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Child Care in the United States: Markets, Policy, and Evidence

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ABSTRACT

Child Care in the United States: Markets, Policy, and Evidence*

Participation in non-parental child care arrangements is now the norm for preschool-age children in the U.S. However, child care services are becoming increasingly expensive for many families, and quality is highly uneven across providers and sectors, raising questions about the impact of child care costs and quality on parental employment and child development. The U.S. policy landscape is dominated by three policies that subsidize costs for low-income families or attempt to improve the safety and quality of providers: Child Care and Development Fund, regulations, and quality rating and improvement systems. In this paper, I provide a thorough review of the evidence on each policy, focusing on how they influence a wide range of family and provider outcomes. The paper begins with a detailed description of the structure and functioning of the child care market, using the most up-to-date data on families' utilization of care services and provider characteristics. I then draw on a diverse set of studies across multiple fields to summarize the evidence on the impact of child care policy. In the final section of the paper, I offer recommendations for future research in each policy area.

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1 Introduction

Today, non-parental child care arrangements play a significant role in U.S. children's preschool experiences. Approximately 13 million children ages 0 to 5 now regularly attend a form of non-parental care—equivalent to 60% of such children—with the average child spending between 23 and 27 hours per week in these settings (Cui and Natzke, 2021). Nearly half of children participate in a child care arrangement as of their first birthday, and they accumulate about four months of non-parental care, on average, during the first year of life (Herbst, 2013). Although the early-life exposure to non-parental caregivers is common for most children, the quality of care they receive is highly uneven across different families and child care sectors (Bassok et al., 2016; Flood et al., 2021). Nevertheless, there is mounting evidence that access to high-quality care can have positive short-run effects on child development, leading to long-run schooling and labor market success (Auger et al., 2014; Currie and Rossin-Slater, 2015; Elango et al., 2015; Herbst, 2017b). The growing importance of child care is explained to a large extent by the sustained increase in employment among mothers with preschool-age children, rising from 8% in 1940 to 66% in 2019 (Author's Calculations). However, the evidence suggests that child care costs are highly regressive and appear to be increasing in recent years, renewing questions about the disincentive effects of child care expenses on parental employment (Hotz and Wiswall, 2019).

The importance of child care for children and families has cast a bright light onto the role of public policy in making these services safe and high-quality for children as well as accessible and affordable for parents. Currently, the U.S. policy landscape is dominated by three child care policies that either compel (or encourage) providers to increase the quality of their services or subsidize families' costs. The Child Care and Development Fund (CCDF) is a federal program that provides grants to states and localities for the purpose of subsidizing the out-of-pocket child care expenses of low-income families, conditional on meeting a parental work activity requirement. Aimed explicitly at moving current or at-risk cash aid recipients into the workforce, the CCDF serves about 1.4 million children every month in a variety of child care settings. State-administered minimum quality regulations establish and enforce a variety standards related to the health, safety, and qualifications of center- and home-based child care providers. The primary goal of regulations is to reduce children's exposure to low-quality or dangerous non-parental care environments by compelling such providers to improve or exit the market. Finally, nearly all states

operate a quality rating and improvement system (QRIS), whose goal is to encourage (rather than compel) child care services to increase quality through a mix quality assessment activities, technical and financial assistance, and consumer education. Indeed, all QRIS evaluate and rate provider quality according to numerous criteria, and then communicate those ratings in an easy-to-understand format to parents.

This paper provides a detailed assessment of what we know about the impact of each child care policy on several key outcomes for families and providers. The discussion of family-level outcomes focuses on child care choices and expenses, the demand for quality, maternal employment, and family well-being, including children's health and development. As for providers, I focus on how the policies influence supply, prices, staff compensation and turnover, and quality. The review casts a wide net, drawing on studies from economics, public policy, education, and developmental psychology. As a result, there is enormous diversity in the data sources used, how those data are organized for analysis, and what variation in the data is exploited for the purpose of identifying policy effects. These research design issues are relevant for determining whether previous studies are able to mitigate the well-known self-selection biases that arise when researchers cannot randomly assign units to treatment and control conditions. I therefore pay careful attention to the data structures and empirical strategies used in each policy literature—and in some cases highlight studies that seem particularly strong in this regard—to assist readers in evaluating the credibility of the studies. In addition, because these literatures span multiple decades, some studies might be embedded in policy contexts or rely on household and provider data that are not entirely relevant to the current context. Rather than disregard these studies, which may still provide important insights about policy effects, I provide information on when the data in various studies were collected. My overarching goal in this review is to allow readers to assess the internal and external validity of the results from each policy literature.

Throughout the paper, the terms "non-parental child care" and "child care" are used interchangeably, and refer to the provision of care, either in group or one-on-one settings, for preschool-age children (i.e., those ages 0 to 5 and not in kindergarten) by individuals or services that are not the child's primary caretaker(s) (i.e., the parents), often though not always for the purpose of allowing the parent(s) to work.[1] As discussed in the next section, child care generally takes place in the child's home, the home of another individual, or in a center-based setting. As such, child care modes can be informal—provided by friends, family members, or neighbors—or formal—provided

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[1] Although the CCDF serves children older than age 5 (up to age 12), the studies reviewed here focus on preschool-age children. Similarly, child care regulations and QRIS are applicable to providers that serve school-age children, but once again I limit my review to studies of preschoolers.

in homes or centers by trained early educators. The terms "provider," "arrangement," "caregiver," and "mode" are also used interchangeably to denote any of the child care types just discussed. It is important to note that the evidence reviewed here pertains to policies influencing group or individual *care*, rather than group *instruction*. Publicly-funded early childhood education programs such as Head Start and pre-kindergarten are not covered in this review, nor are small boutique programs like the Perry Preschool Project or Abecedarian Project.[2] The evidence on these programs is covered by Elango et al. (2015) and more recently by Cascio (2021). In addition, the evidence on other early-life "interventions" like the Women, Infants, and Children (WIC), parental leave, and home visiting programs are not reviewed here, but has been covered elsewhere (Currie and Rossin-Slater, 2015).

In Section 2, I provide a detailed description of the structure of the U.S. child care market, paying attention to the level and trend in some key demand- and supply-side characteristics. A key goal of this section is to analyze the most recent data available, thereby providing readers with an updated view of the market[3]. Sections 3, 4, and 5 comprise the heart of the paper, as they review the evidence on the CCDF, regulations, and QRIS, respectively. In particular, each section contains four elements. I begin by providing an overview of each policy, followed by a discussion of the main theoretical considerations for understanding the potential impacts on families and providers. I then review the empirical evidence. Finally, I end each policy section by summarizing the strengths and weaknesses of the literature and identifying strong patterns of results from the most credible studies. Section 6 provides some recommendations for future research in each policy area.

2   Overview of the U.S. Child Care Market

In this section, I provide a series of stylized facts regarding the organization of the child care market, focusing on the demand for and supply of care services. I begin by analyzing the evolution in the demand for non-parental care, as measured by mothers' employment rates and children's participation in child care. In addition, I present evidence on families' child care expenses as well as the "cost burden," defined as the share of family income allocated to paying for child care. The supply-side of the market is then discussed, with a focus on documenting the size of child

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[2]In a few instances, I discuss a study that examines one of the three policies in the context of Head Start. I do so because the existing evidence base in the child care literature is very thin. Thus, making reference to a Head Start study is necessary to our understanding of policy impacts.

[3]Although this paper is not concerned specifically with the effect of the Covid-19 pandemic on the child care market, I do in several instances provide some discussion, particularly in Section 2, on what we know about how the pandemic (and related containment policies) influenced supply and labor demand.

care workforce, the characteristics of its workers, and the level and trend in worker compensation, differentiated by sector. Together, these analyses provide an updated descriptive portrait of the child care market, building on previous work by Blau (1992, 2001) and Herbst (2018b).

2.1 Child Care Demand

Given that most non-parental child care services are used to support working parents—particularly mothers—the discussion of child care demand begins by presenting the trend in maternal employment rates over the past few decades. Specifically, I draw on the U.S. Decennial Census as well as the American Community Survey (ACS) to plot these data over the period 1940 to 2019.[4] Overall, the U.S. has witnessed phenomenal growth in share of employed women with preschool-aged children, rising from 8% in 1940 to 66% in 2019. Figure 1 presents these employment rates separately by the age of mothers' youngest child. Not surprisingly, mothers with older preschool-age children are more likely to be working than those with younger children, but all mothers experienced similarly large employment increases over the past few decades. As of 2019, fully 64% of mothers with infants (i.e., ages 0 to 1) were employed, while 71% of those with 5-year-olds were employed.

A more direct measure of child care demand is the participation rate in various child care arrangements. Although it is difficult to find a high-quality and consistent time series of child care participation rates, two nationally representative surveys are able to provide such information. First, the Current Population Survey (CPS) has since 1968 fielded a special education supplement in which information on school attendance is ascertained for those ages three and over. In a recent analysis of these data, Cascio (2021) finds substantial increases in formal child care participation (e.g., preschool and nursery school) rising from 9% in 1968 to 39% in 2018 among three-year-olds and from 23% to 67% among four-year-olds. Interestingly, nearly all of this growth occurred prior to the early-2000's; since then, participation rates have been flat, a pattern that accords with that found in Herbst (2018b). The second data source is the National Household Education Survey's Early Childhood Program Participation (NHES-ECPP) supplement. This survey is advantageous because it collects detailed participation data across children of all preschool ages and for a variety of informal and formal arrangements. I analyze the 2005, 2012, 2016, and 2019 surveys, in which comparable measures of child care arrangements can be constructed. Consistent with the

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[4]To do so, I use Decennial Census data from 1940 to 2000 and ACS data for the years 2005, 2010, 2015, and 2019 (Ruggles et al., 2022).

evidence discussed above, the share of preschool-age children regularly attending a form of non-parental care has remained steady between 2005 and 2019, at about 59%.

I also use the NHES-ECPP to examine participation across three distinct categories of child care arrangements: relatives (e.g., siblings and grandparents), non-relatives (e.g., friends, au pairs, and home-based providers), and center-based providers. As shown in Table 1, I assess participation along the extensive (i.e., any use) and intensive (i.e., hours of use) margins. As of 2019, center-based care was the predominant non-parental arrangement for preschool-age children (35%), followed by relative (23%) and non-relative (12%) caregivers. Most center-based care occurs at a private for- or non-profit program or place of worship, while most non-relative care occurs in the home of the caregiver. In addition, children participated in these arrangements for 23 to 27 hours per week, on average. These data once again suggest that children's use of specific arrangements, as well as the intensity of using such caregivers, has been largely stable over the past several years.

One of the most salient questions in recent years is whether, and by how much, the cost of child care has increased over time. Some analyses and press reports suggest that costs have risen substantially, to the point of being financially burdensome on families and at least partially responsible for the decline in fertility rates and the stagnation in mothers' employment. For example, one study finds that between 1985 and 2011, families' weekly expenditures on child care increased by 71% (Laughlin, 2013), and another report shows that the annual cost of infant, center-based care now exceeds the tuition at public universities in 28 states (Fraga, 2018). However, a study by Herbst (2018b) calls into question the extent to which costs have risen. This paper reanalyzes the child care expenditure data in the Survey of Income and Program Participation's (SIPP) Child Care Module for the years 1990 and 2011, which roughly corresponds to the period covered in Laughlin (2013)'s original analysis. Relying on a different measure of families' child care expenses, Herbst (2018b) finds that such expenses rose only 14% between 1990 and 2011, significantly less than the increase documented by Laughlin (2013).[5] Nevertheless, the paper also finds significant variation in the cost trajectory experienced by different families. For example, families with preschool-age children spent 29% more on child care, while those with school-age children spent 8% less. Furthermore, among families with preschool-age children, those in the bottom income quartile saw their expenses rise only modestly, by 10%, while those in the top quartile experienced a 48% rise. A final noteworthy finding is

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[5]The measure of child care costs in Herbst (2018b) differs in two key ways: it scales weekly expenses by the number of hours worked per week by mothers to adjust for changes in labor supply, and it reports median instead of mean expenditures given that the mean is influenced by a small number of families making very large child care payments.

that child care costs did not become more financially burdensome over this period, on average. Overall, families in 1990 allocated 8.7% of monthly income to child care costs, rising to 9.1% by 2011, which represents a 5% increase in the cost burden.

Although other recent papers have largely confirmed these findings (e.g., Kubota, 2020), this work, along with the analyses presented in Herbst (2018b), relies on child care expenditure data collected at least a decade ago. Therefore, I provide an updated time series in families' expenses, again drawing on the 2005 through 2019 waves of the NHES-ECPP. I find that the share of families paying for child care in 2019 was 37%, mostly unchanged from the 39% paying in 2005. However, among those paying for care, expenses rose sharply over this period. Indeed, I find that median hourly child care expenses (per hour of use) grew from $3.64 to $5.39, an increase of 48%. Table 1 presents these cost data separately for relative, non-relative, and center-based providers. Although families were about equally likely to pay for a given provider in 2005 and 2019, expenses increased considerably across all three service-types. The cost of relative care experienced the largest increase (85%), followed by non-relative (47%) and center-based (43%) services.

Table 2 similarly updates the time series for families' child care cost burden. Given the data presented above, it is not surprising that child care has become increasingly burdensome in recent years. Overall, families in 2005 allocated 6.6% of annual income to child care costs, rising to 8.7% by 2019, which represents a 32% increase in the cost burden. Furthermore, child care is becoming more burdensome for families regardless of their level of economic advantage. Although families with annual incomes of $40,000 or less allocated a greater share of income to child care (22%) than those with incomes more than $75,000 (7%) in 2019, both groups experienced an equally large rise in the cost burden since 2005: an increase of 55% for the former and an increase of 59% for the latter. As shown in Table 2, such patterns apply to families regardless of the parents' marital status and level of education.

There is one other feature of families' child care expenses that has received increased attention from researchers: as children age, the cost of care becomes less burdensome for families. Indeed, this pattern emerged in a recent analysis of child care expenses by Hotz and Wiswall (2019), and it is evident in the NHES-ECPP data. In 2019, families with children less than one year old allocated about 10% of annual income to child care, compared to 7% for families with five-year-olds. Furthermore, the quantity of parental time with children decreases substantially as children age (Black, 2016; Flood et al., 2021). Together, these dynamics create a situation in which the largest

parental monetary and time investments in children occur when they are youngest. However, public investments in children have the opposite relationship. A recent analysis by Davis and Sojourner (2021) shows that government education spending in 2019 was less than $500 per child during the first three years of life, about $2,800 per child for children ages three and four, and $12,800 per child for elementary-age children. This imbalance leaves parents to bear the heaviest financial care burden during a period when they are least able to afford it (Black, 2016).

2.2 Child Care Supply

For preschool-age children, child care in the U.S. is largely the domain of private providers, and these providers generally operate in center- or home-based settings. Programs within the center-based sector—which can be for- or non-profit entities—are usually licensed and regulated, and they provide care services in a stand-alone building or one that is shared with another entity. Such programs operate through church- or community-based organizations, large national chains, or locally-owned businesses. Classrooms within these programs are typically organized by children's age group—with separate spaces for infants, toddlers, older preschoolers, and school-age children—and most rooms contain at least a lead teacher and sometimes a teacher's aide. 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).

