
Technical Report

Child Care Subsidies and Child Care Markets: Evidence from Three States

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Executive Summary

Most young children in the U.S. regularly spend time in a child care setting, often in a child care center or licensed family child care home. Unlike kindergarten through grade 12, non-parental care and education for younger children is provided mainly in the private sector and the fees are mostly paid by parents. Nonetheless, government plays an important role in the child care sector through regulations and funding. The rapid increase in spending on child care subsidies since 1996 has raised interest in the impact of public monies on the private child care market.

The goal of this study was to increase understanding of the factors influencing child care prices and, in particular, the relationship between child care subsidy expenditures and prices. The conceptual model of a market was the basic framework for the analysis. Using methodology pioneered in California, this study used data from Oregon to analyze the influence of a number of economic, demographic and policy variables on child care prices. The results were then compared to earlier studies in California and Minnesota. In all three studies, similar econometric models were estimated using longitudinal county-level data.

Child care price variation in the three states was found to be related to a number of variables derived from the basic economic model of supply and demand. Demand factors such as higher family incomes and employment rates were associated with higher child care prices, as were factors related to supply costs such as wages and rents. Subsidy expenditures were found to be positively associated with child care prices, though in general their contribution to price increases has been small. Only in California, where subsidies increased almost 300% in a few years, did the results suggest that child care price increases associated with the rapidly increasing subsidy expenditures would exceed one percent per year.

Child care advocates worry that maximum subsidy payment rates act as a ceiling on prices that providers charge, while some policymakers worry that providers may use subsidy payment rates as a benchmark to increase their prices. The study findings suggest that the most important drivers of average child care prices are economic and demographic factors, such as

income levels, employment rates, rents and population, rather than child care policy. Subsidy expenditures are one factor influencing child care demand but they generally have not had a large impact on prices in the states studied. However, the relationship between subsidy expenditures and child care prices is likely to differ depending on the characteristics of the local child care market and subsidy policies. In locations where subsidized care is a substantial part of the market and where more subsidy families choose licensed care, the relationship between market prices and subsidies is likely to be stronger. Further research is needed to examine how child care providers respond in terms of both price and capacity within the context of different subsidy policy environments and in different local markets.

Even with increased public funding of child care subsidies and preschool and pre-kindergarten programs in recent years, parents pay for the majority of early care and education services for young children in the U.S. Given that parents pay for the majority of child care, higher child care prices will negatively impact family budgets. At the same time, the amount of funds available to providers may have implications for the quality of child care services available in the market. Higher child care prices may allow child care providers to improve compensation, training, facilities and equipment. Research has established the long-run societal benefits from high quality child care for low-income children; therefore, improving the quality of care is an important public policy objective. Yet the private child care market largely reflects what parents are willing and able to pay for child care. Given the importance of quality child care for both current and future workforce development, better understanding of the dynamics of the child care market is necessary to develop strategies that can both improve affordability and increase quality of care.

Child Care Subsidies and Child Care Markets: Evidence from Three States

I. Introduction

Most young children in the U.S. regularly spend time in a child care setting. Among children under age 5, nearly two-thirds have a regular non-parental care arrangement (Johnson, 2005). While parents use non-parental care for many reasons, to a large extent the increase in the use of non-parental care in recent decades has been a result of growing labor force participation of mothers. Nearly two-thirds of mothers with children under age six are in the paid labor force (Mosisa & Hipple, 2006). However, many parents also send their young children to preschools and child care settings to help prepare them for kindergarten and school.

Child care services in the United States are provided by a diverse mix of child care centers, family child care providers, community organizations, nanny services, schools and churches. These services are provided in different settings, mainly in homes (either the child's or the provider's) and in non-residential facilities such as child care centers and schools. Many child care providers are private businesses, including both for-profit and not-for-profit organizations. This variety of types of child care providers has developed in the private market largely in response to parents' needs and preferences.

Unlike countries like Sweden and Norway, and indeed, unlike K-12 education, child care services in the United States are largely provided by the private sector and paid for by parents. Studies estimate that parents pay 60% or more of the costs of child care (Mitchell, Stoney & Dichter, 2001; Helburn & Howes, 1996). A more recent study in Oregon estimated that families paid 76% of the costs of child care while government programs and tax credits covered 23% (and 1% was paid by business and philanthropy) (Oregon Department of Employment, 2005). Given that fees are largely paid by parents, demand for child care services will be highly dependent on what parents are willing and able to pay for child care.

The role of the government in the child care sector is nonetheless of critical importance. States' policies influence the private child care market primarily through the regulation and licensing of certain types of care. States set regulations regarding maximum child-staff ratios and training requirements as well as basic health and safety rules. In addition, government directly

funds child care services for some children who are too young to attend school, including Head Start Programs and pre-kindergarten programs. However, most public spending related to care and education of young children is in the form of subsidies to help low-income families pay for child care.¹

Child care subsidies in the U.S. are largely funded through the Child Care and Development Fund (CCDF).² States have wide discretion in their child care subsidy programs, including responsibility for setting eligibility limits, maximum payment rates and co-payments for parents. The federal CCDF rules support parent choice in the child care market by specifying that families should have “equal access ... to child care services comparable to those provided to families not eligible to receive CCDF assistance” (Child Care and Development Fund, Final Rule, 1998, p.39988). In connection to welfare reform efforts at the federal and state levels, spending on child care subsidies in the U.S. has risen rapidly since 1996. Total annual spending on child care subsidies increased from about \$4 billion in 1997 to nearly \$12 billion by 2006 (Matthews and Ewen, 2008).

While public dollars spent on subsidized child care are a relatively small part of the child care market, the increase in spending on child care subsidies has raised concerns about the impact of these public monies on the private market. Whenever government intervenes in a market, economists (and others) express concern about the (often unintended) consequences that may occur. In the case of child care subsidy policy, at least two groups have expressed concern that the subsidy program affects market child care prices. Some legislators have worried that the program leads to increases in child care prices, or that child care providers use the subsidy payment rate to set their prices. In contrast, child care advocates express concern that the prices child care providers charge are constrained by the subsidy program and, in particular, by the setting of maximum subsidy payment rates. In order to understand the potential influence of the subsidy program on prices, we first need to understand what other factors influence prices in the child care market.

¹ Federal spending for Head Start programs was \$6 billion in the fiscal year of 2004. In addition, states spent \$2.5 billion on state-funded pre-kindergarten in the 2002-2003 school year. (Source: <http://www.nccic.org>). Total federal and state spending for child care subsidies through the Child Care and Development Fund, including TANF-related monies, was \$12 billion in fiscal year 2006 (Matthews and Ewen, 2008).

² A significant amount of the funding for child care subsidies comes from the Temporary Assistance to Needy Families (TANF) block grant, which states can either transfer to CCDF or spend directly on child care subsidies.

