.00424	0.00271
N	15,466,008	15,466,008	15,466,008	15,466,008	15,466,008	15,466,008

Notes: This table reports OLS estimates of the heterogeneity in the relationship between the unemployment rate and employment of women ages 18-65 in the previous 12 months. The dependent variable is a binary variable that in column (1) equals one if the woman was employed, in column (2) equals one if she primarily worked in child care, and in columns (3)-(6) equals one if she primarily worked in the specified child care sector and equals zero otherwise. Unemployment rates are measured at the state level. All models include state and year fixed effects and individual-level controls (age, race, ethnicity, educational attainment, marital status, number of children, children younger than five years, and English fluency). Effect sizes in brackets report the point estimate as a percent of the mean. Standard errors in parentheses are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Consumer Satisfaction

	Average Rating				Highest Rating			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unemployment Rate	0.0310**	0.0480***	0.0565***	0.0624***	0.0106**	0.0152***	0.0202***	0.0167***
	(0.0155)	(0.0163)	(0.0191)	(0.0203)	(0.0041)	(0.0050)	(0.0060)	(0.0063)
UR*Low Income			-0.0086				-0.0050*	
			(0.0090)				(0.0030)	
UR*High Non-White				-0.0131				-0.0014
				(0.0099)				(0.0032)
Dep. Var. Mean	4.29	4.29	4.29	4.29	0.76	0.76	0.76	0.76
County FE	Yes	No	No	No	Yes	No	No	No
Firm FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
N	48,637	48,637	48,630	48,630	48,637	48,637	48,630	48,630

Notes: This table reports OLS estimates of the relationship between the unemployment rate and consumer ratings of child care facilities on Yelp. In columns (1)-(4), the outcome of interest is the reviewer's rating of the facility on a scale from one to five, where five is the best possible rating. In columns (5)-(8), the outcome of interest is an indicator that equals one if the reviewer gave the facility a rating of five, the highest rating, and equals zero otherwise. Columns (3) and (7) add an interaction of the unemployment rate with the indicator "Low Income", which equals one if the facility is located in a county [CHRIS: FILL IN?] and equals zero otherwise. Columns (4) and (8) add an interaction of the unemployment rate with the indicator "High Non-White", which equals one if the facility is located in a county with an above-median fraction of non-white residents and equals zero otherwise. All regressions include controls for available reviewer characteristics (quadratic in friend count, quadratic in review count, indicator for whether they have a profile picture, CHRIS: what are picrev, usefulany, lndic, informalany, swearany?), firm characteristics (CHRIS: claimed? and an indicator for whether this is the first review of the facility) as well as year fixed effects and calendar month fixed effects. In columns (1) and (4), standard errors in parentheses are clustered at the county level. In the remaining columns, standard errors are clustered at the firm level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A Additional Tables

Table A.1: Log Weekly Hours Worked and the Business Cycle

	(1) Any Employment	(2) Any Child Care	(3) Center-based	(4) Household	(5) Home-based	(6) School-based
Panel A: Log(Hours)						
Unemployment Rate	-0.0055***	-0.0085***	-0.0072***	-0.0019	-0.0118*	-0.0185***
	(0.0006)	(0.0019)	(0.0020)	(0.0050)	(0.0060)	(0.0053)
Panel B: By Education						
Unemployment Rate	-0.0077***	-0.0138***	-0.0124***	-0.0024	-0.0140*	-0.0221***
	(0.0012)	(0.0032)	(0.0028)	(0.0054)	(0.0067)	(0.0053)
UR*Some College or more	0.0033***	0.0080***	0.0071***	0.0008	0.0045*	0.0051
	(0.0010)	(0.0027)	(0.0023)	(0.0060)	(0.0022)	(0.0039)
Panel C: By Age						
Unemployment Rate	-0.0025***	-0.0040**	-0.0023	0.0139*	-0.0093	-0.0144**
	(0.0006)	(0.0019)	(0.0035)	(0.0073)	(0.0066)	(0.0054)
UR*Age<35	-0.0071***	-0.0095***	-0.0098***	-0.0228***	-0.0145***	-0.0065**
	(0.0020)	(0.0020)	(0.0029)	(0.0050)	(0.0046)	(0.0028)
UR*Age 35-49	-0.0007	-0.0016**	-0.0019	-0.0071*	0.0024	-0.0026
	(0.0006)	(0.0007)	(0.0024)	(0.0038)	(0.0037)	(0.0035)
Panel D: By English Fluency						
Unemployment Rate	-0.0052***	-0.0080***	-0.0068***	-0.0010	-0.0108*	-0.0183***
	(0.0006)	(0.0019)	(0.0019)	(0.0053)	(0.0059)	(0.0053)
UR*Not Fluent	-0.0041**	-0.0061*	-0.0081	-0.0093*	-0.0057	-0.0065
	(0.0016)	(0.0034)	(0.0050)	(0.0049)	(0.0046)	(0.0157)
Dep. Var. Mean	3.52	3.41	3.40	3.26	3.57	3.33
Level Mean	36.5	33.9	32.5	30.1	40.9	31.9
N	11,566,993	303,535	166,550	31,219	62,945	42,821