The home-based sector, in contrast, is lightly or entirely unregulated, and its workers care for one or more children in the provider's home or in the home of the child(ren). This paper refers to care that takes place in the home of the provider as "home-based" care and that which takes place in the child(ren)'s home as "private household" care. There are three sub-sectors within the home-based market: listed, unlisted and paid, and unlisted and unpaid. The term "listed" refers to operators of licensed and regulated home-based child care programs— usually functioning as small, independent businesses—that appear on state or national lists of early care and education services. Those within the "unlisted" category are referred to as "informal" caregivers, because they are unlicensed and unregulated, generally work within the home of the family requesting a caregiver, and are either unpaid or paid at a negotiated wage. In total, there are 3.8 million home-based/private household child care workers, of which 2.7 million are classified as "unlisted and unpaid," 919,000 are "unlisted and paid," and 118,000 are "listed" (National Survey of Early Care and Education Project Team, 2016).

How has the supply of child care evolved over the past few decades? Figure 2 presents the time series in the number of child care industry workers and establishments in the private (Panel A) and public (Panel B) sectors over the period 1990 to 2019. These data are drawn from the Quarterly Census of Employment and Wages (QCEW), an establishment-level database of employment and wage information for workers covered by state unemployment insurance (UI) laws as well as the Unemployment Compensation for Federal Employees program.[6] The supply of child care in the U.S. has grown considerably over time. The number private-sector workers (establishments) rose from 391,000 (35,000) in 1990 to 920,000 (73,000) by 2019. Interestingly, although the public-sector is much smaller, it experienced more robust growth over this period, with the number of workers (establishments) rising from 4,000 (79) to 21,000 (724).

The nearly 30-year uninterpreted increase in child care supply shown in Figure 2 was suddenly halted in early-2020 because of the Covid-19 pandemic. Indeed, the pandemic and its consequent economic contraction immediately and substantially reduced the supply of child care. As shown in Figure 3, which uses the Occupational Employment Survey to plot the number of child care industry employees over the first nine months of 2019 and 2020, the industry lost over 300,000 workers between March and April of 2020—a number that was not recuperated as of September, nor by the end of the year (Malik, 2021). Furthermore, evidence of large-scale program closures is abundant. For example, an early-pandemic survey found that 60% of parents reported that their child care program had closed (Bipartisan Policy Center, 2020). A more recent study by Child Care Aware of America (2022) finds that 8,899 center-based providers and 6,957 home-based providers closed between December of 2019 and March of 2021.[7]

Tables 3 and 4 provide a descriptive portrait of the child care workforce. Table 3 pools data from the ACS for the years 2017 to 2019 to compare child care workers in four sectors (i.e., private households, home-based, center-based, and school-based) with their female counterparts employed in all other industries. Those employed in the child care industry are slightly younger; more likely to be black, Hispanic, and foreign born; and more likely to have preschool-age children than those employed elsewhere. In addition, child care workers as a whole have fewer

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[6]All of the QCEW analyses are based on workers in the "child day care services" industry. Included here are UI-covered individuals working in the center- and home-based sectors. The definition likely (but not altogether) excludes informal caregivers, such as neighbors, relatives, and nannies, as these individuals may not be UI-covered.

[7]Several policies were enacted during the pandemic in an attempt to mitigate the spread of Covid-19, chief among them were states' stay-at-home orders (SAHOs). States also changed their child care regulations, primarily by reducing maximum classroom group sizes and child-to-staff ratios, again in an attempt to reduce interactions between people in child care programs. However, both policies may have inadvertently contributed to the reduction in child care supply. Indeed, a study by Ali et al. (2021b) finds that the enactment of a SAHO reduced the number of center-based job postings by over 16% per day—implying a reduction in labor demand. Another study by Ali et al. (2021a) finds that labor demand fell by 6% after the enactment of a group size regulation and that reducing the child-to-staff ratio by one standard deviation led to an additional 1% reduction in demand.

years of education and earn substantially lower wages. Approximately 28% of child care workers have a bachelor's degree (compared to 37% among all other workers), and their median hourly wage is $11.35 (compared to $17.97). Nevertheless, there is substantial variation in caregiver education and wages by sector. Those in the school- and center-based sectors are more likely to have a bachelor's degree, along with higher wages, than their counterparts employed by private households or in the home-based sector.

Table 4 provides a detailed work history and education profile of assistant and lead teachers in center-based programs using data from the 2019 National Survey of Early Care and Education (NSECE). Such individuals have long child care employment histories: 35% of assistant teachers and 50% of lead teachers have more than 10 years of early care work experience. In addition, it appears that many workers remain employed at the same provider for long periods: fully 34% of assistant teachers and 48% of lead teachers have been at their current program for more than three years. The NSECE also provides nuanced information on workers' education and skills. Among lead teachers with a college degree, more than half majored in early childhood education (ECE), while another 20% have an education-related degree. The data also suggest that it is common for teachers to invest in a variety of education-related credentials—including the Child Development Associate (CDA) and state teaching certificates—and are involved in a wide range of professional development activities (e.g., workshop attendance and mentoring).

As discussed above, child care industry wages are substantially lower than those in other industries. Have child care employees seen their earnings increase over the past few decades? Figures 4 and 5 investigate this question. The former uses the QCEW to show the time series in annual earnings for public- and private-sector workers between 1990 and 2019. Although public-sector workers earn more than their private-sector counterparts, the trend in earnings is largely consistent: both groups experienced rising earnings throughout most of the 1990s, followed by flat or falling earnings since the early-2000s. The earnings of public child care workers increased from about $23,000 in 1990 to $31,000 in 2019 (or 35%), while those for private workers grew from $18,000 to $24,000 (or 33%). Again, most of this increase occurred before 2000. The recent stagnation is confirmed in Figure 5, which uses the 2005 to 2019 ACS to plot sector-specific median hourly wages for child care workers. Although there is substantial wage variation across the sectors, the time series are very consistent, showing little wage growth over the past few years. The flat wages of child care workers was first documented by Blau (1992), whose data covered

the years 1976 to 1986, and later by Herbst (2018b), whose data covered the years 1990 to 2013.

A supply-side issue receiving increased attention in recent years is the high rate of staff turnover within the child care industry.[8] One of the earliest studies documenting this phenomenon is from Bassok et al. (2013), who analyze March Current Population Survey (CPS) data over the years 1990 to 2010. They find annual turnover rates close to 25%, or four times higher than that within elementary schools. More recent work by Brown and Herbst (2022) use the Quarterly Workforce Indicators (QWI) database to examine turnover rates between 2000 and 2019 in the child care and other low-wage industries. They estimate a child care turnover rate of 12% per quarter, which is substantially higher than that in elementary and secondary schools but also lower than in the clothing and restaurant industries. Another recent paper by Bassok et al. (2021b) analyzes data on lead teachers in all publicly funded, center-based programs in Louisiana for the school years 2017-2018 and 2018-2019. They estimate an annual turnover rate of 37%. Interestingly, they find that most of the turnover is driven by lead teachers leaving the ECE sector entirely, rather than moving to a different program in the same or different ECE sector.[9]

3   Child Care and Development Fund

3.1   Background on and Evolution of the CCDF

The 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA)—also known as welfare reform—reorganized and expanded the patchwork child care subsidy system in the U.S.[10] In particular, Congress consolidated several preexisting subsidy programs into a single block grant, the Child Care and Development Fund (CCDF), and increased federal expenditures for child care assistance. Welfare reform allocated $21 billion for child care assistance over the first seven years, 70% of which was earmarked to subsidize child care costs for families receiving welfare or transitioning into work (Herbst and Tekin, 2010). Given that the CCDF is a close-ended block grant, there is no legal obligation to serve all eligible families, and as the research review below will show, an

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[8]Child care turnover rates are comparatively high, despite the fact that, as discussed above, many workers remain with the same employer for long periods

[9]A recent paper by Bassok et al. (2021a) examines Virginia's Teacher Recognition Program, which provides financial incentives to child care teachers in an attempt to reduce turnover. Consistent with previous work, the paper finds high rates of teacher turnover: 19% of teachers turned over in eight months. However, the $1,500 financial incentive to remain at the program led to large reductions in turnover. Among those in center-based settings, for example, the payment reduced turnover by 50%.

[10]For more information on the CCDF's original legislative language as well as the law's reauthorization in 2014, see https://www.federalregister.gov/documents/2016/09/30/2016-22986/child-care-and-development-fund-ccdf-program and https://www.acf.hhs.gov/occ/ccdf-reauthorization.

overwhelming majority of eligible families do not receive assistance. Such families for whom funds are not available are typically placed on a waiting list.

To be eligible for a subsidy, families must have at least one child under age 13, have an income below 85% of the state median income (SMI) for a given family size, and be employed or participate in a state-defined work activity (e.g., education, job search, or job training). Subsidized child care is available to eligible families largely through vouchers and contracts with providers. However, states are given substantial latitude to establish key program parameters, including income eligibility thresholds, benefit reimbursement rates, and co-payment rates. Market rate surveys are conducted periodically to determine reimbursement rates (i.e., payment rates) for providers, which establish the highest-price child care that a family can purchase using the subsidy. States are expected to establish reimbursement rates at a level sufficient to allow providers to meet health and safety, quality, staffing, and other requirements stipulated under the CCDF. The reimbursement rates vary by provider-type, age of the child, and the amount of care used. The family's co-payment is applied toward the maximum amount a state will pay the provider for its services (i.e., the reimbursement rate). It depends as well on a number of factors, such as the provider-type, family income and size, and the number and ages of children in the family. States establish co-payment amounts in flat dollar terms, as a share of family income, or as a share of market prices, and they are allowed to waive co-payments entirely for families meeting certain criteria.

One of the CCDF's most important design features is the principle of "parental choice," in which parents can utilize subsidies to purchase child care services from most legally-operating providers, including unregulated caregivers. The increased flexibility through parental choice enables parents to quickly find caregivers and transition into employment, but it raises questions over whether subsidized children participate in high-quality arrangements (Herbst and Tekin, 2016). Although in FY 2019 only 10% of children nationwide participated in an unregulated provider, in some states this number is quite high. For example, 66% of children in Hawaii, 35% in Alabama, and 34% in Nevada were enrolled in an unregulated provider.

The first, and only, time the CCDF was reauthorized was in 2014. The reauthorization did a number of things to improve the ease of accessing and maintaining subsidies as well as to enhance the safety and quality of providers serving subsidized children. First, the legislation requires providers to undergo background checks and on-site inspections and stipulates provider training requirements in 10 topic areas, including CPR and first aid. Second,

states are required to provide parents with specific information on local care options and other services, primarily through the quality rating and improvement system (QRIS), but also through states' inspection and incident (i.e., injury, abuse, and death) reports. Finally, the legislation mandates that states establish 12-month eligibility periods for subsidies regardless of temporary changes in parents' employment status or income levels.

Additional funding was also made available for the CCDF through three separate pieces of Covid-19 legislation: the Coronavirus Aid, Relief, and Economic Security (CARES) Act of 2020 made an additional $3.5 billion in discretionary funding available; the Coronavirus Response and Relief Supplemental Appropriations (CRRSA) Act of 2020 made and additional $10 billion in discretionary funding available; and the American Rescue Plan (ARP) Act of 2021 included an additional $15 billion in discretionary and created a $24 billion child care stabilization grant program. The stabilization fund allows states to award to grants to individual child care providers for the purpose of defraying personnel costs (e.g., salaries and benefits); rent, utilities, and facility maintenance; personal protective equipment, cleaning and sanitization of supplies and services; and the cost of mental health supports for children and employees. States are encouraged to provide grants to providers for at least 6 months and to prioritize "small" child care programs. All stabilization funds must be obligated by September 30, 2022, and they must be spent by September 30, 2023.

In fiscal year (FY) 2019, combined federal and state expenditures through the CCDF totaled $10.3 billion, of which $7.7 billion (or 75% of the total) was allocated to direct service provision and $1.2 billion (or 12% of the total) was allocated to various quality improvement activities. The program in 2019 served 1.4 million children and 858,000 families each month, on average. By comparison, the CCDF served 1.8 million children and one million families each month in FY 2000. Thus, it appears that the size of the subsidy caseload has remained fairly constant over time. However, the number of providers (centers) serving subsidized children declined over this period, from 807,000 (108,000) in FY 2000 to 244,000 (72,000) in FY 2019.[11]

3.2 Theoretical Considerations

In papers studying the impact of subsidy receipt on children's developmental outcomes, the empirical models are generally informed by the standard ability production function whose inputs include purchased goods (e.g., food,

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[11]See here for additional administrative data on the CCDF: https://www.acf.hhs.gov/occ/data-0

books, and medical care), the quality of non-parental child care, and the market and non-market time use of parents. Instead of entering the production function as a direct input, a child care subsidy is assumed to influence child development indirectly by influencing the mix of inputs toward purchased goods, non-parental care, and the time allocation of parents (Herbst and Tekin, 2010, 2016). This assumption seems plausible because a child care subsidy is an in-kind benefit that enters parents' optimization problem through the budget and time constraints. Therefore, a subsidy-induced decrease in the price of child care is predicted to increase the likelihood that a parent will work and use paid non-parental care by increasing the effective wage rate and making such care relatively cheaper.

As stated above, a subsidy can influence child development through several mechanisms, the first of which is by altering the income available for private consumption and the purchase of goods to enhance child ability. This stems from the simple idea that these benefits free up financial resources that can be used for purchases other than child care. It is straightforward to show that the effect of an in-kind benefit is equivalent to a pure income transfer, since it causes a parallel, outward shift in the budget constraint. Parents will therefore respond by increasing both private consumption and purchases for child-enhancing goods and services. Second, child care subsidies reduce the amount of time children spend in parental care, while increasing the amount of time in non-parental child care arrangements. Although the increased spending on quality-enhancing goods is predicted to be beneficial for child development, the impact of reduced maternal time depends on the relative quality of maternal versus non-parental care. A key determinant of this relative productivity is the way in which the CCDF influences access to high-quality providers, a topic that will be discussed in the literature review. Empirically, studies substitute subsidy receipt for the non-market time of parents and the quality of non-parental caregivers, thereby allowing child outcomes to be modelled as a function of subsidy receipt.

3.3   Empirical Evidence on the CCDF

This section provides a comprehensive review of the literature on CCDF child care subsidies. I focus the discussion on several keys areas, beginning with studies that estimate subsidy take-up rates, the determinants of subsidy receipt, and the length of subsidy spells. I then turn to the primary areas of policy interest, summarizing the evidence on the impact of subsidy receipt on families' child care choices, quality, maternal employment, and

family well-being. The section on family well-being covers research on children's cognitive and social-emotional development and physical health as well as mothers' mental health and parenting practices. As discussed in the previous section, the studies on mode choice, quality, and employment are critical for understanding how the CCDF influences child and maternal well-being. Although most of the outcomes-based research relies on a small number of data sources, it is quite varied regarding how the counterfactuals (i.e., the comparison groups) are defined in the measures of subsidy receipt and how impacts are empirically identified. Thus, I pay close attention to these aspects of the research, so that readers can assess both the credibility of the study designs and the interpretation of results.