Study objectives

The market price of child care has a direct effect on the cost of the child care subsidy program, but little is known about whether or not the subsidy program has a direct effect on market child care prices. This study addresses this gap in knowledge by analyzing factors influencing child care prices and the relationship between child care subsidy spending and prices of child care in three states. Our objectives are threefold. First, using methodology pioneered in California, we use data from Oregon from 2000 to 2004 to estimate the relationship between child care prices and a number of economic and demographic variables. We then compare these results to similar studies in both California and Minnesota, with special attention to the estimated relationships between subsidy expenditures and child care prices in the three states. Finally, by analyzing differences in the policy environments and child care markets, we develop a set of hypotheses for the observed differences in results across the three states. The comparative results provide a basis for future research into the potential impact of child care subsidies on the private child care market.

Conceptual framework and related studies

In the basic economic model of a competitive market, price is determined by the interaction of supply and demand. In the child care market, therefore, prices would be influenced by factors related to the supply or demand for care. Yet there is enormous variation in average prices for child care across states. A recent report estimated that average annual full-time child care fees for a four-year-old child in a child care center ranged from \$3,300 to over \$10,000 across states (NACCRRRA, 2008). While the geographic variation in (average) child care prices is well known, few studies have attempted to explain differences in prices across areas or to analyze the factors influencing child care price trends.

A number of studies have examined the factors associated with the demand for child care. In the standard economic model, the demand for child care will depend on the number of children needing care, family preferences about types of child care, and family incomes. Economic theory suggests that demand will also vary depending on the availability of alternatives to paid care, such as relatives willing to provide free care and public programs such as Head Start. Previous empirical studies have found that family income is an important determinant of demand for child care and child care quality (Blau, 2001; Ficano, 2006; Edwards,

Fuller, & Liang, 1996). Demand for child care is closely related to the number of children needing care, which depends on both the number of children in an area and the extent of maternal (or parental) employment (Ficano, 2006; Edwards, Fuller, & Liang, 1996).

In the standard economic model of a market, the costs of production are key determinants of supply. Thus, the supply of child care is expected to be influenced by wages and other costs of providing care such as rent, utilities, insurance, food, and so forth. The largest component of costs for child care services is the cost of labor (wages and benefits). Studies have estimated labor costs at 60 to 70% of total costs (Helburn & Howes, 1996; Policy Studies Inc., 2006). Rental and housing costs have also been shown to be highly correlated with child care prices (Blau, 2001; Blau & Mocan, 1999; Ficano, 2006; Weber, Grobe, Davis, Kreader & Pratt, 2007). In addition, regulation of child care providers and strictness of enforcement will impact child care costs as well as availability and quality (Blau, 2003; Chipty, 1995; Ficano, 2006). States typically set rules for the number of children per caregiver, group size, and the training and education levels of the caregivers. Regulations requiring fewer children per caregiver or more education and training will raise labor costs and thus influence the supply of child care.

According to economic theory, government subsidies to help low-income families pay for child care lower the cost of child care to the family, and thus would likely lead to an increase in the demand for (paid) child care. An increase in demand generally leads to an increase in the price of a good or service, unless the supply of that good or service increases sufficiently to offset the increased demand (in economic terms, if the supply is perfectly elastic). The impact on prices might be quite small, however, if the amount of subsidy expenditures is small relative to the entire market, so that the increase in demand would be relatively small. Within certain sub-sectors of the market, however, the use of subsidized care might represent a sizeable fraction of the market and have a non-negligible effect on prices.

The economic model of the market suggests that public subsidies for child care are likely to increase demand for child care, which under certain circumstances would result in higher child care prices. If there is such a “demand effect,” economic theory predicts that it works in both directions; that is, if an increase in subsidies increases demand for child care, a decrease in subsidies would reduce it. Given the current economic climate and state budget deficits, public spending on child care subsidies may be reduced in the near term. While few child care providers may literally lower their prices in response to lower demand, overall child care prices may

increase more slowly than in recent years, and may decline in inflation-adjusted terms if demand for child care falls.

The child care market is complex and in many ways differs from the simple supply and demand framework outlined above. The child care market operates as a set of submarkets with providers who offer different types of care that vary in terms of services, quality, and price. Parents usually look for child care close to home or work, and thus the effective market for child care is very localized. Government plays an important role in the child care sector through regulation, subsidies, and support for Head Start and public pre-K programs. Nonetheless, in this study we use the conceptual model of a market as the basic framework for analyzing the factors that influence child care prices. This study draws heavily on two earlier studies of subsidy expenditures and child care markets. Marrufo, O'Brien-Strain and Oliver (2003) conducted the first such study, and found that the substantial increase in subsidy expenditures in California was associated with an increase in child care prices between 1992 and 2000. Using similar methodology, Davis and Li (2005) found consistent results for Minnesota during the time period 1998 to 2004. These two studies form the basis of the comparison with the results from Oregon.

Alternative views on the influence of the child care subsidy program on child care prices

The hypothesis that increased government funding of child care subsidies would increase demand for child care and thereby put upwards pressure on prices relies on a number of assumptions about the child care market. In particular, this approach assumes that the child care market fits the model of a (reasonably) competitive market and that prices are determined by the interaction of supply and demand. Some of the concerns raised by policy makers and advocates about the influence of subsidies on child care prices reflect differing views about how the child care market works.

One alternative view is that providers' pricing practices are not strongly influenced by market forces. Some providers may set their prices based on other sources of information or on what they perceive to be a fair price. For example, it is not unusual for new child care providers to ask about the subsidy payment rate when starting their businesses. Thus, information about the subsidy payment rate may be used by providers when setting their prices. Indeed, some policy makers have expressed concern that the subsidy payment rate becomes "the price to charge." Often they are worried that providers charge a higher price than otherwise because of the subsidy

program.³ A contrasting view is held by some child care advocates, who believe that child care prices are held down by the ceiling of a maximum subsidy payment rate.⁴ While leading to opposite conclusions about the influence of subsidies on prices, these two views are both premised on the assumption that child care prices are not primarily determined by market forces.

To the extent that child care operates like a competitive market, there is little reason to expect that most providers would raise or lower prices in response to the subsidy payment rate. Overall, the amount paid for subsidized child care is a relatively small part of the child care market. If child care providers respond to market signals, raising the price above what the market will bear would result in a loss of customers and/or vacancies, and lowering the price below the market would lead to excess demand such as long waiting lists. While some providers may report using the subsidy payment rate as a price benchmark, there is little evidence that overall this behavior is sustainable in a competitive marketplace. However, there may be local markets where the priced child care market is “thin,” that is, where there are few participants in the market. In thin markets, prices may be substantially influenced by factors other than supply and demand (Peterson, 2005). In these instances, the maximum subsidy payment rate may have more influence on child care prices.

The goal of this study was to increase understanding of the factors influencing child care prices. The main focus was on whether there is evidence that subsidies influence child care prices through an effect on the demand for child care. Detailed analysis of how providers set their prices was beyond the scope of this study and a direct test of the alternative price setting hypothesis was not possible with the current methodology. However, studying the extent to which child care prices respond to factors related to supply and demand provides insight into whether the child care market acts like a competitive marketplace. These issues are discussed further in the last section of the report.