Notes: This table reports OLS estimates of the relationship between the unemployment rate and the usual hours worked per week for female workers in each sector. The dependent variable is the log of reported usual hours of work per week. Each column is restricted to individuals who work in that sector: column (1) includes all employed women, column (2) includes all women working in child care, and columns (3)-(6) include women working in each of the specified child care sectors. Unemployment rates are measured at the state level. All models include state and year fixed effects and individual-level controls (age, race, ethnicity, educational attainment, marital status, number of children, children younger than five years, and English fluency). Standard errors in parentheses are clustered at the state level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.2: Change in Turnover, Hiring, and Separation Rates by Industry

	(1) Child Care	(2) Household	(3) Schools	(4) Clothing	(5) Restaurants	(6) Manufacturing	(7) All
Panel A: Turnover Rate							
Unemployment Rate	-0.00253***	0.00355	0.0000400	-0.00340***	-0.00441***	-0.00211***	-0.00241***
	(0.000533)	(0.00245)	(0.000400)	(0.000515)	(0.000535)	(0.000364)	(0.000351)
Dep. Var. Mean	0.131	0.121	0.055	0.176	0.177	0.063	0.095
N	4,388	1,304	4,381	4,432	4,432	4,393	4,386
Panel B: Separation Rate							
Unemployment Rate	-0.00288***	0.00503**	0.00175***	-0.00496***	-0.00769***	-0.00339***	-0.00349***
	(0.000689)	(0.00246)	(0.000564)	(0.000718)	(0.000894)	(0.00118)	(0.000488)
Dep. Var. Mean	0.161	0.142	0.070	0.229	0.228	0.081	0.124
N	4,490	1,355	4,483	4,534	4,534	4,495	4,482
Panel C: Hire Rate							
Unemployment Rate	-0.00464***	0.00357	-0.00254***	-0.00502***	-0.00557***	-0.00112	-0.00271***
	(0.000734)	(0.00339)	(0.000539)	(0.000970)	(0.00108)	(0.00131)	(0.000637)
Dep. Var. Mean	0.170	0.155	0.073	0.238	0.237	0.081	0.131
N	4,490	1,355	4,483	4,534	4,534	4,495	4,482

Notes: This table reports OLS estimates of the relationship between the unemployment rate and the change in the employee turnover, hire, and separation rates. Data is from the QWI and at the state-quarter level. Unemployment rate is measured at the state level on the first day of the quarter. Regressions include state and quarter-year fixed effects, and standard errors are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Fraction of Workers with Some College or More

	(1) Child Care	(2) Household	(3) Schools	(4) Clothing	(5) Restaurants	(6) Manufacturing	(7) All
Unemployment Rate	0.00169***	-0.00194	-0.000238	0.000939	0.000908*	0.00252***	0.00243***
	(0.000554)	(0.00137)	(0.000538)	(0.000842)	(0.000521)	(0.000594)	(0.000469)
Dep. Var. Mean	0.590	0.513	0.726	0.543	0.457	0.523	0.603
N	4,537	1,402	4,530	4,537	4,537	4,537	4,485

Notes: This table reports OLS estimates of the relationship between the unemployment rate and the fraction of workers age 25 or older in that sector with some college or more. Data is from the QWI and at the state-quarter level. Due to a classification change, data for household employees is restricted to years 2013 and later. Unemployment rate is measured at the state level on the first day of the quarter. Regressions include state and quarter-year fixed effects, and standard errors are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Change in Child Care Separations, Hires, and Employment by Education Level