3.3.1   Subsidy Take-Up and Predictors of Receipt

One of the first active lines of subsidy research—initiated shortly after the PROWRA was enacted—was to estimate the share of eligible families receiving assistance (i.e., the take-up rate) and to understand the family-level determinants of subsidy receipt. Although it appeared that states were serving large numbers of children each given month, the initial evidence consistently showed that only 12% to 15% of eligible children receive assistance (Isaacs, 1999). Results from another early analysis by U.S. General Accounting Office (1999) confirm this, estimating an average take-up rate of no more than 15%. Finally, using the 2002 wave of the National Survey of America's Families (NSAF), Herbst (2008b) calculates eligibility and take-up rates for households with children ages 0 to 12. The study finds that approximately 28% of households were eligible for CCDF subsidies, with a take-up of 14%. Among female-headed households, the study estimates substantially higher eligibility and take-up rates: 52% and 23%, respectively. These national estimates, however, were shown to mask substantial variation across states. For example, one study of 17 states finds that a small number of states served between 20% and 25% of eligible children, while a larger number of states served no more than 15% of children (Collins et al., 2000). Another study of Illinois, Maryland, and Massachusetts estimates take-up rates as low 24% in Maryland and as high as 35% in Illinois and Massachusetts (Lee et al., 2004). Finally, a study of single mothers in Rhode Island finds that nearly 40% of eligible mothers received a subsidy (Witte and Queralt, 2002).

As mentioned above, another early line of research focused on the determinants of subsidy receipt (e.g., Myers et al., 2002; Danziger et al., 2004; Durfee and Meyers, 2006; Tekin, 2005, 2007a; Blau and Tekin, 2007; Herbst,

2008b; Johnson et al., 2011). Although some of these studies compare the characteristics of subsidy recipients to broad groups of non-recipients, most draw comparisons within a group of potentially eligible individuals, as defined by marital status or educational attainment. Results from these studies are remarkably consistent. Subsidy recipients are younger and more likely to be unmarried, U.S.-born, black, and have more preschool-age children in the household. In addition, recipients are more likely to be both employed and receive a form a cash assistance (e.g., TANF and SNAP), while also less likely to be uninsured (and more likely to be insured by a public program). Participation in other work-related activities, including the receipt of job search assistance and enrollment in job training or formal education, is also more prevalent among subsidy recipients. Finally, such individuals appear to have higher levels of completed education, including higher rates of high school completion and some college experience.

3.3.2   Length of Subsidy Spells

Given that low-income children are in general less likely to have stable child care arrangements, one question is whether families receiving subsidies experience more stability than similarly-disadvantaged non-recipients. This issue has been studied using three somewhat indirect approaches, all of which attempt to calculate the amount of time families receive subsidies, under the assumption that longer "spells" of receipt might translate into more stable child care arrangements. The first approach consists of simply calculating the total number of months of subsidized care within some time period. For example, using Wisconsin administrative data between 2000 and 2005, Ha (2009) finds that while 11% of the subsidy-eligible families did not receive any assistance during the 48-month study period (and another 21% received one to six months of assistance), only 33% received 25 months or more of subsidies during the study period. The second approach examines the length of subsidized care "spells" children experience. Results from this work show that such spells are short. For example, one study of 35 states finds that the median spell length is approximately six months, although there is substantial cross-state variation, ranging from three months in Nevada to 13 months in the District of Columbia (Swenson, 2014).[12]

The final strand of literature examines both the predictors of short spells of subsidy receipt as well as child care transitions during periods of subsidy receipt or after a spell has ended. One study from Illinois and New York shows

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[12]Such spell lengths are consistent with state-specific studies. For example, one analysis from Minnesota finds that the median length of subsidy spells is about eight months (Davis et al., 2014).

that a number of programmatic and administrative factors are related to exiting the subsidy program, including the length of the eligibility period, ease of the application process, and approval wait times (Henly et al., 2017). Such findings are important given that subsidy instability is linked with increased material hardship (Kim and Henly, 2021). Nevertheless, other work finds relatively strong evidence of child care arrangement stability during and even after a spell of subsidy receipt. For example, a randomized controlled trial conducted in Cook County, Illinois (which assigned families to receive or not receive a subsidy) finds that 92% of children receiving subsidies never experienced an interruption in their care arrangement, compared to 89% of children who did not receive subsidies (Michalopoulos et al., 2011). In addition, the evidence suggests that many children remain in the same arrangement after a subsidy spell has ended. One study from Wisconsin finds that 37% of children who exited and then returned to the subsidy system did so with the same provider (Ha et al., 2012), while a study from Minnesota finds that approximately half did so (Davis et al., 2014).

3.3.3   Child Care Choices

Another line of research examines the relationship between subsidy receipt and families' child care choices. This work is important because, as discussed above, one of the mechanisms through which subsidies is predicted to influence child development is by altering families' child care choices, specifically by encouraging a shift from informal (including parental) to formal child care arrangements (Herbst and Tekin, 2010, 2016). If changes in care quality accompany changes in mode choice, such a shift could affect child development. The most recent CCDF administrative data indicate that 88% of children receiving subsidies are cared for in regulated settings, and that the predominant arrangement-type is center-based care (75%) followed by home-based care (20%)[13]. These program data are consistent with survey-based descriptive studies that simply compare the child care arrangements of subsidy recipients and non-recipients. Specifically, this work finds that recipients are more likely to use center- and home-based care, while non-recipients are more likely to rely on parents and other relatives (Herbst, 2008b; Herbst and Tekin, 2010). Indeed, among those receiving a subsidy, center-based care is by far the predominant mode choice. Such patterns appear in other descriptive studies of demographically-defined subsets of recipients (e.g., Weinraub et al., 2005). Greater use of center-based arrangements—and regulated providers more generally—

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[13]See: https://www.acf.hhs.gov/occ/data/fy-2019-preliminary-data-table-3

has also been found in a pair studies that compare families receiving a subsidy with either the same families when they were on the waitlist (Forry, 2009) or with a different set of families on the waitlist (Brooks et al., 2002).

Finally, a number of regression-based studies exploit survey data on actual subsidy receipt to estimate the impact of subsidies on child care choices. For example, Markowitz et al. (2014) estimate multinomial choice models using the Fragile Families and Child Well-Being Survey (FFCWS) and the Birth Cohort of the Early Childhood Longitudinal Study (ECLS-B). The paper finds consistent evidence that subsidy recipients are more likely to use center-based care than friend and relative care, but inconsistent evidence on the relative use of center- and home-based care. In another paper, Tekin (2005) uses the 1999 National Survey of America's Families (NSAF) to estimate the impact of subsidy receipt on the joint employment and child care mode decisions of single mothers, using a discrete random effects multinomial choice model. Results from this analysis suggest that non-working mothers are encouraged not only to shift from parental care to work and center-based care, but also from relative to center-based care when they receive a subsidy.

3.3.4 Child Care Quality

The studies discussed above indicate that subsidy receipt is associated with greater use of licensed and regulated child care providers, primarily center-based care. To what extent is the subsidy-driven shift toward formal child care arrangements associated with the use of higher-quality care? This question is critical for understanding the potential impact of CCDF-type subsidies on children's developmental outcomes. If the shift toward center-based care exposes subsidized children to higher-quality caregivers and environments, and if higher-quality care is associated with improved developmental outcomes, one might expect children to benefit from receiving a CCDF subsidy. The best available evidence suggests that formal arrangements are of higher-quality than informal ones (Bassok et al., 2016), and that center-based providers (particularly Head Start programs) are rated more highly than any other non-parental setting (Flood et al., 2021). Furthermore, results from credibly identified studies show that higher-quality early education settings—whether measured by the quality of teacher-child interactions (Araujo et al., 2019), the structural features of the setting (Chetty et al., 2011), or ERS-based global quality (Auger et al., 2014)—have modest short-run effects on child development and school readiness as well as long-run effects on schooling and labor market outcomes. Thus, one might reasonably conclude that child care subsidies have positive

effects on child development because they are exposed to higher-quality non-parental arrangements.

However, the earliest studies on the association between subsidy receipt and provider quality found either no relationship in a sample of center-based classrooms (Jones-Branch et al., 2004) and a sample of mixed arrangement settings (Weinraub et al., 2005) or a negative relationship in a sample of home-based providers (Raikes et al., 2005). However, the credibility of the results is hampered by the fact that the samples are extremely small and that little attention is given to the possibility that subsidy recipients (or subsidized classrooms) differ systematically from their unsubsidized counterparts on a range of characteristics that influences quality. In addition, while the studies by Jones-Branch et al. (2004) and Raikes et al. (2005) compare recipients and non-recipients within the same type of provider (i.e., center or home), the study by Weinraub et al. (2005) conducts its comparison across a mixed set of three distinct provider-types, thereby potentially confounding subsidy-driven differences in quality with underlying sectoral differences in quality.

More recently, a few studies have exploited large, nationally representative samples, paid more careful attention to issues around selection into subsidy receipt—albeit imperfectly—and performed within-sector comparisons of quality between recipients and non-recipients. Results from these studies are remarkably consistent. First, Ryan et al. (2011) use the Child Care Supplement to the FFCWS to examine quality differences in a sample of three-year-olds, estimating richly conditioned OLS and propensity score matching models. Overall, the results suggest that subsidized families use higher-quality care than unsubsidized families, a result that is explained by the greater use of center-based arrangements among recipients. However, within-sector comparisons reveal that families using subsidies purchased higher-quality home-based care but lower-quality center-based care than non-recipients. The latter result is driven by the possibility that similarly disadvantaged children not receiving subsidies are more likely to enroll in higher-quality publicly-provided care arrangements, including Head Start and pre-k programs.

To further probe this latter result, Johnson et al. (2012) examine quality differences in a sample of preschool-age children using the ECLS-B, also relying on OLS and propensity score matching regressions. A key feature of this study is that it compares the quality of care chosen by subsidy recipients with that among those attending publicly-provided services. The results once again indicate that subsidized families use higher-quality care than their unsubsidized counterparts (who use a mix of center- and home-based arrangements). However, when compared with those in Head Start or pre-k programs, subsidy recipients attend providers rated to be of significantly lower quality.

A final study by Johnson et al. (2019) also uses the ECLS-B, but compares the structural features of center-based classrooms rather than ERS-based measures of quality. Specifically, the study compares subsidized classrooms with unsubsidized classrooms serving low-income children that do and do not receive public funding through Head Start or pre-k. The study finds few differences across subsidized and unsubsidized classrooms, but the differences that do emerge are consistent with previous work: subsidized center-based classrooms are of lower-quality than Head Start or pre-k classrooms, but are of higher-quality than other (non-publicly-funded) classrooms.

3.3.5 Maternal Employment

Perhaps one of the earliest and largest literatures to develop following the creation of the CCDF examines whether these subsidies influence maternal employment. As discussed above, interest in employment stems primarily from program's explicit goal to help welfare recipients transition into the labor force. Indeed, eligibility for child care assistance is conditioned on fulfilling a work activity requirement, which, among other things, includes paid employment. Even without a work requirement, however, a child care subsidy would be expected to increase maternal employment, given that it lowers the fixed costs associated with work, thereby increasing the net (financial) returns to such activity. As a result, the literature on maternal employment is as much about testing whether the CCDF is working as intended as it is a test of the more general question of whether a child care subsidy encourages parents to work. In addition, this literature is important for understanding yet another potential mechanism through which CCDF-type subsidies influence children's development. Early maternal employment by itself has been shown to have complicated and potentially conflicting effects on child outcomes, as found in the large literature in this area (e.g., Herbst, 2017a; Brooks-Gunn et al., 2002), and so it is natural to examine whether a subsidy program encourages maternal employment because of its possible spillovers to child well-being.

The studies in this literature are diverse with respect to the data sources used, how CCDF subsidies are operationalized in the model, and the empirical methodologies utilized. Some of these studies rely on a single cross-section of survey data from one state (e.g., Myers et al., 2002) or a cross-section of state administrative data (e.g., Zanoni and Weinberger, 2015); others rely on a cross-section of nationally representative survey data (e.g., Blau and Tekin, 2007; Herbst and Tekin, 2016); and still others rely repeated cross-sections of nationally representative survey data (e.g., Herbst, 2008a). In addition, most studies exploit one or more survey items to construct a measure

of subsidy receipt through a binary indicator that equals one if a given child (or family) receives a CCDF subsidy (e.g., Myers et al., 2002; Tekin, 2005; Blau and Tekin, 2007; Herbst and Tekin, 2011b, 2016). Such studies capture the average treatment (or local average treatment) effect on employment of receiving a child care subsidy, and these models have been estimated by a two-step selection-corrected employment equation or an instrumental variables (IV) approach. A few other studies estimate the impact of an increase in state-level CCDF spending (per child ages 0 to 12), which captures the intent-to-treat difference-in-differences (DD) effect on mothers' employment (e.g., Herbst, 2008a, 2010).

Despite their many differences, results from these studies are remarkably consistent: mothers receiving a subsidy are more likely to be employed, to be working without receiving welfare, and to be engaged in standard-hour work than their unsubsidized counterparts. For example, in one of the earliest studies, Blau and Tekin (2007) use the 1999 NSAF combined with an IV methodology to show that subsidy receipt increases the employment rate of single mothers by 33 percentage points, while reducing the rate of unemployment by 20 percentage points. In another study using the ECLS-K along with a different IV strategy, Herbst and Tekin (2016) show that subsidy receipt increases single mothers' employment rate by 11 percentage points. Furthermore, receipt of a subsidy increases the likelihood that such mothers work standard hours (i.e., non-nights and -weekends) by seven percentage points (Tekin, 2007b). The DD-based studies show similarly large employment effects, highlighted by Herbst (2008a), who uses the March CPS between 1985 and 2004 to find that a $1,000 increase in CCDF spending (per child ages 0-12) increases the likelihood of engaging in any work for single mothers by 16 percentage points. Finally, subsidies enable low-skilled mothers to invest in their own human capital by enrolling in college-level courses and participating in job training programs (Herbst and Tekin, 2011b).

3.3.6 Family Well-Being

The final set of studies in this literature examines the impact of CCDF subsidies on family well-being. Like the quality literature discussed above, the studies on family well-being are varied with respect to the outcomes and data sources examined as well as the empirical strategies utilized. The well-being outcomes in these studies are defined broadly to include young children's cognitive and social-emotional development and physical health as well as mothers' mental health and parenting practices. In particular, this work studies children's early literacy and

math skills, behavior problems and interpersonal skills, and measures of overweight and obesity, while the maternal outcomes include indices of anxiety and depression, parenting stress, responsive and sensitive parenting, and self-reported life satisfaction. These outcomes are usually drawn from the nationally representative surveys ECLS-B, ECLS-K, and FFCWS, and the studies using these data generally rely on cross-sectional variation in a binary indicator of subsidy receipt. However, at least one study relies on administrative data (Zanoni and Johnson, 2019), and another study relies on repeated cross-sections of a national survey of consumer attitudes (Herbst and Tekin, 2014). The empirical strategies range from OLS regressions with rich controls for child and parent characteristics and propensity score matching methods to dynamic structural models and IV estimators.

The analysis by Herbst and Tekin (2010) represents the first attempt to examine the impact of subsidy receipt on low-income children's cognitive and social-emotional development. Combining data from the ECLS-K with an IV strategy that uses county-of-residence fixed effects as the instruments, the paper finds that subsidy receipt in the year before kindergarten is associated with lower scores on reading and math tests and higher scores on indices of behavior problems at kindergarten entry, with some of these effects persisting until the end of kindergarten. Specifically, subsidized children score 0.30 standard deviations lower on a test of early reading ability, 0.26 standard deviations lower on a test of math ability, and 0.30 standard deviations lower on a measure of self-control.