³ Providers are required to charge the same fee for care of a child on subsidy as they charge parents whose children are not in the subsidy program. The CCDF final rule states that “Federal subsidy funds can not pay more for services than is charged to the general public for the same service” (Child Care and Development Fund, Final Rule, p.39959).

⁴ States pay child care providers for the care provided to children in the subsidy program at the price the provider usually charges other parents unless that price exceeds the maximum rate allowed by the state. While states are required by the federal regulations to demonstrate that families using subsidies have equal access to the market, in practice, maximum subsidy payment rates vary considerably across states. If the provider’s usual charge is more than the maximum rate, in some states the provider may require the parent to pay the difference.

II. Study of factors influencing prices in the Oregon child care market

The first component of this study was an analysis of factors influencing child care prices in Oregon between 2000 and 2004. The methods used were similar to those used in studies done in California and Minnesota in order to provide a solid basis for comparison (as reported in the next section of the report). The research questions included:

- What economic and demographic factors are associated with child care prices in Oregon?
- How do subsidy investments influence child care prices in Oregon after controlling for other factors?

Data on child care prices in Oregon were provided by Oregon State University from market rate studies conducted in 2000, 2002 and 2004.⁵ For each market rate survey, the data originally were downloaded from the 16 local Child Care Resource and Referral (CCR&R) agencies' databases. These data were then compiled into a single database by the Oregon Child Care Resource and Referral Network. The data were cleaned to remove those with no price information, inactive providers and duplicates. The data provided for this study were essentially the same as used in the Oregon market rate studies (Grobe & Pratt, 2000; Grobe, Pratt and Weber, 2003; Grobe, Pratt & Weber, 2004). Sample sizes for each year are reported in table 1.

Table 1. Sample sizes for Oregon market rate studies

Year of market rate study	Sample size (Number of providers reporting prices)
2000	6,680
2002	6,308
2004	6,232

Data and methods

In order to analyze the factors associated with average child care prices across counties in Oregon, we first needed to summarize the price information available in the biennial market rate studies. Providers report prices for different age groups and in different pricing modes (typically

⁵ We initially planned to use data from the 1999 Oregon price survey as well, but the different methodology used in that study for collecting the price data led to results that did not seem comparable with the more recent surveys. The market rate survey is conducted every two years in Oregon.

hourly prices for licensed family providers and monthly prices for child care centers). In some years of the survey, providers also reported separate prices for part-time and full-time care. For the analysis, we used the full-time prices for preschool children as a representative price, following the method used first in the California study (Marrufo, et al., 2003). Tests suggested that the use of this age group did not substantially alter the findings. In addition, prices were converted to an hourly price if the provider did not report an hourly price. The conversions were based on 40 hours per week or 160 hours per month.⁶

This study constructed a panel of county-level data from 2000-2004 to investigate the factors associated with trends in the average price of child care across counties in Oregon. Data on a number of economic and demographic characteristics of counties were obtained from the Census and other sources (which are detailed in Appendix Table A-1). These characteristics, described in more detail below, were the factors expected to explain differences in average child care prices across counties. We merged the data to create a county-level longitudinal database on child care prices, child care subsidy expenditures, and economic and demographic characteristics of counties. This study closely followed the methods pioneered in the California study (Marrufo, et al., 2003) in order to provide a basis of comparison across studies.

Based on the conceptual framework of a competitive market, child care prices in a county or local area are determined by the interaction of demand and supply of child care. In the empirical model, the average child care price (for preschool-age children) in a county is the dependent variable, with separate models estimated for centers and licensed family child care prices. The key variable of interest is the measure of subsidy expenditures per child in the county (*subexppc*). Factors expected to influence either child care demand or supply are included as covariates in the model. The number of children in need of non-parental care underlies demand for child care and so we included the county employment rate (*emprate*) and percentage of the county population under age 13 in the model (*und13pct*) to capture demand.⁷ Median household

⁶ Studies have shown that providers do not use a standardized formula for converting prices from one pricing mode to another, and so conversions will result in different average prices (Grobe et al. 2008). For the purposes of reporting average or median prices, price conversions are not recommended. In the section on sensitivity analyses, we discuss the results using reported prices with no conversions. Results using different conversion formulas resulted in similar findings.

⁷ The employment rate of parents, or specifically of mothers, may be more closely tied to the demand for child care. However mothers' employment is influenced by the price of child care (see, for example, Connelly & Kimmel, 2003; Davis & Connelly, 2005; Blau & Hagy, 1998; Powell, 1997, 2002), therefore, in order to avoid endogeneity problems, we use the overall employment rate in the model.

income (*medinc*) and the percentage of children on TANF (*welfarekids*) in the county are also included as demand factors. Families on TANF or leaving TANF for employment have priority for child care subsidies in some states, and this variable proved important in the California study.

On the supply side, the county average weekly wage of all workers is included to capture differences in the cost of providing child care in different areas (*avgwkwg*).⁸ We also included fair market rent (*rent*) as an indicator of rental and housing costs in the area. A dummy variable for counties not in the major metropolitan area around Portland (*nonmetro*) was included as a control. Finally, we included a measure of county child care capacity in order to control for the degree to which supply could increase in respond to changes in demand (*capacity*). We tested models with and without capacity because of endogeneity concerns (described further in the next section). In sum, the estimating equation takes the form:

$$\begin{aligned} \log(\text{price}_{it}) = & B_0 + B_1 \log(\text{subexppc}_{it}) + B_2 \log(\text{emprate}_{it}) + B_3 \log(\text{medinc}_{it}) \\ & + B_4 \log(\text{avgwkwg}_{it}) + B_5 \log(\text{rent}_{it}) + B_6 \log(\text{undl3pct}_{it}) + B_7 \log(\text{welfarekids}_{it}) + \\ & B_8 (\text{nonmetro})_{it} + B_9 \log(\text{capacity}_{it}) + e_{it} \end{aligned} \quad (1)$$

The variables were expressed in natural logarithms so that each coefficient measures the approximate percentage change in price associated with a one percent change in the explanatory variable. The variables were measured in real dollar terms, that is, prices, wages, fair market rent, child care subsidy expenditures and household income were deflated to take out the effects of inflation. The annual Consumer Price Index (CPI) for the Portland-Vancouver metropolitan area was used to deflate all variables denominated in dollars.⁹

The estimated coefficients in the model are expected to have positive signs with the exception of capacity and the nonmetropolitan dummy variable. Theory predicts that demand will be higher the more children need care and with higher incomes, all else equal. An increase in subsidy expenditures is expected to increase demand and therefore put upward pressure on the price of child care, all else equal. Factors that increase the cost of providing child care, such as higher average wages and rents, would also be expected to push up prices. Prices are expected to

⁸ The study in California used average wage of child care workers. We substituted average wage for all workers because county-level estimates of wages for child care workers were not available for Oregon for all years of the study.