	(1) College	(2) Some College	(3) High School	(4) < High School	(5) Not Available (Age < 25 years)	(6) Overall
Panel A: Log(Number of Separations)						
Unemployment Rate	-0.0246***	-0.0308***	-0.0343***	-0.0446***	-0.0750***	-0.0477***
	(0.00856)	(0.00747)	(0.00784)	(0.00939)	(0.00873)	(0.00744)
Dep. Var. Mean	5.559	6.028	5.851	5.085	6.742	7.639
Mean Level	431	671	560	306	1,329	3,297
N	4,541	4,541	4,541	4,541	4,541	4,541
Panel B: Log(Number of Hires)						
Unemployment Rate	-0.0349***	-0.0440***	-0.0463***	-0.0530***	-0.0754***	-0.0555***
	(0.00858)	(0.00727)	(0.00745)	(0.00874)	(0.00804)	(0.00719)
Dep. Var. Mean	5.381	5.856	5.692	4.958	6.756	7.551
Mean Level	362	568	481	271	1,318	2,999
N	4,384	4,384	4,384	4,384	4,384	4,384
Panel C: Log(Number of Stable Employees)						
Unemployment Rate	-0.0106*	-0.0115**	-0.0174***	-0.0212***	-0.0432***	-0.0201***
	(0.00560)	(0.00551)	(0.00500)	(0.00633)	(0.00740)	(0.00523)
Dep. Var. Mean	7.197	7.709	7.466	6.516	7.495	8.980
Mean Level	2,300	3,660	2,834	1,357	2,707	12,858
N	4,490	4,490	4,490	4,490	4,490	4,490

Notes: This table reports OLS estimates of the relationship between the unemployment rate and the change in log separations, hires, and employees by education in the child care industry. Data is from the QWI and at the state-quarter level. Education level in the QWI is only available for workers ages 25 years and older. Unemployment rate is measured at the state level on the first day of the quarter. Regressions include state and quarter-year fixed effects, and standard errors are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.5: Changes in Child Care Participation over the Business Cycle

	(1) All	(2) Low Education	(3) High Education	(4) Not Employed	(5) Employed	(6) Married	(7) Unmarried
Panel A: Any child care participation							
Unemployment Rate	-0.0039	-0.0086	0.0008	0.0010	-0.0088	-0.0039	-0.0018
	(0.0039)	(0.0052)	(0.0046)	(0.0063)	(0.0056)	(0.0042)	(0.0079)
Dep. Var. Mean	0.643	0.577	0.732	0.391	0.822	0.629	0.681
Panel B: Relative care participation							
Unemployment Rate	0.0091***	0.0054*	0.0102***	0.0074*	0.0068	0.0046*	0.0202***
	(0.0025)	(0.0032)	(0.0038)	(0.0038)	(0.0045)	(0.0027)	(0.0061)
Dep. Var. Mean	0.178	0.198	0.148	0.090	0.240	0.149	0.259
Panel C: Non-relative care participation							
Unemployment Rate	-0.0018	-0.0041***	0.0022	-0.0027	0.0000	-0.0007	-0.0034**
	(0.0019)	(0.0010)	(0.0041)	(0.0019)	(0.0027)	(0.0027)	(0.0014)
Dep. Var. Mean	0.031	0.015	0.053	0.017	0.040	0.034	0.023
Panel D: Home day care participation							
Unemployment Rate	0.0031	0.0020	0.0028	0.0033*	0.0031	0.0036	0.0014
	(0.0027)	(0.0035)	(0.0047)	(0.0018)	(0.0043)	(0.0036)	(0.0040)
Dep. Var. Mean	0.085	0.075	0.103	0.018	0.136	0.088	0.077
Panel E: Center-based care participation							
Unemployment Rate	-0.0131***	-0.0103**	-0.0136**	-0.0060	-0.0173***	-0.0108**	-0.0166*
	(0.0036)	(0.0049)	(0.0052)	(0.0064)	(0.0034)	(0.0045)	(0.0098)
Dep. Var. Mean	0.351	0.292	0.430	0.269	0.406	0.361	0.324
N	15090	8629	6012	6142	8499	11030	4060
Panel F: Total weekly hours in non-parental care							
Unemployment Rate	-0.3680*	-0.4389	-0.2622	0.0159	-0.5342**	-0.3660	-0.2271
	(0.2048)	(0.3680)	(0.2670)	(0.4193)	(0.2619)	(0.2251)	(0.3600)
Dep. Var. Mean	17.79	15.74	20.39	7.24	25.17	16.63	20.95
N	15090	8629	6012	6142	8499	11030	4060