Follow-up work by Johnson et al. (2013) relies on the ECLS-B to study the impact of subsidy receipt among four-year-olds in a value-added regression framework. The study finds that subsidy receipt when children are preschool-aged is not associated with reading or social-emotional measures of school readiness in kindergarten, conditional on previously measured abilities. However, the paper finds some evidence that subsidy receipt is associated with lower math scores among children attending non-public center-based arrangements. Additional work using the ECLS-B from Hawkinson et al. (2013), which estimates both value-added as well as propensity score matching regressions, similarly finds that child care subsidy use during the preschool year is negatively associated with children's math skills at kindergarten entry. A final paper using the ECLS-B by Johnson et al. (2014) compares the impact of subsidy receipt across children of immigrants and natives. Results suggest that among children of immigrants, subsidized center-based care is positively associated with reading test scores (compared to those in home-based care). However, among children of native-born parents, those in subsidized center care score lower on a test of math ability and display more externalizing behavior problems than their unsubsidized counterparts.[14]

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[14]One final study is noteworthy. Zanoni and Johnson (2019) use administrative data from Chicago to examine whether subsidy

In their own follow-up work, Herbst and Tekin (2016) return to the ECLS-K to study the impact of subsidy receipt in the year before kindergarten entry on kindergarten year outcomes. This paper uses a different IV strategy, leveraging plausibly exogenous variation in subsidy receipt through the distance that low-income families must travel from home in order to reach the nearest social service agency that administers the subsidy application process. Therefore, the IV estimates reflect the difference in the developmental outcomes of otherwise similar children who differ in their propensity to receive a subsidy because their family resides different distances from a social service agency. The paper finds sizeable negative effects on cognitive ability tests and teacher-reported behavior measures in the fall and spring of kindergarten. For example, the estimates suggest that subsidized children score 0.4 and 0.3 standard deviations lower on tests of reading and math ability, respectively, in the fall of kindergarten. Results also suggest that the adverse effects of subsidy receipt are concentrated on children of higher-skilled single mothers, but that these negative effects do not persist beyond the kindergarten year.

In a series of subsequent studies—which also rely on the ECLS-K and similar estimation strategies—Herbst and Tekin (2011a) and Herbst and Tekin (2012) show that children receiving a subsidy have adverse health outcomes, in the form of higher body mass indexes and a higher probability of being overweight and obese. In addition, Herbst and Tekin (2014) provide the only evidence on the impact of subsidy receipt on maternal health and the quality of child-parent interactions. The paper uses data from three nationally representative surveys, and the authors attempt to handle the possibility of non-random selection into subsidy receipt by using several identification strategies both within and across the surveys. The results indicate that child care subsidies are associated with worse maternal health and poorer interactions between parents and children. In particular, subsidized mothers report lower levels of overall health and are more likely to show symptoms consistent with anxiety, depression, and parenting stress. Such mothers also reveal more psychological and physical aggression toward their children and are more likely to utilize spanking as a disciplinary tool.

3.4 Structural Models of Child Care Subsidies

Beyond the CCDF studies summarized above, there is a set of recent papers that estimate structural models of the market for early childhood education, thereby allowing for a variety of subsidy policy counterfactuals to be

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receipt influences reading and math test scores and school absences in third through eighth grades. The findings suggest that subsidies are associated with reduced absenteeism in seventh and eighth grade and with increased reading and math scores in third grade.

tested. Such papers are critically important for assessing alternative and ex ante policy environments, and as a result, they can be responsive to reforms proposed by state and federal policymakers. For example, Griffen (2019) simulates the impact of changes to the CCDF's eligibility, reimbursement, and co-payment policies, finding that maternal employment is predicted to increase substantially under a variety of reforms with negligible effects on child development. In addition, Guner et al. (2020) estimate an equilibrium model of U.S. employment-conditioned (e.g., child care subsidies) and non-conditioned (e.g., child tax credits) means-tested and universal policies. The authors find that a system of universal child care would increase maternal employment by 10% and hours by 2%, while an equivalent expansion of child tax credits would reduce employment by more than 2% and hours by over 1%. Finally, Berlinski et al. (2020) and Borowsky et al. (2022) estimate equilibrium models of the child care market to simulate a range of policies that either subsidize parent costs or regulate the provision of quality. For example, Borowsky et al. (2022) simulate the impact of two recent Congressional proposals to expand child care subsidies: a broad-based subsidy similar to that included in the Build Back Better Act (BBBA) and a more narrow subsidy along the lines in an alternative proposal by Senators Patty Murray and Tim Kaine.[15] This paper estimates effects on families' care costs and choices, maternal labor supply, child care workers' wages, and market prices. Under the broad-based subsidy, families in the bottom income quintile are predicted to experience a 76% reduction in care costs, a 34 percentage point increase in the likelihood of using center-based services, and an 18 percentage point increase in the likelihood of full-time maternal employment. Furthermore, teachers' hourly wages are predicted to rise between 14% and 29%, depending on the particular subsidy policy.

3.5 Discussion

Writing a few years after the CCDF's creation in 1996, Blau (2001) argued that all child care subsidy programs can be categorized along two dimensions. The first dimension concerns to what extent the program requires a parent to work, with one end of spectrum reserved for programs that require full-time employment and the other end reserved for programs without any such requirement. The second dimension characterizes the quality standards for providers in order to serve subsidized children, ranging from no quality requirements to very stringent requirements.

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[15]Briefly, the BBBA-type subsidy includes a parental work activity requirement and limits family payments for child care to no more than 7% of income among families up to 250% of national median income. The narrow subsidy also includes a work requirement and caps families' child care expenses at 7% income but extends eligibility up to only 85% of national median income. Both policies are structured as entitlements.

This section summarized the research base on the CCDF, a child care subsidy program that enacts strict parental work requirements but imposes relatively few quality stipulations on providers. Indeed, eligibility for the CCDF is conditioned on parental engagement in a state-defined work activity—with many states requiring a certain number of hours of formal employment each week—while most child care providers—even some unregulated services—are eligible to serve subsidized children. Although the 2014 reauthorization of the CCDF enacted some important safety requirements on providers, the basic work activity and (flexible) care choice framework remains intact. Together, these characteristics imply that CCDF subsidies are likely to lead to higher employment rates among disadvantaged mothers, but are predicated to have ambiguous effects on the demand for quality and child development. Below I summarize what the literature reveals about these outcomes, and I discuss some caveats that should be borne in mind when interpreting the results.

Much of the literature on child care choices, quality, and family well-being—arguably the key outcomes for understanding any subsidy program—relies on a small number of surveys that were fielded during the early days of the CCDF: the first wave of the ECLS-B was fielded in 2001 and 2002, the first wave of the ECLS-K was fielded in the fall of 1998, and families first entered the FFCWS in 1998. Although some of the studies reviewed above rely on more contemporary data, with the exception of the 2008 cohort of the ECLS-K—which to my knowledge has not been used to study child care subsidies—researchers currently lack access to newer data sources that may allow for updated analyses of the CCDF. Thus, one concern with the existing literature is whether the results summarized here remain relevant to the current system. Given the changes in the CCDF caseload over time as well as the policy's reauthorization in 2014, which may have led to some quality improvements, there are reasons to be skeptical about this.

Another concern with the literature relates to selection issues. First, most studies condition the analysis sample on mothers' marital status or educational attainment. Given that these characteristics are likely to be correlated with both the propensity to receive a subsidy and the outcomes of interest, using them to select which units are studied may introduce a form of sample selection bias. Second, child care subsidies are not distributed randomly to families, but rather some combination of family characteristics and local government rationing decisions determine who receives such assistance. As a result, subsidy recipients may be different from non-recipients in a variety of ways that are unknown to the researcher, which may lead to a classic omitted variables problem. While all

studies in this literature recognize these problems—particularly the second one—attempts at mitigating potential biases have been uneven. Indeed, the identification strategies in previous work range from selection-on-observables methods like OLS regression and propensity scores to value-added, IV, and structural models. Thus, it is important to consider the variation across studies in the quality of the methodology used to identify subsidy effects.

With these caveats in mind, the available evidence provides some clarity about who receives a subsidy and its impact on families. First, the take-up rate for child care subsidies was low during the early days of the CCDF, and it remains low today (Chien, 2021). The best evidence suggests that approximately 15% of eligibile families receive a CCDF subsidy—far below the share of eligible families served by Head Start and pre-k programs. Second, the length of a typical subsidy spell is short—on the order of approximately six months—but the 2014 changes to the CCDF, which authorized 12 months of continuous subsidy receipt for families, may have lengthened subsidy spells. However, this is only speculation. Third, subsidy recipients are not systematically more disadvantaged than non-recipients. Indeed, the evidence suggests that they are more likely to be employed and have higher levels of education. Fourth, subsidies induce families to switch from using parental care and informal non-parental care to center-based providers, primarily. Fifth, subsidy recipients are more likely to be employed, to be engaged in standard-hour work, and to invest in their own human capital than their unsubsidized counterparts.

Less clear, however, is the impact of CCDF subsidies on child care quality and family well-being. Regarding quality, the lack clarity partially stems from whether the quality received by subsidized children is compared to that for all subsidized children, to those in other forms of publicly-supported programs (e.g., Head Start), or to those attending home-based arrangements. The most consistent result seems to be that subsidized children use higher-quality home-based providers but lower-quality center-based providers than similarly disadvantaged unsubsidized children, and that the center effect is likely explained by the greater use of Head Start and pre-k programs by children outside the subsidy system. Nevertheless, some caution should be exercised when interpreting these results, given that studies in the quality literature do not fully account for unobserved confounders. Regarding family-being, the bulk of the evidence indicates that subsidy receipt is negatively related to early childhood development, to some measures of children's physical health, and to parental well-being, although it should be noted that only one previous study examines parental well-being. While there is some evidence of neutral effects of the CCDF, no study to my knowledge shows that subsidies improve school readiness outcomes.

There are several plausible explanations for the negative effects of CCDF subsidies on child development. One explanation, informed by the research on quality, is that the CCDF may "crowd-out" participation in higher-quality publicly-provided ECE, especially in cases where low-income parents seek care services to support their employment. In other words, it may be the case that, in the absence of a child care subsidy, parents would have enrolled their children in higher-quality Head Start programs—for which they are also eligible—and that this substitution toward higher-quality care would have produced comparatively better outcomes. Again, this is just speculation, given that no study has explicitly addressed crowd-out with the CCDF, although at least two studies have uncovered evidence of crowd-out in the context of pre-k programs (Bassok et al., 2014; Brown, 2018). Another potential explanation, informed by the results in Herbst and Tekin (2014), is that receipt of a CCDF subsidy reduces maternal mental and physical health and worsens child-parent interactions in ways that are detrimental to child development. The CCDF's work requirement is the most obvious culprit for the reduction in maternal well-being. This line of thinking is supported in part by the large literature directly estimating the effect of early maternal employment on child development, which generally shows small negative effects (e.g., Brooks-Gunn et al., 2002). More relevant is a paper by Herbst (2017a), which shows that welfare reform's work requirements have negative effects on child development, with reductions maternal health and parental time investments in children identified as potential mechanisms.

4 Child Care Regulations

4.1 Overview of the Regulatory Landscape

Child care regulations in the U.S. are set and enforced at the state-level. They require providers to be licensed and to meet a series of minimum standards related to the physical attributes of the setting. As such, regulations are generally acknowledged to govern aspects of "structural" quality, or the observable (and thus measurable) features of a program, classroom, or home that are relatively static across time, children, and providers.[16] The main objective of regulations is to reduce the risk of harm to young children from exposure to low-quality non-parental caregivers. In particular, regulations attempt to prevent cognitive and social-emotional impairment, physical injury,

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[16]In contrast, "process" quality refers to children's contact and experiences with the people and objects in the child care environment. As a result, process quality is highly dynamic: it likely varies across teachers and classrooms, and it may depend as much on the needs of a given child as it does the skill-level of the teacher (Herbst, 2013)

and the spread of disease. Failure to meet the standards can result in fines or the denial of a license to operate.

Nearly all regulations can be organized into three categories of requirements for providers: health and safety, labor intensiveness, and staff qualifications. Those related to health and safety include immunizations, food safety, sanitation, ventilation and lighting, and physical equipment (e.g., playground equipment, tables and seating, and parking lot access). The two key requirements for labor intensiveness are maximum group sizes and child-to-staff ratios, while staff qualifications refer to the minimum work experience and education required of caregivers. In addition, such qualifications relate to any field-specific certifications (e.g., a Child Development Associate credential or state teaching certification) that may be required in addition to or instead of formal education or work experience as well as ongoing professional development activities. Such requirements vary extensively by state, program setting (i.e., center- versus home-based providers), children's age group, and type of staff. For example, infant and toddler classrooms are generally subject to tougher requirements on group sizes and ratios than those for older children, and lead teachers are required to have more experience and education than assistant teachers.

The data in Table 5 shed light on the substantial cross-state variation in the center-based regulatory environment (Ali et al., 2021a). Specifically, it presents the maximum group sizes and child-to-staff ratios for three-year-olds as well as the education requirements for assistant teachers, lead teachers, and directors prior to the Covid-19 pandemic. Fourteen states did not regulate group sizes, and among those that did, the requirement varied between eight and 30 children allowed per classroom. Child-to-staff ratios were regulated in all but one state, with the ratios ranging between seven and 15 children per caregiver. There is similar variation in staff members' education requirements. Fully 40 states either did not have an explicit education requirement or mandated only a high school diploma (or less) for assistant teachers, while six states required some college credits or a CDA. The requirements for lead teachers were tougher: all but nine states had an education requirement, and among those that did, the requirement varied from a high school diploma (17 states) to a college degree (i.e., associate's or bachelor's degree) (three states). Finally, all but one state regulated education levels for program directors, with most states requiring either college credits or a college degree, although nine states required no more than a high school diploma.

Although there is significant cross-state variation in child care regulations, policy changes within states over time are fairly infrequent. For example, a study by Blau (2003) of group sizes and child-to-staff ratios over a 13-year period finds that such regulations changed only 0.44 times per state, on average. Similarly, Hotz and Xiao (2011)

report that only nine states altered their staff-to-child ratios over their 10-year study period. During the Covid-19 pandemic, however, states enacted unprecedented changes to their regulatory policy in an effort to mitigate the spread of the virus. During the first nine months of 2020, for example, 31 states reformed their center-based group size regulations and 18 states reformed their child-to-staff ratios, with most of these states making multiple changes over this period (Ali et al., 2021a). At the height of states' pandemic regulatory stringency—lasting from late-May to early-June of 2020—approximately 85% of states had a group size regulation in effect, compared to 70% prior to the pandemic, while the average group size fell from 20 to 14 children. Similarly, the average child-to-staff ratio dropped from 12:1 to 10:1.

4.2   Theoretical Considerations

Regulations are justified on the basis that they mitigate information asymmetries in the child care market, whereby parents are poorly informed about the quality of care received by children. Parents may be poorly informed because they lack the resources to assess quality or they cannot efficiently monitor caregivers. Providers therefore have an incentive to produce lower-quality services by reducing health and safety investments or hiring less-skilled teachers than would be the case if parents were perfectly informed (Shapiro, 1986). Regulations may be necessary because they ensure a minimally acceptable level of quality exists throughout the market, primarily by forcing low-quality providers to improve or exit the market. It should be noted, however, that even if parents were perfectly informed, regulations may be desirable if the increase in quality translates into health and developmental benefits for children.

Nevertheless, even if service quality were predicted to increase under regulations, the canonical economic model of minimum quality standards highlights some potential adverse outcomes. In particular, in competitive markets offering consumers multiple product choices—as is the case in the market for child care—a perfectly enforced and binding regulation is predicted to reduce the supply of licensed and regulated child care and increase prices, while increasing the supply lightly or entirely unregulated services (Leland, 1979; Shapiro, 1986). Price increases will occur if the cost of compliance—or more generally the cost of raising quality—is financially burdensome for providers, and thus is passed through to consumers. As mentioned above, this may increase the supply of care in the unregulated sector if consumers are induced by the increase in regulated prices to substitute toward unregulated providers. Note the possibility that any quality increase in the regulated sector may be offset by the increased

supply of lower-quality, unregulated services, leaving the market overall with the same average level of quality.