⁹ The use of the Portland metropolitan CPI for all dollar-denominated variables may introduce error if rural counties experienced a difference rate of inflation than the Portland metro area. However, no reliable inflation-adjustment factor is available on an annual basis for rural counties and smaller metropolitan areas. Sensitivity analysis with variables not adjusted for inflation found similar results.

be lower in more rural areas outside the Portland metropolitan area. More child care capacity, all else equal, was expected to be associated with lower child care prices.

The estimation strategy followed the previous studies and accounted for the longitudinal nature of the data and the fact that prices were likely to be correlated over time and for each county. We estimated panel data models with random county effects and compared results with and without an autoregressive error AR(1) structure. Sensitivity tests and variations in model specifications are described after the discussion of the main empirical results.

Empirical results

The models were estimated separately for prices in Oregon at child care centers (table 2) and licensed family child care providers (table 3). The estimated results were largely as expected, although only a few of the estimated coefficients were statistically significant at conventional levels. The lack of statistical significance may have been due in part to the relatively small sample size (N=108). Due to data limitations, only three years of data were available for Oregon, and the state has only 36 counties.

Table 2: Estimated model for average center child care prices in Oregon

Dependent variable: Mean county price for preschool-age children	Estimated coefficient	Estimated standard error	t-statistic
Intercept	-10.586*	2.517	-4.205
Subsidy expenditures per child	0.055	0.054	1.021
Employment rate	0.091	0.112	0.809
Median income	0.175	0.150	1.165
Average wage	0.303	0.209	1.449
Fair market rent	0.844**	0.295	2.866
Children under 13 as share of population	-0.394*	0.158	-2.490
Children on TANF as share of children	-0.078	0.053	-1.454
Nonmetropolitan dummy	0.076	0.089	0.849
Capacity: Slots per child under age 13	-0.022	0.078	-0.287
Note: All variables (except dummies) are expressed in natural logarithms. **Significant at the 1% level, *Significant at the 5% level, +Significant at the 10% level			

Looking first at the factors other than subsidies, higher county rent levels were associated with higher center prices (table 2). Other economic variables including the employment rate,

median income, and average wages also were positively associated with center prices, though the estimated coefficients were not statistically significant.¹⁰ The number of children as a share of the population was estimated to be inversely related to child care prices.¹¹ The estimated coefficient on the proportion of children receiving TANF cash was negative and not statistically significant. The estimated coefficient on capacity in centers was negative as expected, though not statistically significant.

In general, the estimated coefficients of all variables had the same signs in both the center and family child care models. For family child care prices, the estimated coefficients on rent, income, average wages and employment rate were positive, and statistically significant for rent and average wages (at the 10% level) (table 3). Child share was again negatively associated with child care prices. More capacity in family child care homes was negatively and significantly associated with family child care prices.

Table 3: Estimated model for average licensed family child care prices in Oregon

Dependent variable: Mean county price for preschool-age children	Estimated coefficient	Estimated standard error	t-statistic
Intercept	-5.764**	1.499	-3.845
Subsidy expenditures per child	-0.009	0.024	-0.390
Employment rate	0.112	0.068	1.645
Median income	0.094	0.057	1.646
Average wage	0.203+	0.119	1.712
Fair market rent	0.505*	0.192	2.627
Children under 13 as share of population	-0.270**	0.092	-2.951
Children on TANF as share of children	0.008	0.019	0.418
Nonmetropolitan dummy	0.039	0.062	0.629
Capacity: Slots per child under age 13	-0.043*	0.021	-2.030
Note: All variables (except dummies) are expressed in natural logarithms.			
**Significant at the 1% level, *Significant at the 5% level, +Significant at the 10% level			

¹⁰ Median family income and fair market rent in a county are highly correlated. When we estimated the center model without median rent, the estimated coefficient on median family income nearly doubled in size and was statistically significant. Similarly, income and average wages are also highly correlated. When we estimated the model without average wages, the estimated coefficient on median income became larger and statistically significant. The main coefficient of interest, however, on subsidy expenditures, was similar in all variations.

¹¹ As noted in the next section, the negative sign on this coefficient is different from the results in California. If we include the number of children in the model instead of the children's share of the population, the estimated coefficient is positive. For comparability with the previous studies, we use the child share variable.

The primary focus of this study was the estimated coefficient on the amount of subsidy expenditures (per child). The estimated coefficient on the subsidy variable for centers was positive and similar in size to previous studies, but was not statistically significant (table 2). For family child care prices, the estimated coefficient on subsidies per child was very close to zero and not statistically significant (table 3). This result suggests that child care subsidies in Oregon did not have an effect on prices at licensed family child care facilities.

In order to interpret the model results, we use two neighboring counties in Oregon, Benton and Linn, to examine the factors associated with the price changes predicted by the model for each of these two counties. We first calculated the predicted price change for centers and for family child care based on the estimated model coefficients and the actual trends in the explanatory variables during the period 2000 to 2004. We then calculated the percentage of the total predicted price change associated with each of the variables.

In Benton County, the model predicted that child care center prices after adjusting for inflation would increase by 10% over the time period, while family child care prices would increase 8%. The factors contributing to the predicted price increase are shown in table 4 and figure 1 for Benton County. Increasing family incomes and higher rents were the key factors behind the price increases, contributing 85% and 63% of the predicted price change for centers and for family child care, respectively. The share of children in the population declined in Benton County, which, given the estimated negative coefficient, also contributed to the price increases. At the same time, the declining subsidy expenditures per child in the county and increasing share of children on welfare put downward pressure on child care prices, all else equal. In other words, child care prices would have risen even faster in Benton County without these offsetting effects.

In Linn County, similar factors contributed to the predicted 7% rise in center prices and 4% rise in family child care prices after adjusting for inflation (table 4 and figure 2). Higher incomes, wages and rent, as well as declining child share, all contributed to higher prices. In contrast to Benton County, average subsidy expenditures per child rose in Linn County, contributing about 15% of the total predicted center price increase according to the model results.¹²

¹² Note, however, that these calculations were based on the estimated coefficients even though these estimates were not statistically significant for a number of the variables.

These examples illustrate the importance of economic trends in determining child care price trends in Oregon. Growth in family incomes, average wages, and fair market rent were the main factors contributing to the predicted price changes. Demographic trends also mattered, with child share of the population and of children on welfare associated with changes in child care center prices. Changes in subsidy expenditures, while positively associated with center prices, did not seem to have much effect. Based on the model results, declining subsidy investments would put downward pressure on child care prices, or, more likely, slow the rise in prices due to other economic and demographic factors. In counties in which subsidy expenditures rose, the model predicted those expenditures would put added upward pressure on center prices. However, the results suggest this effect was quite small relative to other factors. It is also important to recall that the estimated coefficient on subsidy expenditures for center prices was not statistically significant, so it could be interpreted as having no effect on prices. For family child care prices the estimated coefficient was very close to zero, indicating virtually no association between family child care prices and subsidy expenditures.