Notes: This table reports estimates of the relationship between the unemployment rate and child care participation mode. In Panels A through E, the outcome of interest is a binary variable that equals one if the child participates in that form of child care and equals zero otherwise, and regressions are estimated using OLS. In Panel F, the outcome of interest is the total weekly hours in non-parental care, and the regression is estimated using the tobit model due to a large number of zeros. Data is from the NHES and includes children ages six years and younger. All regressions include child controls (gender, age, and race), mother controls (quadratic in age, marital status, education, and employment status), state controls (fixed effects and controls for per capita income and population density), and year fixed effects. Standard errors in parentheses are clustered at the state-year level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6: Child Care Costs over the Business Cycle

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Low Education	High Education	Not Employed	Employed	Married	Unmarried
Panel A: Pay for care (conditional on using it)							
Unemployment Rate	0.0011	0.0121*	-0.0142**	0.0095	-0.0023	0.0011	-0.0030
	(0.0039)	(0.0062)	(0.0058)	(0.0078)	(0.0046)	(0.0048)	(0.0066)
Dep. Var. Mean	0.671	0.563	0.800	0.544	0.719	0.723	0.540
N	9704	4979	4403	2400	6982	6941	2763
Panel B: Log(Hourly Expenditure)							
Unemployment Rate	0.0142*	0.0244**	-0.0041	0.0499*	0.0055	0.0111	0.0335*
	(0.0081)	(0.0121)	(0.0115)	(0.0254)	(0.0096)	(0.0081)	(0.0174)
Dep. Var. Mean	6.03	4.82	6.96	7.18	5.71	6.44	4.65
N	6513	2802	3524	1305	5021	5021	1492

Notes: This table reports estimates of the relationship between the unemployment rate and child care cost. Panel A includes only children who use non-parental care, and the outcome of interest is an indicator that equals one if the care is paid and equals zero otherwise. Panel B includes only children in paid care, and the outcome of interest is the log of hourly expenditures. Data is from the NHES and includes children ages six years and younger. All regressions include child controls (gender, age, and race), mother controls (quadratic in age, marital status, education, and employment status), state controls (fixed effects and controls for per capita income and population density), and year fixed effects. Standard errors in parentheses are clustered at the state-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.7: Preschool Enrollment over the Business Cycle

	(1) All	(2) Parent Education Less than High School	(3) Parent Education College or more	(4) Mom Employed All Last Year
Unemployment Rate	-0.00075	0.00367	-0.00229	-0.00303*
	(0.00145)	(0.00243)	(0.00144)	(0.00166)
Age=4 years	0.258***	0.267***	0.241***	0.252***
	(0.00563)	(0.0140)	(0.00626)	(0.00634)
Dep. Var. Mean	0.468	0.327	0.593	0.514
N	1,184,806	159,853	476,890	499,510

Notes: This table reports OLS estimates of the relationship between the unemployment rate and preschool enrollment for children ages 3 years and 4 years using data from ACS surveys from years 2000-2019. Observations are at the child-year level, and the dependent variable is an indicator equals one if the parent reports that the child is enrolled in school and equals zero otherwise. Parents report current enrollment, but households are sampled throughout the year, and survey month is not available in the data. Unemployment rate is therefore measured in July of the previous calendar year to reflect the macroeconomic conditions relevant to the school enrollment decision for most months of the year. Column (1) includes all 3 and 4 year olds. Column (2) restricts to children with at least one parent who has less than a high school education. Column (3) restricts to children with at least one parent who has a college degree. Column (4) restricts to children whose mothers worked 50-52 weeks in the past year. All regressions include child controls (sex, race, ethnicity, number of siblings), parent controls (quadratic in age, education, number of parents present, marital status), state fixed effects, and year fixed effects. Standard errors in parentheses are clustered at the state level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$