The standard model articulated above does not fully capture some important features specific to the child care market. In the standard model, there is a unitary input to the production of quality, which allows the regulation to effectively dictate levels of quality. However, in the child care market, the determinants of quality are numerous and complex, leaving regulations to influence only the measurable inputs to quality production. This can cause two unintended consequences. First, regulations may be ill-targeted in the sense that they govern unproductive features of the child care setting or they may be targeted at the correct characteristics but are set at levels too lenient to be effective. Second, providers might engage in input substitution, whereby to comply with a tougher regulation in one domain, they increase the quantity of inputs in that domain but reduce their investments elsewhere. For example, faced with a tougher regulation on group sizes (leading to smaller classrooms), a provider could respond by hiring more teachers but favor those with lower levels of education. That such input substitution is a possible response to regulations means that program quality may not increase, and could in fact decrease.

There are at least two other questions to consider when thinking through the potential impact of regulations. The first is whether regulations bind on most providers. If regulations are not binding on child care services, it is unlikely they would have a large impact on the market. For example, if a provider would chose a maximum group size of 10 in the absence of a regulation, then requiring group sizes to be 15 would not influence its behavior. The larger the number of providers that face a "binding regulation," the more that regulations will influence supply and prices within the market. Although I assess in the next section the literature analyzing bindingness, suffice it to say that the evidence suggests many providers operate above states' minimum requirements, indicating that regulations at their current levels do not bind. The second question is whether parents care about child care quality and are able to afford high-quality services. As noted above, regulations may be predicted to increase average quality, but this depends on parents' willingness to pay higher prices in the regulated sector. If parents value the "quality assurance" stemming from regulations and are able to pay higher prices, then average quality is predicted to increase. However, if parents do not recognize or value the quality improvements, or cannot afford the increased prices, then parents may be induced to consume lower-cost services in the unregulated sector.

Regarding the second question, the evidence suggests that while parents strongly value the quality-related attributes of child care providers (e.g., Herbst et al., 2020) and are willing to pay for higher-quality care (Gordon

et al., 2021), their child care choices may be determined as much by such convenience factors as whether providers' operating hours align with their work schedules and are located close to home or work (Bassok et al., 2018a).[17] Recent work also shows that parents may not be accurate assessors of their child's program quality (e.g., Mocan, 2007), nor does it appear that parents' reported level of satisfaction with their provider is correlated with its quality (Bassok et al., 2018b). This descriptive evidence, together with the econometric evidence showing that the demand for child care services and for quality are only moderately sensitive to prices (Blau and Hagy, 1998), suggest that parents may not be willing to consumer higher-cost, regulated care. However, this is ultimately an empirical question, one whose evidence I consider in the next section.

4.3 Summary of Research on Child Care Regulations

This section provides a comprehensive review of the literature on child care regulations. I begin by discussing the evidence on whether regulations are binding on providers and to what extent they appear to voluntarily exceed the requirements. I then turn my attention to the studies estimating the relationship between regulations and several key outcomes in the market, including the supply and use of regulated child care, the use of unregulated care, the demand for teacher characteristics, and prices and quality. This literature spans over three decades, and as a result, the data and methodologies vary substantially in ways that may have implications for the credibility of the results. Thus, I briefly discuss the data and estimation strategy used in each study, so that readers can assess whether a causal interpretation can be applied to the results. Furthermore, most of this work focuses on the impact of child-to-staff ratios and maximum group sizes, but a few studies examine a wide range of regulations; important results from such studies will be noted.

4.3.1 Rates of Bindingness and Compliance

The question of whether child care regulations are binding is of first-order importance for assessing the potential impact of regulations. Fortunately, a number of studies shed light on this issue, beginning with Blau (2001), who uses the Cost, Quality, and Outcomes Study (CQOS) and the National Child Care Staffing Study (NCCSS) to

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[17]It should be noted that the discussion of willingness and ability to pay for quality is equally relevant to the theory and evidence on states' QRIS, which is addressed in the next section.

estimate rates of bindingness and compliance. The CQOS collected cross-sectional information on approximately 100 child care centers in each of four states in 1993 (California, Colorado, Connecticut, and North Carolina). Given that program directors provided information on the number of children enrolled and actively attending services in each classroom, along with the number staff assigned to each room, it was possible to compare actual child-to-staff ratios and group sizes with the corresponding age-group-specific regulation in each state. The analysis reveals that regulations are not binding on most child care centers, largely because providers voluntarily exceed the requirements. Specifically, Blau (2001) estimates that child-to-staff ratios and group sizes are binding on 20% to 30% of classrooms, while the remaining (about 70% to 80%) exceed the requirements. However, rates of non-compliance are non-trivial, ranging from 11% to 20% of classrooms. The analysis of the NCCSS, which in 1988 collected similar information on 227 centers in five cities (Atlanta, Boston, Detroit, Phoenix, and Seattle), shows classroom rates of bindingness (20%) and non-compliance (10%) with the ratio and group size regulations.

A set of recent papers by Boyd-Swan and Herbst (2018) and Ali et al. (2021a) provide a different assessment of bindingness by comparing teachers' experience and education requirements in advertised on-line job postings with the corresponding state regulations. The former paper implemented a randomized resume audit study of center-based providers in 17 states, and coded the minimum experience and education requirements stipulated in the job ads for assistant and lead teachers. Results from this work imply comparatively high rates of bindingness. For example, although 31% of providers voluntarily exceeded a state work experience requirement of one year for lead teachers, most providers (69%) exactly met the requirement by advertising for one year of experience. Similarly, of those faced with a state education mandate requiring lead teachers to have an associate's degree, 27% sought applicants with a bachelor's degree or more, while the remaining providers (73%) were at or below the regulated standard. The latter study examines the universe of on-line job postings for center-based lead teachers over the period January 1 to September 30, 2020. Again, the authors compare the education requirements in the job postings with the state education regulations, but they report only an overall rate of non-compliance, thereby potentially understating bindingness.[18] Nevertheless, the study reveals a high rate of non-compliance (33%) with states' education regulations.

A final paper by Doromal et al. (2018) provides yet another approach to studying regulatory compliance.

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[18]In this paper, "non-complicance" is defined as any teacher job posting whose minimum education requirement does not meet the corresponding state regulation for teachers' education.

Specifically, the authors examine administrative records for the state of North Carolina to estimate the frequency, category, and severity of safety violations documented in the universe of licensed center-based programs. Such violations were recorded by state administrators during routine, unannounced licensing inspections. The authors find that 32% of all programs had at least one "severe" regulatory violation, largely driven by general health and safety, child medication, and ratio violations. Interestingly, privately-operated programs were about eight percentage points more likely to have a severe violation than their public counterparts.

4.3.2 Estimates of the Impact of Regulations

Given the discussion above, it is useful to begin by summarizing results from studies that estimate the impact of states' center-based child care regulations—specifically, those covering child-to-staff ratios and group sizes—on the observed ratios and group sizes in actual classrooms. Indeed, such studies provide additional evidence on whether regulations bind. An early study by Chipty (1995) uses cross-sectional household-level data from the National Child Care Survey (NCCS) to assess parent reports of child-to-staff ratios at each child care arrangement. The paper finds that tougher center-based regulations on child-to staff ratios reduce such ratios in children's classrooms. However, a follow-up paper by Hofferth and Chaplin (1998), who also use the NCCS, finds no association between these regulations and the reported ratios in children's arrangements. A different set of papers by Fuller et al. (1993) and Chipty and Witte (1997) use the 1990 Profile of Child Care Settings (PCCS), which is a cross-sectional firm-level survey, to estimate the impact of director-reported child-to-staff ratios and group sizes constructed at the provider-level. Both studies find that tougher regulations are associated with smaller ratios and group sizes.

The most recent work on this question is by Blau (2007), who uses the CQOS to study the impact of state regulations on child-to-staff ratios and group sizes on observed classroom ratios and group sizes. This paper is distinct because, although it relies on a cross-sectional survey of centers in four states, the author observes ratios and group sizes in classrooms serving children of different ages. Thus, the paper does not rely on cross-state variation in regulatory stringency, but rather exploits within-state between-age-group variation in the regulations. In models with state and child age-group fixed effects, the paper finds that tougher regulations on ratios are associated with lower observed classroom ratios, but that regulations on group sizes are not associated with classroom sizes.

Another line of work studies the relationship between child care regulations and the availability of services.

An early set of studies, relying on cross-state variation in regulatory stringency, consistently finds that tougher regulations reduce the number of slots available in center- and home-based settings (Chipty and Witte, 1997; Gormley Jr., 1991; Lowenberg and Tinnin, 1992; Rose-Ackerman, 1983). A more recent set of studies examines alternative measures of availability while exploiting within-state over-time variation in regulations. First, Blau (2003) studies child care occupational choices using Current Population Survey (CPS) data between 1984 and 1997. In models with state and year fixed effects, he finds that the enactment of a large number of regulations collectively influence the decision to work in the child care industry, but the coefficients on the individual regulations sometimes take the incorrect sign. Second, using establishment-level panel data between 1987 and 1997, Hotz and Xiao (2011) study the impact of center-based group sizes and child-to-staff ratios on the supply of centers. The authors find that more stringent regulations reduce the number of establishments, particularly in low-income markets, with no offsetting increase in the number of slots available at providers remaining open. Finally, Ali et al. (2021a) examine the impact of center-based group sizes and ratios on the demand for child care labor, using the universe of on-line teacher job postings organized into state-day-child-age-group cells. In separate models that exploit variation within-state over-time and across children's age groups (within states and days), the authors find that tougher regulations reduce the number of child care job postings, which is indicative of a drop in labor demand.

A third line of research examines whether regulations induce providers to substitute among the inputs to quality production. To my knowledge, there are only two studies providing such evidence. The first, by Blau (2007), finds strong evidence that providers engage in input substitution. For example, center-based regulations that require more teacher education and experience encourage providers to increase their child-to-staff ratios. The second paper, by Ali et al. (2021a), also finds evidence of input substitution. Specifically, the paper finds that tougher regulations on group sizes and child-to-staff ratios increase the demand for lead teachers (compared to assistant teachers), but reduces the demand for those with a bachelor's degree (compared to less education). Interestingly, both papers find that regulations on some inputs increase the likelihood that providers are out-of-compliance with requirements on other inputs. For example, Ali et al. (2021a) find that tougher regulations on group sizes and ratios increase the odds that a job posting's teacher education requirement does not meet the corresponding state education regulation.

Relevant to the literature on input substitution is a pair of studies that examine whether regulations alter the hiring preferences of child care providers (Boyd-Swan and Herbst, 2018, 2019). Both papers rely on an audit

study design that submitted a large number of fictitious resumes with randomly assigned teacher characteristics (e.g., previous child care work experience, educational attainment, and professional credentials) in response to online job advertisements in 14 U.S. cities. Boyd-Swan and Herbst (2018) compare applicants' work experience and education profiles with the corresponding state regulations, and find that applicants who meet both regulations are substantially more likely to be invited for an interview. Boyd-Swan and Herbst (2019) study the impact of regulations on the extent of racial and ethnic discrimination in the teacher hiring process. Under the assumption that regulations increase the cost of discriminating against well-qualified members of minority groups, such requirements are predicted to reduce racial and ethnic disparities in the labor market. Indeed, the authors find that while black and Hispanic applicants are less likely to receive an interview than otherwise identical white applicants, increasing the stringency of regulations substantially reduces the racial and ethnic gap in interview requests.

The literature on input substitution is important because it sheds light on the potential impact of regulations on an outcome critical to child development: quality. Indeed, the best available evidence suggests that higher-quality early education settings have modest short-run effects on school readiness (e.g., Auger et al., 2014) as well as long-run schooling and labor market outcomes (e.g., Chetty et al., 2011). If child care regulations encourage providers to shift toward less productive inputs, program and classroom quality may decrease as a result. Unfortunately, this question has received only scant attention by researchers, and the results are mixed. For example, using the CQOS along with a program fixed effects model, Blau (2000) finds that observed group sizes and child-to-staff ratios do not influence center-based classroom quality as measured by environmental rating scales (ERS). Furthermore, using the same data, Blau (2007) finds no impact of tougher regulations on group sizes and ratios on (ERS-based) classroom quality. On the other hand, Hotz and Xiao (2011) show that such regulations increase the share of providers that are of sufficiently high quality to receive accreditation from the National Association for the Education of Young Children (NAEYC). Increasing the stringency of regulations also appears to improve the safety of center-based settings by reducing the incidence of serious child accidents (Currie and Hotz, 2004).

The final strand of relevant literature examines the impact of regulations on households' child care choices and expenses and mothers' labor supply. Much like the supply-side studies, this work generally relies on a single cross section of data on states' regulations, merged with household information on child care utilization. Regarding the literature on child care choices, the evidence is mixed. On the one hand, Hotz and Kilburn (1994) find that

tougher regulations on center-based child-to-staff ratios and staff education requirements reduce the utilization of non-parental care, using data from the National Longitudinal Survey of the High School Class of 1972 (NLS72). Such results are corroborated in Hofferth and Chaplin (1998), who find that tougher staff training requirements lower the use of center-based care. However, analyses by Ribar (1992) and Chipty (1995), both of which rely on cross-sectional data, and Blau (2003), who uses repeated cross-sectional data, find no impact of regulations on child care use. The evidence on households' child care expenses is similarly mixed, with some studies finding increased expenditures (Hotz and Kilburn, 1994; Hofferth and Chaplin, 1998) and others finding no or inconsistent effects (Chipty, 1995; Blau, 2003). Finally, the work on maternal employment finds that tougher regulations are generally associated with small reductions in mothers' work effort (Ribar, 1992; Hotz and Kilburn, 1994).

4.4   Discussion

Overall, the evidence discussed in this section paints an uncertain picture about the impact of regulations on the child care market. Some of this uncertainly relates to the fact that much of this research was conducted in the 1990s—and sometimes on data that was fielded in the 1980s—when the child care regulatory and market structures were quite different, thereby raising questions about the generalizability of the results to the current context. Such concerns are more salient in the post-pandemic environment, in which most states enacted new regulations or strengthened existing ones. In addition, the uncertainty relates to the data sources and empirical strategies used in previous studies. Notwithstanding some notable exceptions, much of the early work evaluating regulations relies on a single cross-section of state-specific requirements, merged with one year of firm or household data on the outcomes, limiting the identification of policy effects to a cross-state comparison of regulatory stringency. Thus, there are reasons to be concerned that the estimated regulation effects are biased from unobserved state confounders.

Nevertheless, several recent studies rely on more credible sources of policy variation. Specifically, Blau (2003), Hotz and Xiao (2011), and Ali et al. (2021a) rely on within-state over-time variation in regulations (merged with repeated cross-section or panel data on the outcomes); Blau (2007) and Ali et al. (2021a) rely on between-child-age-group variation (merged with a cross-section of or panel data on the outcomes); and Boyd-Swan and Herbst (2018) and Boyd-Swan and Herbst (2019) rely on randomized worker characteristics to identify regulation effects. It is these studies to which I now primarily turn to summarize what is currently known about the impact of regulations.