Table 4: Contribution of each explanatory variable to predicted price change

Benton County	Percent of predicted price change associated with each explanatory variable	
	Centers	Licensed Family Child Care (FCC)
Declining subsidy per child	-10%	2%
Declining employment rate	-2%	-3%
Increasing median family income	26%	18%
Declining average wages	-6%	-5%
Increasing rent	59%	45%
Declining child share of population	39%	34%
Increasing welfare share of child population	-11%	1%
Declining child care capacity	3%	7%
Linn County	Percent of predicted price change associated with each explanatory variable	
	Centers	Licensed Family Child Care (FCC)
Increasing subsidy per child	15%	-5%
Declining employment rate	-13%	-36%
Increasing median family income	41%	49%
Increasing average wages	11%	16%
Increasing rent	6%	8%
Declining child share of population	28%	42%
Declining welfare share of child population	6%	-1%
Declining child care capacity	7%	29%

Figure 1. Percent of predicted 2000 to 2004 child care price change associated with each explanatory variable in Benton County

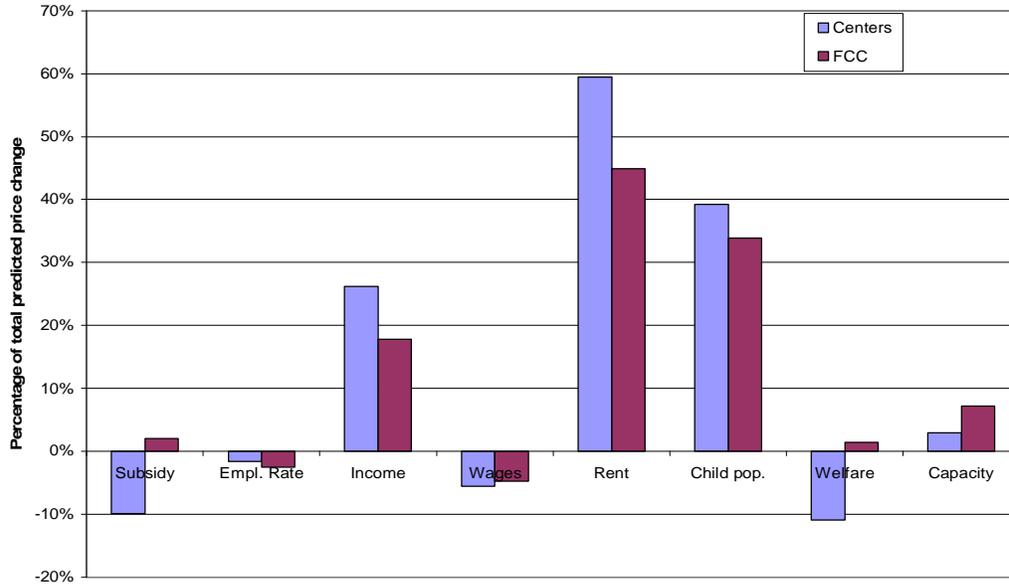
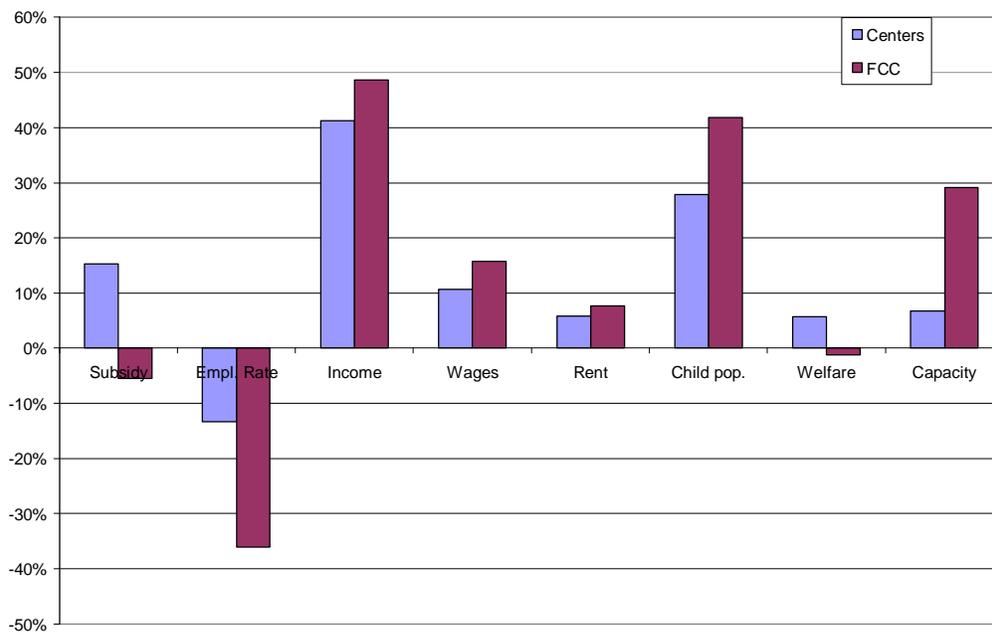


Figure 2. Percent of predicted 2000 to 2004 child care price change associated with each explanatory variable in Linn County



Sensitivity tests and model variations

We compared the results from a number of different model specifications in order to assess whether the estimated coefficients changed dramatically in different models. For the most part, the results were consistent across specifications.

No price conversions

In the market rate survey, providers were asked to report prices in the pricing modes or time units they typically use. A provider may have reported only an hourly price, for example, or may report both an hourly and weekly price. In order to maximize the data available, we converted prices in one pricing mode (e.g., weekly) into another (e.g., hourly). Using converted prices in the analysis raises concerns because there is no standard conversion practice in the market, and average prices differ when conversions are used. To ensure that conversions were not driving the results, we compared the main results reported in the study to models using prices reported by providers (with no conversions). For centers, we compared the main regression results to those from a model in which the dependent variable was the (natural log of) the (deflated) average monthly price for centers in the county (monthly pricing is the most common pricing mode for centers in Oregon). The estimated coefficient on subsidy expenditures per child was considerably larger (0.21) than in the model with converted prices (0.05). However, the sample size was about one-third smaller because counties in which centers report only hourly or daily prices could not be included, and these tend to be more rural counties. For this reason, we prefer the model including converted prices for this type of analysis. Changing the conversion formula did not influence the results, as models with different conversion ratios resulted in very similar results.

To examine the impact of conversions on the analysis of family child care provider prices, we used the (mean of) hourly prices without conversions as the dependent variable (hourly pricing is the most common pricing mode for family child care providers in Oregon). The estimated coefficient on subsidy expenditures per child was nearly identical to the results with converted prices. In both models, the estimated coefficient was nearly zero and was not statistically significant. For family child care prices, therefore, converting prices in the analysis did not substantively impact the results.

With and without child care capacity

Following the California methodology, capacity for child care centers and family child care providers was included in the main models reported in this study.¹³ Inclusion of a measure of supply in the model raises concerns about endogeneity since the price of child care affects the willingness of providers to supply that care. Models estimated without the capacity variable showed little change in the results, however. For centers, the estimated coefficient on subsidy expenditures per child was virtually identical (0.0556 versus 0.0551). Other variables in the model for center prices did not change substantively. For family child care prices, the estimated coefficient on subsidy expenditures per child was a very small positive number (0.0035) compared to the model with capacity in which the estimated coefficient was negative and very small (-0.009). The results were consistent in the sense that the estimated coefficient in both cases was very close to zero (and not statistically significant). Given that capacity was statistically significant in the model for family child care prices, and for comparability with other studies, we prefer the specification including capacity.

Correlation over time

Economic variables often exhibit autocorrelation, that is, the values in one year are related to values in the previous year. Both the Minnesota and California studies accounted for serial correlation by estimating models with an AR(1) structure. For Oregon, the price data from the market rate studies were available only every two years. Thus it is likely that autocorrelation would be less strong in the Oregon data. Nonetheless, we tested models with and without AR(1) error structures in order to check the sensitivity of the results to this assumption. The results did not change substantively. In particular, the estimated coefficient on subsidy expenditures per child (the main coefficient of interest) and its standard error were virtually identical in the two specifications. Other estimates were largely unchanged as well.

¹³ In the California study, enrollment was included separately for centers and family child care homes. We used capacity (of centers and licensed homes combined) rather than enrollment due to data availability.

Summary of the findings from the Oregon analysis

Differences in average child care prices across counties in Oregon were related to the economic and demographic characteristics of counties. Factors associated with higher demand for child care, such as higher median family incomes and higher employment rates, were positively associated with average county child care prices. Factors associated with higher costs of providing care such as higher median rent and average wages were also positively associated with child care prices at the county level. Some of these estimated coefficients were not statistically significant, which was likely due to the high level of correlation among these variables.¹⁴ Capacity and proportion of children under 13 as a share of the population were both negatively associated with child care prices. Overall, these results demonstrate that trends in average child care prices across counties in Oregon were related to differences in supply and demand factors in the child care market.

A key purpose of this study was to examine the relationship between subsidy expenditures and child care prices while controlling for other factors related to the supply and demand of child care. The empirical results suggest that the influence of subsidy expenditures differed for centers and licensed family child care providers in Oregon. After controlling for other factors, the estimated coefficient on subsidy expenditures was positive for centers, though not statistically significant. As we will discuss in the next section, the estimate is similar to those found in the two similar studies in other states. For licensed family providers, however, the estimated coefficient was very close to zero and suggests that once other factors were controlled, there was no influence on family child care prices from subsidy expenditures during this time period.

This study builds on two previous studies to examine factors related to child care prices, but it is important to recognize the limitations of the methodology and the data. First, most of the estimated coefficients were not statistically significant at conventional levels. One could interpret the results, therefore, as showing that few of these variables were associated with changes in child care prices. As discussed in the next section, the similarity of findings across studies provides some support for the view that the estimated relationships were not due to random error. The relatively small sample size (36 counties for three years) and high correlation among

¹⁴ In the next section, the comparison of results with other studies shows the similarity of findings across states and in those studies with more years of data, these factors were statistically significant.

explanatory variables may have contributed to the lack of statistical significance. Second, child care prices vary both within and across counties, and the use of county average child care prices as the dependent variable masks some of that variation. Most of the explanatory variables were not readily available at the sub-county level, however, restricting us to a county-based analysis. Many of the variables included in the model are endogenous, including, as mentioned above, child care capacity. Finally, and most importantly, the regression analysis does not prove a causal link between child care prices and subsidy expenditures or the other explanatory variables. The study has uncovered a number of statistical associations among the variables, and these estimated relationships support the underlying theoretical economic model.

III. Comparative study of factors influencing child care markets in three states

In the second part of this study, we compared the findings from Oregon with studies of factors influencing child care prices in two other states. The first study of this type was conducted in California, and that study was used as a model for a study in Minnesota as well as for this study in Oregon. The data sources and methods used in all three studies were very similar. The objective of the comparative study was to determine whether the factors influencing child care prices were consistent in different economic and policy environments. The research questions included:

- Are the factors influencing child care prices similar across the three states?
- Controlling for other factors, is the relationship between subsidy expenditures and child care prices similar across the three states?

In the final section of this report, we will consider whether specific characteristics of the child care subsidy program would be expected to lead to different relationships between child care prices and subsidy expenditures in different states.

Data and methods

Details on the data sources and methods in the California and Minnesota studies can be found in the earlier reports (Marrufo, O'Brien-Strain, & Oliver, 2003; Davis & Li, 2005). In all three studies, the child care price data were obtained from each state's market rate survey which used data from the state child care resource and referral agencies. The survey methods, frequency of the survey, sampling procedures and specific price data collected varied across the three states. Nonetheless, the price data were expected to be reasonably accurate and comparable based on the methods used in each state.

In all three studies, similar econometric models were estimated. The dependent variable in each case was the (natural logarithm) of (deflated) average child care price in a county. All three studies used a longitudinal design, although the specific time periods studied varied across the states. The same variables were used as controls, with a few exceptions. A detailed comparison of the variables used in the three studies is located in Appendix Table A-2.

Following the methods first used in California allows for comparison of the results across states.

One should be mindful, however, that some differences were inevitable because of data availability and time period studied.

Comparison of the estimated models of factors influencing child care prices across states

The factors associated with child care prices were similar across states, though there were some differences both across states and between centers and licensed family child care providers. Table 5 presents a comparison of the regression results for child care centers in Oregon with the earlier studies conducted in California and Minnesota.

Table 5: Comparison of regression results for child care center prices

Dependent variable: Mean county price for preschool-age children (centers)	California	Minnesota	Oregon
Subsidy expenditures per child	0.028*	0.077*	0.055
Employment rate	0.271*	-0.004	0.091
Median income	0.598*	-0.037	0.175
Average wage	0.123*	0.309+	0.303
Fair market rent	0.268*	0.343*	0.844*
Child share in population	0.164*	0.212+	-0.394*
Children on TANF as share of child population	0.103*	0.013	-0.078
Child care capacity (slots per child)	-0.022*	0.039*	-0.022
Rural or nonmetropolitan indicator	-0.048	-0.106	0.076

Notes: For details on variable definitions and model and data differences, see appendix. Sources: California: Marrufo, et al., 2003. Minnesota: Davis & Li, 2005; Oregon: This study.