The evidence suggests that regulations do not bind for a large share of center-based child care providers; that is, a substantial fraction of providers voluntarily exceed the minimum standards promulgated in the regulations. Indeed, the studies of observed classroom group sizes and child-to-staff ratios imply that regulations bind on 20% to 30% of center-based providers. This pattern is somewhat consistent with the job posting studies, which show that many providers advertise above the regulated minimum requirements for teachers. At the same time, however, a non-trivial minority of providers appears to be out-of-compliance with the regulations, which is consistent with a perception that state administrators are unlikely to enforce the rules or impose severe sanctions. Together, this evidence implies that regulations may not have large effects on the child care market.

Results from the econometric studies, however, indicate that regulations have important implications for the market. First, increasing the stringency of regulations reduces the demand for child care labor as well as the supply of center-based establishments, with no offsetting increase in the number of slots available in the remaining centers, especially in lower-income markets. Second, regulations influence the allocation of inputs within center-based settings. Providers have strong preferences for job applicants whose experience and education credentials comply with the corresponding state requirements, and they appear to reduce actual classroom group sizes and child-to-staff ratios in response to tougher regulations on these inputs. However, providers also substitute away from other inputs, in part by decreasing the demand for higher-skilled workers, making them more likely to be in violation of other regulations. Fourth, consistent with the presence of input substitution, regulations do not appear to influence prices, and there is inconsistent effects on quality. Finally, regulations are found to have some positive unintended consequences, in form of reducing racial and ethnic disparities in the child care labor market, presumably because providers cannot afford to indulge their distaste for (well-qualified) minorities.

5   Quality Rating and Improvement Systems

5.1   Overview

Over the past two decades, quality rating and improvement systems (QRIS) have become an essential tool for measuring and increasing child care quality across a range of provider-types, with the goal of improving young children's developmental outcomes. Much of the impetus for enacting QRIS is the growing pressure on policymakers

to inject accountability into the provision of child care services, and to increase uniformity in the definition of "high-quality" across various settings. As such, QRIS are designed to establish and enforce standards regarding the measurable inputs (e.g., teacher education) to the production of program quality. These goals are achieved by defining a series of quality benchmarks, creating incentives and offering technical assistance to help providers meet the benchmarks, and communicating transparently to consumers the level of quality attained by individual child care providers (Herbst, 2018a; Zellman and Perlman, 2008).

Although states have significant authority over the construction of their QRIS, the primary design features are fairly consistent across all systems: establish a set of escalating quality goals or standards, develop a rating system to measure providers in relation to those standards, give programs the technical support and financial incentives to improve their quality, and engage in consumer education activities to inform parents about the quality of care available in the local market (Tout et al., 2010b). In practice, child care providers volunteer to be assessed in relation to a number of quality indicators, including child-to-staff ratios, staff training and education, and the quality of the classroom learning environment. Providers then receive a summary rating—often in the form of "stars" or numerical values—along with financial resources and technical assistance to improve program quality. The ratings are disseminated to the public, often through a searchable online database, with the intention that consumers use the information to inform their child care choices (Herbst, 2018a).

The number of states with a QRIS has grown dramatically since 1997, when the first state (North Carolina) launched its system. As of 2021, 41 states and the District of Columbia had enacted a QRIS. The share of center- and home-based providers participating in the system varies dramatically by state, ranging from 3% (one state) to 100% (six states) of centers and from 2% (two states) to 100% (six states) of homes. Most states require center- and home-based providers to be licensed to enroll in QRIS, and about half use licensing as a way for providers to enter the first quality tier. The most commonly assessed features of center- and home-based environments (for the purpose of calculating the quality rating) are providers' physical features, staff qualifications and training, whether a curriculum is used, and the nature of child-staff interactions. In addition, 40 states incorporate at least one financial incentive into the QRIS, although these funding efforts take a number of forms, ranging from start-up grants and staff bonuses to quality rating bonuses. Finally, it appears that few states take seriously the public education aim of QRIS: awareness campaigns are funded through a patchwork of sources, with only 13 states having

dedicated (and budgeted) funding available for such operations.[19]

5.2   Rationale and Conceptual Framework

As with regulations, the design and goals of QRIS are built around a recognition that there are inefficiencies in the child care market that limit the ability of parents and providers alone to generate the socially optimal level of quality. Indeed, the informational frictions used to justify regulations are often invoked as a rationale for QRIS. In fact, no attribute of QRIS is a greater acknowledgement the market's information problems than its public education goals. The logic model underlying QRIS argues that as more information on program quality is made available to consumers—thereby improving their ability to discern low- from high-quality services—preferences for high-quality care will increase (Zellman and Perlman, 2008). Child care providers, as a result, will have an incentive to participate in QRIS and improve service quality by complying with the standards. These insights imply that market-wide quality will increase because low-quality programs will improve or exit the market.

As discussed in Herbst (2018a), the combination of quality standards and consumer education means that states' QRIS are likely to generate consequential behavioral changes in child care providers and families. Regarding providers, the resources made available in the form of information and financial incentives are likely to be used to increase the supply of high-skilled staff, raise compensation levels and improve overall quality. QRIS may also increase provider competition over high-skilled teachers, thereby increasing the attractiveness of child care employment and raising wages. Also discussed in Herbst (2018a) is the possibility that QRIS increases staff turnover rates in the short-run. Specifically, to comply with the teacher education requirements, it is possible that providers would have to hire new individuals with certain degrees (and at certain levels), requiring them to replace some of their existing staff. As for families, QRIS enactment is predicted to increase the demand for higher-quality services, by shifting demand away from lower-quality informal arrangements toward the formal sector and by shifting demand from non-QRIS to QRIS participants within the formal sector. As a result, such shifts may increase family expenditures on child care. However, as with regulations, family responses to QRIS depend on the underlying preferences for quality: if parents value the QRIS-driven quality improvements (and are willing to pay for more expensive care arrangements), the demand for such providers will increase. Conversely, if parents prefer

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[19]For more information on the characteristics of states' QRIS, see https://qualitycompendium.org/.

lower-cost providers, even at the expense of quality, QRIS enactment may drive parents out of the formal sector and toward providers that do not have to comply with QRIS's standards.

5.3   Empirical Evidence

This section reviews the evidence on QRIS. The summary proceeds in three steps, beginning with studies that estimate child care provider participation rates in QRIS as well as the determinants of participation. Second, I review the evidence from QRIS validation studies, in which decisions around quality standards and measurement strategies are assessed in relation to programs' observed summary ratings (Cannon et al., 2017). Most validation studies assess one or more of three questions: (i) whether providers with a higher QRIS rating score higher on objective, independent measures of quality; (ii) whether providers' QRIS rating shows improvement over time, especially after providers have had a chance to take advantage of technical assistance and other incentives; and (iii) whether providers with higher ratings lead to better developmental outcomes for children. As of 2021, all but a few states had conducted a validation study. This literature is marked by considerable variation in the credibility of the empirical methods used, including simple correlations between QRIS ratings and classroom quality, regression analyses that condition on child and parent characteristics, and value-added models that control for pre-treatment values of the outcome. As a result, I pay particular attention to the studies with the strongest designs. Third, there is a small set of studies that examine provider (e.g., supply and turnover) and family (e.g., mothers' employment and wages) behavior. Generally speaking, these studies are based on large, representative samples and use more credible research designs, relying on cross-state variation in the timing of QRIS roll-out or exogenously determined discontinuities in the likelihood of being assigned to different rating tiers.

5.3.1   Provider Participation Rates and Determinants of Participation

Beyond the provider participation rates published in the QIS Compendium, I am aware of two previous studies that calculate the share of center-based providers participating in QRIS, aggregated to the state-level. The first study, by Boyd-Swan and Herbst (2020), conducted a resume audit study in which 10,986 resumes were submitted in response to 2,772 center-based job advertisements in 17 states. In the 11 states for which a participation rate was able to be calculated, the authors find an overall participation rate of 42%, with a low of 22% in Georgia and a high

of 100% in Wisconsin. It should be noted that this study is not based on a random sample of providers. In another recent study, Jenkins et al. (2021) use the nationally representative NSECE to calculate a participation rate of 30% in a sample of center-based providers in 30 states. This paper also conducts an analysis of the determinants of QRIS participation. Although it finds few differences between QRIS participants and non-participants, the paper shows that participants are more likely to be pre-k providers, NAEYC accredited, and operate with multiple funding sources.

5.3.2 QRIS Validation Studies

As previously mentioned, the first strand of validation research analyzes the relationship between QRIS ratings and classroom quality. Results from these studies are mixed. For example, a review of 14 validation studies covering 11 states concludes that program ratings are positively correlated with ERS quality measures, but notes that such ERS's are usually among the components used to produce the rating (Karoly, 2014). When independent measures of quality are used instead, the association with provider ratings is less clear. In another review of 10 validation studies across nine states, Cannon et al. (2017) conclude that the association between QRIS ratings and independent measures of classroom quality are positive and statistically significant but of a modest magnitude for most of the systems assessed. In addition, quality differences from one rating-level to the next are generally small and non-linear. As mentioned above, one concern with most validation studies is that the evidence comes from simple correlations between QRIS ratings and provider quality. An exception to this is a recent analysis by Boller et al. (2015), which randomly assigned a small number of home- and center-based providers to a "QRIS treatment" condition in Washington State. This paper finds that those in the treatment group have higher quality ratings (equivalent to 1.3 standard deviations), on average, six months after random assignment.

The second stream of validation work examines whether providers in the QRIS experience improved quality (or quality ratings) over time. The review by Karoly (2014) finds consistent evidence that programs witness fairly steady increases in quality. For example, in separate studies of the Colorado, Florida, and Pennsylvania QRIS, both center- and home-based providers experienced rising scores on ERS assessments (Shen et al., 2008; Sirinides, 2010; Zellman et al., 2008). In addition, a study of Indiana's QRIS finds that about 20% of the state's child care providers advanced at least one quality tier over a six-month period (Elicker et al., 2011), and approximately two-

thirds of Minnesota's providers witnessed at least a one-tier improvement during the 12-month window in between assessments (Tout et al., 2010a). Finally, Yazejian and Iruka (2015)'s analysis of 412 center- and home-based providers between 2008 and 2013 finds that quality in both provider-types improved over time, with the duration in QRIS being one of the most important determinants of the degree of quality improvement.

The final set of validation studies examines the association between providers' QRIS ratings and child outcomes. In a review of the literature, Karoly (2014) concludes once again that the evidence is mixed. The quality of the data and research designs is similarly mixed, with two studies relying on a single cross-section of data, one study relying on repeated cross-sections, and five studies constructing longitudinal designs. Three of the longitudinal studies appear to be relatively strong (i.e., they include pretest-posttest comparisons and controls for child and family characteristics), and of those only one study finds that more highly rated programs are associated with better developmental outcomes (Thornburg et al., 2009). More recent work from Hestenes et al. (2015), which examines North Carolina's QRIS using regression-based methods, finds that a higher star-rating improves some child behaviors but not others. Another two studies use data on the characteristics of providers to simulate the QRIS scoring algorithm (and then apply a rating to each provider), neither of which finds an association with child outcomes (Sabol et al., 2013; Hong et al., 2015). For example, the analysis by Sabol et al. (2013) replicates the algorithm in nine states, finding that the estimated effect of the simulated QRIS rating is about half the size of a single measure of teacher-child interactions (i.e., CLASS scores). Finally, another two studies show that only those attending the highest-rated programs experience gains in developmental outcomes (Jeon and Buettner, 2015; Sabol and Pianta, 2015). For example, the analysis by Sabol and Pianta (2015) of Virginia's QRIS shows that attending programs with three- and four-star ratings is positively associated with children's pre-literacy skills.

5.3.3 Econometric Evidence

Beyond the validation studies—which focus on whether states' QRIS are "working" as intended—there are to my knowledge four studies that provide credible evidence on the impact of QRIS on provider and family behavior. The supply-side studies focus on the supply, compensation, and turnover of child care industry employees (Herbst, 2018a), the demand for teacher characteristics (e.g., education and other credentials) (Boyd-Swan and Herbst, 2020), and program quality and enrollments (Bassok et al., 2019). The fourth study examines issues related to

quality and teacher qualifications in the context of the Head Start program (Gonzalez, 2019). Regarding family-level outcomes, there is just one study, by Herbst (2018a), who examines mothers' employment and wages. Below I discuss each study, paying careful attention to the data and empirical methods used, in addition to each paper's key findings.

Herbst (2018a) exploits the staggered timing in states' QRIS enactment in a difference-in-differences (DD) and event-study framework to examine the supply and compensation of child care labor, families' child care choices, and maternal employment. The paper begins by using March CPS samples over the years 1992 to 2015 to examine women's decision to become a child care worker in one of three sectors (home, center, and school)—a proxy for supply—as well as hourly wages. The paper also uses the Quarterly Workforce Indicators (QWI) series to examine the supply of child care industry employees, compensation, and turnover. The results suggest that QRIS enactment induces more high-skilled women to work in the center-based sector and increases the earnings of child care employees across much of the skill distribution, but also increases staff turnover. The analysis of family-level outcomes draws on repeated cross-sections of NHES (i.e., the 2005 and 2012 waves) and March CPS data. Results using these surveys show that QRIS encourages families to use more non-parental care, but increases the employment and wages of only high-skilled mothers.

The paper by Boyd-Swan and Herbst (2020) studies the impact of QRIS participation on center-based providers' demand for teacher qualifications (e.g., child care work experience, field-specific degrees, and other professional credentials). It combines a randomized resume audit study of child care providers with administrative data on those participating in QRIS. A variety of job-seeker characteristics were randomly assigned to fictitious resumes submitted in response to real child care teacher job postings in 14 cities. The paper records whether a given resume was invited for an interview and compares interview rates across providers participating and not participating in QRIS. The results indicate that QRIS participation does not influence the demand for teacher characteristics. Indeed, QRIS participants are no more likely than non-participants to value applicants with more work experience, higher levels of education, and a college degree in ECE, nor does it lead to meaningful changes in the demand for non-academic credentials.[20]

In a study of child care centers in North Carolina, Bassok et al. (2019) use a fuzzy regression discontinuity (RD)

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[20]The paper conducts similar comparisons across NAEYC participants and non-participants. It finds that NAEYC-accredited providers are strongly attracted to job applicants with child care work experience, an ECE degree, and other professional credentials.

design to examine the impact of assignment to a lower QRIS rating on subsequent quality improvement. The RD design is based on a continuous measure of classroom quality, which generates variation around a state-determined threshold value, thereby increasing the likelihood that some providers will earn a lower QRIS star rating. The paper finds that the quasi-random assignment to a lower initial rating induces centers to improve the quality of their services, as measured by the subsequent rise in the star rating as well as the gains on a multifaceted measure of classroom quality. In addition, the paper shows that a lower QRIS rating leads to reductions in program enrollment, with larger declines estimated in markets with a greater concentration of other providers. Importantly, the paper finds no effects on indicators of structural quality, including child-to-staff ratios and staff credentials.

The final paper, by Gonzalez (2019), assesses whether the enactment of QRIS influences aspects of structural and process quality as well as teacher turnover in the context of the Head Start program. In particular, the paper combines program-level data on the outcomes from the Head Start Program Information Reports (PIR) and CLASS Reports with information on the timing of QRIS roll-out at the state-level to estimate DD models of the impact of QRIS adoption. Generally speaking, the paper uncovers little evidence that QRIS adoption improves Head Start program quality, as measured by teacher qualifications and teacher-child interactions. Consistent with Herbst (2018a), the paper also finds that QRIS adoption increases the annual rate of teacher turnover.

5.4   Discussion

Over the past two decades, state-administered QRIS have become an essential policy tool for monitoring and improving child care quality across a range of provider-types. Today nearly all states operate a QRIS, with implications not just for home- and center-based child care providers but also Head Start programs. The best available evidence indicates that approximately one-third of center-based providers nationwide participate in QRIS. As these systems continue to grow in importance, it is clear that research is needed to assess whether they operate as intended and to discern their impact on providers and families. The QRIS literature has focused largely on producing validation studies, which analyze whether the assigned provider ratings are correlated with objective measures of quality. A second, though much smaller, literature attempts to document the impact of QRIS on a range of behavioral responses by child care providers—the supply, compensation, and turnover of teachers; the demand for teacher characteristics; and program quality—and to a lesser extent families.

A key concern with the validation studies is that they generally lack a convincing empirical strategy for estimating credible effects of QRIS on program quality and child outcomes. Specifically, most studies rely on simple before and after or cross-sectional comparisons of providers or children, making it difficult to construct plausible comparison groups. Perhaps not surprisingly, results from these studies are mixed and therefore do not allow for definitive statements about whether participation in QRIS (or progressing up the star-rating ladder) has demonstrable effects on quality or child well-being. The one exception is the paper by Boller et al. (2015), in which home- and center-based providers were randomized to treatment and control conditions, finding that providers in the QRIS treatment group had higher levels of quality. Although the results from this analysis are promising, it is one of the few validation studies with a sufficiently strong research design to produce credible results. Nevertheless, a thorough review of validation studies by Karoly (2014) concludes by stating that "the lack of robust findings across these studies indicate that QRISs, as currently configured, do not necessarily capture differences in program quality that are predictive of gains in key developmental domains."

The second set of studies, which relies on rigorous research designs, provides more consistent evidence in support of QRIS's logic model. It appears that providers respond to their initial QRIS rating, especially if it is comparatively low, by investing in the resources that ultimately improve program quality. These lower-rated programs also appear to lose children, especially if they are located in competitive markets, another sign that QRIS may be working as intended. One of the mechanisms through which quality may improve is by attracting higher-skilled teachers with better compensation—a channel that finds some support in this literature. However, it should be noted that Boyd-Swan and Herbst (2020) uncover potentially contradictory evidence on this channel, given their finding that QRIS participants are no more likely to favor (in the teacher hiring process) applicants with the kinds of credentials included in states' QRIS. Regarding family-level outcomes, the research base is very thin, but the available evidence shows that families respond to QRIS by substituting toward more non-parental care consumption, in particular center-based care, and by increasing high-skilled mothers' employment. The rise in high-skilled employment is noteworthy because these families may be better equipped to absorb any QRIS-related cost increases, raising concerns that lower-income families may find such providers to be increasingly unaffordable.

As explained in Boyd-Swan and Herbst (2020), better credentialed applicants might not be relatively advantaged by QRIS participants because of the way states structure their teacher requirements. States are often ambiguous

about their work experience and education requirements, and they do not always stipulate a set of work experience standards that can be used in lieu of meeting the education requirements, and vice versa. In addition, the paper provides suggestive evidence that QRIS participants have stronger preferences for more qualified applicants when they achieve the highest quality rating in the state, presumably because the experience and education requirements are comparatively strong and uniform at higher rating tiers. Finally, it is possible that states using a points-based QRIS, in which points toward a higher tier are awarded on the basis of meeting a set of provided-selected standards, may discourage some providers from making relatively costly workforce investments. The latter explanation aligns with the findings in Bassok et al. (2019), who posit that structural quality improvements (e.g., ratios and staff credentials) may be more costly to pursue and therefore are not as amenable to change by states' QRIS.

At least two studies in this literature find that QRIS enactment leads to increased teacher turnover. On the one hand, this may be indicative of QRIS working as intended: those who do not meet the state's teacher qualification requirements may be inclined (or forced) to leave the child care labor market. This argument finds some evidence in the paper by Herbst (2018a), who shows that QRIS-induced turnover is driven by young child care workers and those with fewer years of education. Such a dynamic would also be consistent with work by Dee and Wyckoff (2015), who show that similar accountability systems in the K-12 space increase the voluntary attrition of low-performing teachers.

6   Conclusion

Today, non-parental child care use is a critical piece of the preschool experience for most U.S. children. Over half of all children ages 0 to 5 regularly attend a form of child care, and the average child spends between 23 and 27 hours per week in these settings (Cui and Natzke, 2021). At the same time, the discussion in Section 2 shows that child care costs have risen dramatically over the past 15 years, increasing 31% on average since 2005. Moreover, child care costs consume a much larger share of low-income families' budget and generate larger disincentive effects on employment relative to high-income families (Hotz and Wiswall, 2019; Anderson and Levine, 1999). It also appears that child care workers are paid substantially less than other female workers (although they have lower levels of education on average), their wages have been stagnant over the past few decades, and they experience more turnover than other workers (Brown and Herbst, 2022). These stylized facts, coupled with the research showing that high-

quality early care services can be beneficial for children, have increased the importance of enacting policies that make child care more affordable, increase the incentives to supply high-quality care, and improve the functioning of the child care labor market.

This paper provides a detailed review of the evidence on three critical child care policies: consumer subsidies offered through the federal CCDF, state-administered minimum quality regulations, and state-administered QRIS. Collectively, the research on these policies spans at least three decades, and as a result we have learned much about their impact on families and providers. Nevertheless, some of the work discussed here is potentially outdated, particularly as it relates to regulations and the CCDF, either because the policies as initially studied have changed substantially, the characteristics of caseloads have evolved, or the market for child care services has become more complex. Thus, rather than summarizing again the key results from each literature, I end by describing what a future research agenda in each policy area might look like.

In the decade following the creation of the CCDF in 1996, many studies emerged to examine the impact of child care subsidies on maternal employment, child care choices, and family well-being. Research activity on the CCDF has since slowed, perhaps because newer survey datasets covering subsidy receipt are not available. Nevertheless, a continuing research program on the CCDF remains essential in light of the policy's reauthorization in 2014, which made important quality improvements to the original legislation, the federal government's recent pandemic-related increases in CCDF discretionary funding, and changes over time in the characteristics of families and providers receiving a subsidy.[21] In the absence of updated survey datasets, one option is to explore states' administrative data on the CCDF, perhaps matched with Unemployment Insurance records on parental employment, school records on academic performance, or provider information. Such an approach has been used in some studies, as discussed in this review. Furthermore, there is considerable uncertainly about the mechanisms through which subsidy receipt influences child outcomes. Credibly identifying mechanisms, however, would likely require a field experiment. In addition, states vary dramatically on the key subsidy parameters (e.g., work activities, income eligibility thresholds, and reimbursement/co-payment rates), but there is virtually no research—beyond the simulation exercise from Griffen (2019)—on how these policy choices influence the key outcomes. Research on this topic is particularly important in light of recent policy proposals to alter the subsidy eligibility rules and the structure of family co-

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[21] For example, in 2000 26% of children receiving a subsidy were using a unregulated provider. By 2019, that share had decreased to 10%.

payments. For example, New Mexico revised its subsidy program to serve nearly all families earning up to 400% of the FPL and to waive co-payments for one year.[22]

As it relates to child care regulations, there are many avenues for future work, given that much of the literature was developed during the 1990s. First, although there are several studies on labor and input demand and supply, there is comparatively little evidence on staff wages, market prices, and quality. To my knowledge, there is one previous study using a credible identification strategy on wages and prices and two studies on quality. Second, future work might also examine a number of demand-side outcomes that have been given sparse attention, including maternal employment and wages, for which there is only one recent credible study. Finally, no study to date examines the impact of regulations on children's developmental outcomes—a question of critical importance to the policy debate over regulations. Indeed, the closest paper to such an analysis is by Currie and Hotz (2004), who study the incidence of child injuries. Therefore, the developmental consequences of attending regulated care is fertile ground for future work. Some of these outcomes could be studied in the context of the Covid-19 pandemic (and the post-Covid period), during which states made changes to a variety of regulations in an attempt to curb the spread of the virus. Other locales, such as the District of Columbia, are experimenting with changes to staff credentials, providing a robust opportunity to study input and market prices, quality, and child development.

Finally, the literature on QRIS is relatively undeveloped, largely because the system in many states is quite new. As a result, there are many research opportunities in this domain. The work by Herbst (2018a) and Bassok et al. (2019) provide different empirical approaches for studying critical outcomes in a credible way. Specifically, Herbst (2018a) uses the policy variation generated by the differential timing in the introduction of states' QRIS to examine outcomes on the demand- and supply-side. One advantage of this approach is that the QRIS implementation dates can be easily matched to data on a variety outcomes. Thus, future work might take advantage of the longer post-enactment time period now available (since the original paper was published) to examine how increasingly mature QRIS influence families and providers. In addition, Bassok et al. (2019)'s use of administrative panel data on North Carolina's child care providers allows them to take advantage of small differences in the QRIS scoring algorithm to estimate the impact of the star-rating on subsequent quality. This paper provides a useful methodological road map for studying other outcomes, including prices and compensation, supply (i.e., slots),

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[22]For more information, see: https://earlylearningnation.com/2022/05/new-mexico-just-became-the-first-state-to-make-child-care-free-for-nearly-all-families/.

teacher characteristics, and child development. Therefore, future work should attempt to gain access to similar provider-level data in other states. A final avenue for future work is to understand the mechanisms through which QRIS drives provider behavior. The logic model describes several options—including technical assistance, financial incentives, and increased competition—but little is known about the most effective policy components for increasing providers' ability to move up the quality rating ladder.

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Figure 1: Maternal Employment Rates, by Age of Youngest Child, 1940-2019
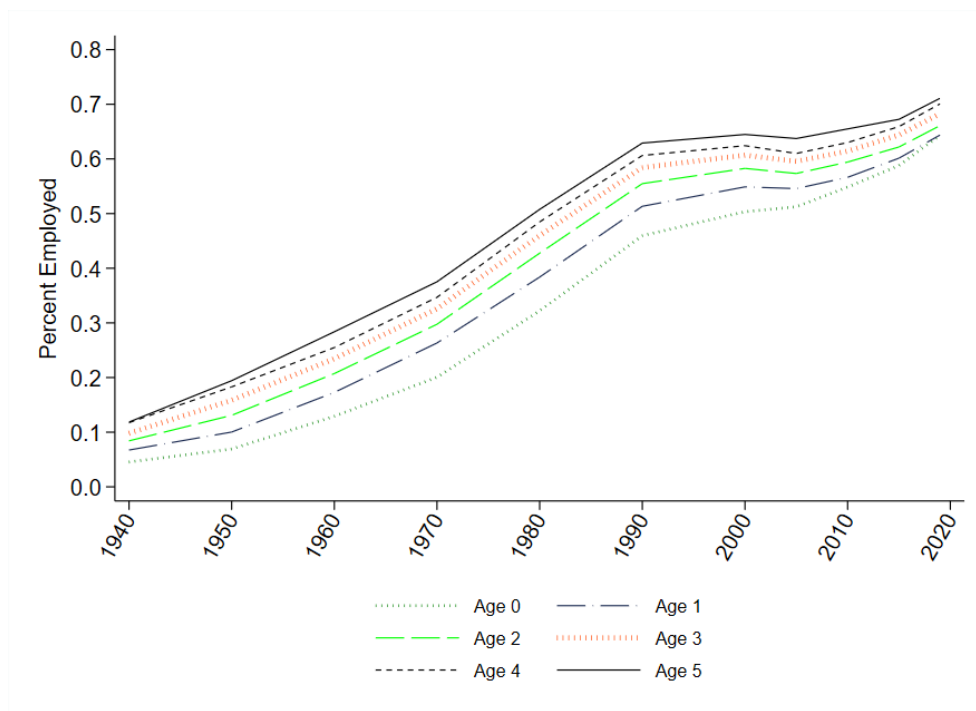
Figure 2: Child Care Employees and Establishments, 1990-2019

((a)) Private Sector

((b)) Public Sector

Figure 3: Child Care Employees, by Month, 2019 and 2020
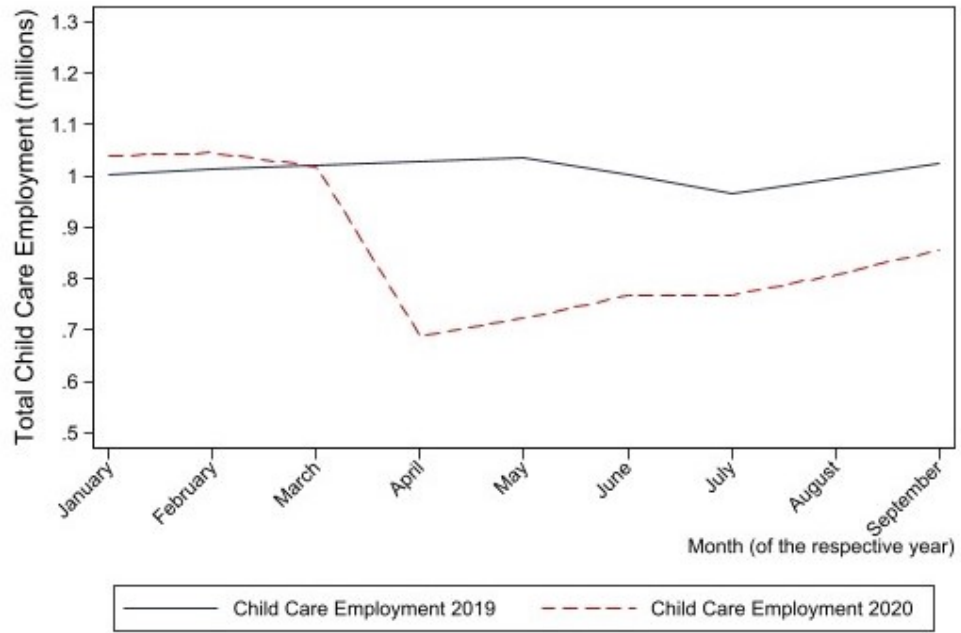
Source.—Author's analysis of the 2019 and 2020 Occupational Employment Survey (OES).