Despite some methodological differences across studies, the results were generally similar for child care centers. Increases in child care subsidies were associated with higher center prices in all three states, though for Oregon the estimated coefficient was not statistically significant. Higher levels of fair market rent in a county was consistently associated with higher child care prices in all three states, with estimated coefficients ranging from 0.26 (California) to 0.84 (Oregon). Higher average wages were also associated with higher average child care prices, with a 10% increase in wages associated with between 1% and 3% higher center prices. Higher median incomes and employment rates were also associated with higher center prices in California and Oregon. More children as a share of the population was associated with higher prices in California and Minnesota, but with lower prices in Oregon. The estimated coefficient for the share of children on TANF was positive and significant only in California. Child care capacity showed differential associations across states, with an estimated negative coefficient in

California and Oregon (not significant) and positive in Minnesota. The dummy variable for rural locations did not have a consistent sign across the three states and was not statistically significant in any of them.

Table 6 provides a similar comparison of the regression models for licensed family child care prices in the three states. While subsidy expenditures were associated with higher child care prices in California and Minnesota, the estimated coefficient for Oregon was very close to zero. Rent levels, average wages and median income were associated with higher prices for family child care in all three states. The employment rate was associated with higher family child care prices in California and Oregon. The share of children in the population was negatively associated with child care prices in all three states, though the estimated coefficient in California was not statistically significant. More child care capacity in family child care homes was associated with lower prices in all three states, though the estimated coefficient in California was not statistically significant. Only in Minnesota were prices for family child care significantly lower in rural areas, all else equal.

Table 6: Comparison of regression results for family child care provider prices

Dependent variable: Mean county price for preschool-age children (licensed family child care)	California	Minnesota	Oregon
Subsidy expenditures per child	0.016*	0.032*	-0.009
Employment rate	0.228*	-0.009	0.112
Median income	0.190*	0.148*	0.094
Average wage	0.110*	0.190*	0.203+
Fair market rent	0.372*	0.175*	0.505*
Child share of population	-0.074	-0.070+	-0.270*
Children on TANF as share of child population	-0.018	0.002	0.008
Child care capacity or enrollment (slots per child)	-0.011	-0.101+	-0.043*
Rural or nonmetropolitan indicator	0.010	-0.113*	0.039

Notes: For details on variable definitions and model and data differences, see appendix.
Sources: California: Marrufo, et al., 2003. Minnesota: Davis & Li, 2005; Oregon: This study

The three studies used similar methodology, though there are differences in the time periods covered, the data available, and the models estimated. Nonetheless, there were similarities in the results that suggest the importance of economic and demographic factors in

explaining differences in child care prices. Factors influencing demand, such as family income, employment rates, and child population explained some of the variation in prices across counties in each of the states. Factors influencing the cost of care, including average wages and rent, also clearly were associated with higher child care prices in the three states.

Comparison of subsidy coefficient estimates across states

Using similar methodology, the estimated relationship between average child care prices and subsidy expenditures was reasonably consistent for centers across three very different states. For child care centers, the estimated coefficient on the subsidy variable ranged from 0.028 in California to 0.077 in Minnesota with the estimate for Oregon at 0.055 (table 7). In an earlier time period (1992-1996), the estimated coefficient in California was 0.056. One difference across the studies was that the estimated coefficients were statistically significant in California and Minnesota, but not in Oregon. The similarity of results gives us some basis for assuming that the estimated coefficient in Oregon reflected a positive relationship rather than random fluctuation and suggest that with additional years of data, a statistically significant relationship would be found.

For licensed family child care prices, the findings were similar in California and Minnesota. The estimated coefficients ranged from 0.16 in California to 0.32 in Minnesota (table 7). The estimated coefficient on subsidy expenditures in Oregon was very small (-0.009) and not statistically significant, suggesting that during this time period, changes in subsidy expenditures were not associated with changes in child care prices in Oregon once other factors have been controlled.

Table 7: Comparison of estimated coefficient on child care subsidies in three states

Estimated coefficient on child care subsidies per child under age 5	Oregon	Minnesota	California	
	2000-2004	1998-2004	1992-1997	1998-2000
Child care centers	0.055	0.077*	0.056*	0.028*
Licensed family child care providers	-0.009	0.032*	0.032*	0.016*
Sources: Oregon: This study; Minnesota: Davis & Li, 2005; California: Marrufo et al., 2003. *Significant at the 5% level				

The empirical results provide estimates of the percentage change in child care prices associated with a one-percentage point change in child care subsidy expenditures. While the estimated coefficients were (mainly) positive, the magnitude of the associated change in child care prices depended on the size and direction of changes in child care expenditures. In the California, after 1997 the increase in subsidy expenditures was quite large, nearly 300%, and was associated with annual price increases of about 4% for centers and about 2% for licensed family child care providers (Marrufo, et al., 2003, p. 58). In Minnesota, the growth in subsidies was much smaller than in California, about 44% over five years, and was associated with price increases of less than one percent per year (0.7% per year for centers and 0.3% per year for licensed family child care).

In contrast, subsidy expenditures declined in Oregon during the study period. On a per child basis, the median county-level decrease in subsidies was about 6%. Using the estimated coefficients, this decrease in subsidy investments would be expected to be associated with a very small decrease in center prices (less than 0.3%) and virtually no impact on family child care prices (less than 0.1%), all else equal. Of course, with other factors such as incomes and rent pushing up child care prices, child care prices rose over the time period even though subsidy expenditures decreased.

We hypothesized that subsidy expenditures in Oregon would not have much effect on demand for child care in that state because of the very low maximum payment levels compared to market prices (Grobe, Weber & Pratt, 2006). Based on the size of the estimated coefficients, the results look similar for centers across the three states despite differences in the level of maximum payment rates. However, given the lack of statistical significance in the Oregon results we must be cautious in drawing strong conclusions. For family child care providers, the estimated coefficient in Oregon was quite small (and not statistically significant), and so unlike the results in the two other states, subsidies appear to have had no effect on their prices.

Discussion: Factors influencing child care price trends in the three states

We next consider the trends in child care prices in the three states in the context of the model results and the actual economic and demographic trends that occurred in each state during the study periods. Child care prices in general have been rising over time, but some of this increase is due to overall inflation. In assessing the trends in child care prices, we take out the

effects of inflation in order to determine whether child care prices are rising faster than the prices of other goods and services. In Minnesota and California, child care prices rose considerably faster than the rate of inflation during the study time period, with annual real price increases of about 3% for both centers and licensed family providers.¹⁵ In contrast, child care prices in Oregon rose more slowly, at an annual rate (adjusted for inflation) of about 1% per year at licensed family providers and about 2% per year at centers (between 2000 and 2004). By some measures, hourly prices at family child care facilities in Oregon declined in real terms during this time period (Grobe, Pratt & Weber, 2006). Nonetheless, when all pricing modes are included, child care prices have risen in Oregon over the time period (based on average prices in each county) but at a slower pace than in California and Minnesota.