Figure 4: Annual Earnings of Child Care Employees, 1990-2019

Figure 5: Median Hourly Wages of Child Care Employees, by Sector, 2005-2019
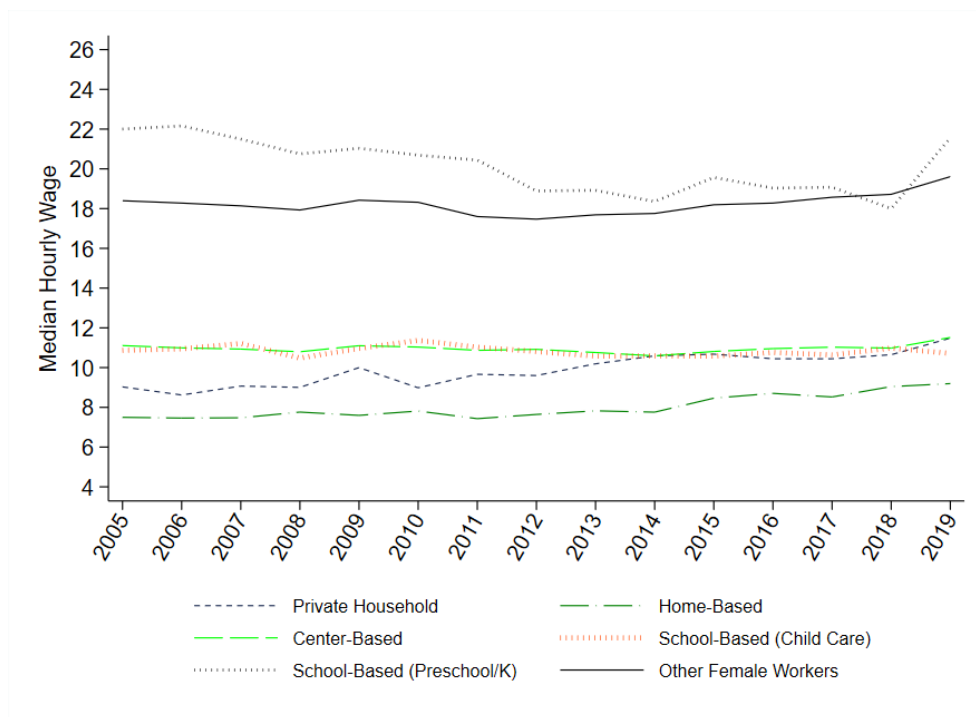
Source.—Author's analysis of the 2005-2019 American Community Survey (ACS) (Ruggles et al., 2022).
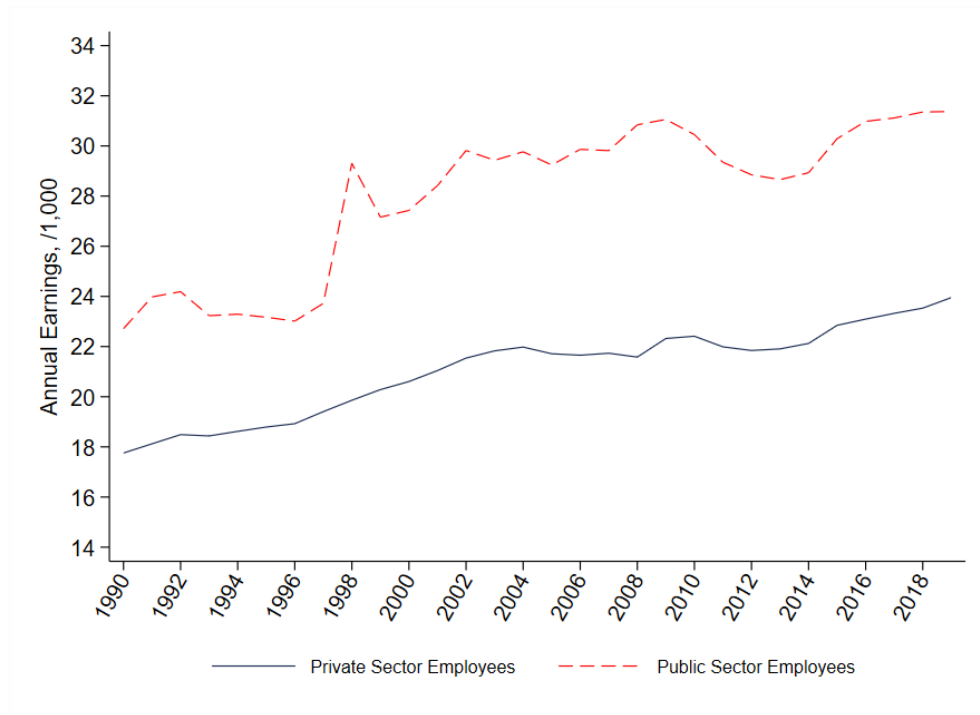Notes.—The term "Private Household" refers to private household child care providers, defined as those employed in the private household services industry and whose primary occupation is a child care worker. The term "Home-Based" refers to workers who are self-employed in the child day care services industry and whose occupation is a child care worker or education administrator. The term "Other Female Workers" refers to women employed in all other (non-child care) industries. All figures are adjusted for inflation to reflect 2019 dollars.

Table 1: Participation in Non-Parental Child Care, 2005-2019

	2005	2012	2016	2019
Panel A: Relative Care				
Participation Rate	0.206	0.257	0.246	0.229
	(0.405)	(0.437)	(0.431)	(0.420)
Weekly Hours of Participation	22.467	20.701	22.924	22.536
	(14.976)	(14.480)	(15.365)	(15.854)
Paying for Care	0.236	0.249	0.230	0.225
	(0.425)	(0.432)	(0.421)	(0.417)
Median Hourly Expenditures	2.49	2.97	3.77	4.60
Panel B: Non-Relative Care				
Participation Rate	0.136	0.144	0.134	0.118
	(0.343)	(0.351)	(0.341)	(0.323)
Weekly Hours of Participation	26.246	26.292	27.292	26.497
	(15.509)	(14.828)	(14.732)	(14.800)
Paying for Care	0.855	0.861	0.854	0.844
	(0.352)	(0.346)	(0.354)	(0.363)
Median Hourly Expenditures	4.07	4.68	5.33	6.00
Panel C: Center-Based Care				
Participation Rate	0.339	0.321	0.330	0.348
	(0.473)	(0.467)	(0.470)	(0.476)
Weekly Hours of Participation	24.857	22.946	24.132	25.099
	(14.620)	(15.247)	(15.422)	(15.007)
Paying for Care	0.741	0.696	0.752	0.730
	(0.438)	(0.460)	(0.432)	(0.444)
Median Hourly Expenditures	4.18	5.22	5.63	5.96

Source.—Author's analysis of the 2005, 2012, 2016, and 2019 waves of the National Household Education Survey (NHES)
Notes.—The analysis sample is comprised of children ages 0 to 5. Non-relative care includes caregivers providing care in the child's home and in the home of the caregiver. Weekly hours of child care use is conditioned on any use of a given type of care. Hourly child care expenditures are calculated per hour of child care use. All figures are weighted using the final survey weight. All monetary figures are adjusted for inflation to reflect 2019 dollars.

Table 2: Percent of Household Income Allocated to Child Care, 2005-2019

	2005	2012	2016	2019
Overall	0.066	0.076	0.080	0.087
Unmarried	0.125	0.111	0.123	0.132
Married	0.058	0.068	0.074	0.080
High School or Less	0.080	0.104	0.110	0.116
More than High School	0.062	0.071	0.077	0.082
Income: $0-$40k	0.144	0.160	0.174	0.223
Income: $40k-$75k	0.064	0.080	0.087	0.095
Income: > $75k	0.046	0.060	0.067	0.073

Source.—Author's analysis of the 2005, 2012, 2016, and 2019 waves of the National Household Education Survey (NHES)
Notes.—The median share of household income is presented in this table. A categorical, rather than continuous, measure of household income is available in the NHES. After standardizing the income categories across each survey wave, I assign each family the midpoint of their category, then divide annualized child care expenditures by household income. All figures are adjusted for inflation to reflect 2019 dollars.

Table 3: Characteristics of Child Care Workers

	Household	Home	Center	School	All Others
Age	32.612	44.298	36.339	41.179	40.731
	(13.558)	(12.018)	(13.269)	(12.726)	(13.130)
Married	0.303	0.582	0.463	0.614	0.499
	(0.459)	(0.493)	(0.499)	(0.487)	(0.500)
Children Ages 0-4	0.112	0.170	0.177	0.133	0.134
	(0.316)	(0.376)	(0.382)	(0.339)	(0.340)
White	0.582	0.536	0.576	0.660	0.609
	(0.493)	(0.499)	(0.494)	(0.474)	(0.488)
Black	0.079	0.129	0.163	0.112	0.131
	(0.270)	(0.335)	(0.369)	(0.315)	(0.337)
Hispanic	0.256	0.269	0.186	0.172	0.167
	(0.436)	(0.444)	(0.389)	(0.377)	(0.373)
Other Race/Ethnicity	0.083	0.066	0.075	0.056	0.094
	(0.276)	(0.249)	(0.263)	(0.229)	(0.292)
Foreign Born	0.282	0.274	0.152	0.123	0.163
	(0.450)	(0.446)	(0.359)	(0.329)	(0.369)
Non-Citizen	0.186	0.157	0.073	0.045	0.075
	(0.389)	(0.364)	(0.260)	(0.207)	(0.263)
High School Degree or Less	0.378	0.454	0.293	0.240	0.293
	(0.485)	(0.498)	(0.455)	(0.427)	(0.455)
Some College	0.403	0.386	0.435	0.281	0.334
	(0.491)	(0.487)	(0.496)	(0.450)	(0.472)
Bachelor's Degree or More	0.218	0.160	0.271	0.479	0.373
	(0.413)	(0.367)	(0.445)	(0.500)	(0.484)
Enrolled in School	0.290	0.070	0.200	0.136	0.117
	(0.454)	(0.255)	(0.400)	(0.343)	(0.321)
Weekly Hours of Work	27.183	34.608	29.560	29.866	33.581
	(16.535)	(20.159)	(15.238)	(15.772)	(15.303)
Median Hourly Wage	10.80	9.16	11.18	14.98	17.97

Source.—Author's analysis of the 2017-2019 American Community Survey (ACS) (Ruggles et al., 2022)
Notes.—The sample consists of women ages 18 to 64. The term "Household" refers to private household child care providers, defined as those employed in the private household services industry and whose primary occupation is a child care worker. The term "Home" refers to workers who are self-employed in the child day care services industry and whose occupation is a child care worker or education administrator. The term "All Others" refers to women employed in all other (non-child care) industries. All figures are weighted using the ACS person weight, and hourly wages are adjusted for inflation to reflect 2019 prices.

Table 4: Characteristics of Center-Based Assistant and Lead Teachers

	Assistant	Lead
Child care work experience: 0-5 years	0.410	0.276
	(0.492)	(0.447)
Child care work experience: 6-10 years	0.245	0.225
	(0.430)	(0.418)
Child care work experience: 11-15 years	0.109	0.178
	(0.312)	(0.383)
Child care work experience: 16-20 years	0.098	0.137
	(0.298)	(0.344)
Child care work experience: 20+ years	0.138	0.183
	(0.345)	(0.387)
Time at current program 0-11 months	0.259	0.182
	(0.438)	(0.386)
Time at current program 1-3 years	0.398	0.338
	(0.490)	(0.473)
Time at current program 4-6 years	0.114	0.165
	(0.317)	(0.371)
Time at current program 7-9 years	0.062	0.084
	(0.241)	(0.278)
Time at current program 10+ years	0.167	0.231
	(0.373)	(0.422)
College major: ECE	0.462	0.553
	(0.499)	(0.497)
College major: related to ECE or education	0.179	0.197
	(0.384)	(0.397)
College major: unrelated to ECE or education	0.359	0.251
	(0.480)	(0.434)
Child Development Associate (CDA) credential	0.241	0.270
	(0.428)	(0.444)
State teaching certificate	0.255	0.430
	(0.436)	(0.495)
Attended professional development workshop	0.740	0.822
	(0.439)	(0.382)
Enrolled in ECE college courses	0.245	0.228
	(0.430)	(0.419)
Received coaching or mentoring	0.358	0.340
	(0.480)	(0.474)
Spends 1+ days per month on professional development	0.431	0.410
	(0.495)	(0.492)

Source.—Author's analysis of the 2019 National Survey of Early Care and Education (NSECE)
Notes.—The sample consists of assistant and lead teachers in center-based child care programs. All figures are weighted using the NSECE's final sampling weight.

Table 5: Summary of the Child Care Regulatory Environment

State	Group Size	Child to Staff Ratio	Assistant Teacher	Minimum Staff Education Requirement Lead Teacher	Director
Alabama	–	8	8th grade	HSD	HSD & 8 semester hrs or CDA
Alaska	20	10	–	–	HSD & 12 semester hrs or CDA
Arizona	–	13	–	HSD	HSD & 6 credit hrs
Arkansas	24	12	HSD	HSD	CDA
California	–	12	HSD & 6 semester units or CDA	HSD & 6 semester units or CDA	HSD & 15 semester units
Colorado	20	10	HSD & 1 ECE course	HSD & 12 semester hrs or CDA	HSD & 60 semester hrs or CDA
Connecticut	20	10	or HSD (ECE experience or HSD)	HSD & 12 credit hrs or CDA	HSD & 3 ECE credit hrs
Delaware	15	10	HSD & 6 credits	HSD & 9 credits or CDA	AA
District of Columbia	16	8	HSD	HSD & 48 credit hrs or CDA	HSD & 48 credit hrs
Florida	–	15	–	AA	HSD & 30 ECE credit hrs
Georgia	30	15	–	HSD & 15 semester hrs or CDA	HSD & 15 semester hrs or CDA
Hawaii	–	12	HSD & CDA or 60 credit hrs	HSD & 60 credit hrs or CDA	HSD & 60 credit hrs or CDA
Idaho	–	–	–	–	–
Illinois	20	10	HSD	HSD & 30 semester hrs or CDA	AA
Indiana	20	10	HSD	CDA	AA
Iowa	–	13	–	HSD	HSD
Kansas	24	8	–	–	Observation Hours or CDA
Kentucky	24	12	–	HSD	HSD
Louisiana	26	13	–	–	HSD & 6 credit hrs
Maine	22	9	–	–	HSD
Maryland	20	10	HSD	HSD & 6 semester hrs or CDA	HSD & 6 semester hrs or CDA
Massachusetts	20	10	HSD	HSD & 12 credit hrs or CDA	HSD & 16 credit hrs or CDA plus 4 credit hrs
Michigan	–	10	–	HSD & 6 semester hrs	HSD & 60 semester hrs or CDA plus 18 ECE semester hrs
Minnesota	20	10	HSD & 8 credit hrs	HSD & 16 credit hrs[1]	HSD & 6 credit hrs[1]
Mississippi	14	14	–	HSD	HSD & 24 ECE credit hrs or CDA
Missouri	–	10	–	–	HSD & 6 semester hrs or CDA
Montana	8	–	–	–	HSD
Nebraska	–	10	–	HSD	HSD & 6 credit hrs or CDA
Nevada	–	13	–	–	HSD & 15 semester hrs in ECE or CDA
New Hampshire	24	8	–	HSD & 18 ECE credit hrs or CDA	HSD & 60 credit hrs plus 6 credit hrs CD/Mngt[2]
New Jersey	20	10	CDA	BA	BA
New Mexico	–	12	–	–	HSD & 3 ECE courses or CDA
New York	18	7	or HSD	HSD & 9 college credits	CDA
North Carolina	25	15	HSD	HSD	HSD & 12 semester hrs (CD) or CDA
North Dakota	14	7	–	HSD	CDA
Ohio	24	12	HSD	HSD	HSD
Oklahoma	24	12	–	HSD & 6 ECE/CD credit hrs or CDA	HSD & 6 ECE/CD credit hrs or CDA
Oregon	20	10	–	HSD & 10 semester hrs or CDA	or HSD & 30 semester hrs or CDA
Pennsylvania	20	10	HSD	AA	AA
Rhode Island	18	9	HSD	HSD	BA
South Carolina	–	13	–	HSD	HSD
South Dakota	20	10	–	–	HSD & 32 credit hrs CD/Mngt or CDA
Tennessee	18	9	–	HSD	HSD & 18 credit hrs CD/Mngt
Texas	30	15	HSD	HSD	CDA
Utah	24	12	–	–	HSD & 21 credit hrs
Vermont	20	10	HSD & 3 credit hrs	BA	HSD & CDA or 30 semester hrs
Virginia	–	10	–	HSD	HSD & CDA or 6.66-30 credit hrs
Washington	20	10	–	HSD	HSD
West Virginia	20	10	HSD	HSD	HSD & 2 non-credit/for-credit ECE courses[3]
Wisconsin	20	10	HSD	HSD & 2 non-credit ECE courses	HSD
Wyoming	24	10	–	–	–