Economic theory and the empirical results suggest a number of factors which have contributed to the faster price increases in California and Minnesota relative to Oregon. Table 8 summarizes the expected correlations between these factors and prices and the trends in those factors in the three states. Income, rents, and average wages increased over time in all three states, and these will be expected to lead to increased child care prices. Employment rates are also expected to be positively associated with child care prices, though the decline in employment rates in Oregon during the economic slowdown would, conversely, put downward pressure on child care prices. These factors are expected to influence child care prices in similar ways across the states, though the actual magnitude of the changes will differ (based on the different estimated coefficients and state trends). For example, the California study was conducted during the economic boom years of the late 1990s and in contrast, Oregon was in an economic slowdown after 2000. If family incomes were rising faster in California than in Oregon during the study periods, we would expect there was greater upward pressure on child care prices in California.

¹⁵ The study time period refers to the years covered by the original studies. For California, the relevant study period was 1998 to 2000 (although the report also covered earlier years), and for Minnesota, the years 1998 to 2004 were studied.

Table 8: Expected relationship between economic and demographic variables and child care prices

	Expected correlation with child care prices	Trend during study period
Subsidy expenditures per child	+	Varied across states
Employment rate	+	Varied across states
Median income	+	+
Average wage	+	+
Fair market rent	+	+
Child share in population	+	Varied across states
Children on TANF as share of child population	?	Varied across states
Child care capacity (slots per child)	-	Varied across states

The most important differences across the three states were the trends in child care capacity and in subsidy expenditures during each of the study periods, as shown in table 9. Capacity increased dramatically in California (by 21%), remained more or less the same in Minnesota, and declined in Oregon. Of course as prices rise, providers may be willing to expand capacity or new providers may open. Thus we cannot rule out the possibility that capacity expanded in California in response to rising prices. However, all else equal, an increase in capacity will help to moderate price increases due to an increase in demand.

Table 9: Trends in child care supply, subsidies and prices across the three states

	California	Minnesota	Oregon
Time period covered	1998 to 2000	1998 to 2004	2000 to 2004
Licensed/regulating child care supply (per child)	Increased 21% statewide with large regional variations.	Statewide, capacity was relatively stable, though family capacity declined and center capacity increased in the Minneapolis-St Paul metropolitan area.	Decline of about 13% statewide
Subsidy expenditures per child adjusted for inflation	Very large increase (289%) in subsidies between 1998 and 2000	Increase of 44% during the study period	Decrease of about 6% over the study period.
Child care prices, adjusted for inflation	Rose about 3% per year for both centers and licensed family homes.	Rose about 3% per year for both centers and licensed family homes.	Rose 1% per year at licensed family homes and 2% per year at centers.
Sources: Oregon: This study; Minnesota: Davis & Li, 2005; California: Marrufo, et al., 2003.			

Of key interest is the relationship between subsidy expenditures and child care prices. In the empirical model, the estimated coefficients on subsidy expenditures were positive for centers in all three states (though not significant in Oregon) and positive for licensed family providers in California and Minnesota. Thus, all else equal, we would expect child care prices to rise with increased subsidy expenditures in California and Minnesota. During the study periods, subsidy expenditures increased rapidly in California and increased more slowly in Minnesota. In Oregon, subsidy expenditures actually declined between 2000 and 2004, which might lead to a decrease in the demand for licensed child care. Thus we would expect to see child care prices rise more slowly in Oregon than in the other two states. Prices rose faster than inflation in all three states, but much faster in California and Minnesota than in Oregon. While factors such as rising median incomes, rent and wages are likely to push up child care prices in all states, differences in other factors fit with the pattern of price changes observed in the three states.

Having established the background factors that influence child care prices based on the three studies, we next turn to a more detailed look at the role of the subsidy program in child care markets. In the next section we develop a set of research questions to further investigate the relationships among policy, child care subsidies and child care prices.

IV. Child care subsidy program policies and child care markets

Using similar methods, the three studies show reasonably similar results across the three states, particularly for child care centers. Yet an important question is whether we should expect the results to be the same. The hypothesis that government funding of child care subsidies would affect child care demand and therefore prices relies on a number of assumptions about the child care market. Changes in child care supply, differences in use of center versus home-based care, demographic characteristics and policy differences could all be expected to alter the relationship between subsidy spending and demand for child care. Thus, it is reasonable to expect that the relationship between subsidy expenditures and child care prices would differ across locations (and over time).

According to economic theory, under some circumstances subsidy expenditures would not be expected to impact the demand for child care. For subsidy expenditures to impact prices through increased demand, the supply of child care must not be perfectly elastic. If supply is perfectly elastic, the supply of child care would increase fully in response to an increase in demand and no price increase would occur (all else equal). In addition, if the families receiving subsidies use child care that is not in the licensed market, there may be no increase in demand for licensed care and therefore no upward pressure on prices (of licensed care). Families may be less likely to use licensed care in states with low subsidy payment rates relative to market prices, especially if subsidy payment rates are combined with high copayments resulting in limited dollar amounts paid by the state. Finally, whether the demand increase impacts prices differentially for centers and licensed family child care will depend in part on parents' preferences for different types of care and the supply responses of centers versus family providers.

In order for increased subsidies to put upward pressure on prices (of licensed care), families using subsidies must have increase demand for licensed care.¹⁶ Whether families will increase their demand for licensed care is likely to vary across states due to differences in state child care regulation and subsidy policies, family preferences, and child care markets. In all three of these states, parents who apply and are eligible for a subsidy receive vouchers that they may

¹⁶ Most care that is (legally) not licensed is provided by relatives and close friends who typically do not have a price they charge for child care to the general public.

use with (almost) any child care provider. The provider may be licensed or may be exempt from state licensing rules. The rules for who must be licensed vary across states, as does the proportion of subsidized care that is license-exempt (which is called “legally non-licensed” care in Minnesota). The California study reports that in 1999, about half of all families on subsidy used care that was licensed (Marrufo et al., 2003, p.29). In Minnesota in 2003, about 71% of children on subsidy were in licensed settings (Office of the Legislative Auditor, 2005, p.14). In contrast, in Oregon only about 37% of children on subsidy were in licensed settings. We would predict a larger demand response (and therefore price effect) in states where a higher percentage of subsidized children are in licensed settings, all else equal.¹⁷ Thus we would expect a smaller price effect in Oregon than in Minnesota and California, given the difference in percentage of subsidized care that is licensed.

State regulations concerning which facilities must be licensed have a direct effect on the availability of licensed settings; however, payment rates in the subsidy program will also affect availability as providers may be unwilling to accept vouchers if payment rates are lower than their usual prices. Thus we would expect a larger demand response (all else equal) in states with higher payment rates for providers. Prior to October 2003, the maximum payment rate in California was set at 1.5 standard deviations above the mean price in the county, which covered over 90% of the providers on average across the state (Marrufo et al., 2003, p.29). During the time period of the Minnesota study, payment rates were set at the 75th percentile of prices in each county (with a few exceptions where regional calculations were used because of small numbers of providers). In contrast, in Oregon, the payment rates were quite low relative to market prices during the study period. The percentage of toddler slots covered by maximum payment rates statewide in Oregon fell from 38% in 2000 to 21% in 2004 (Grobe, Pratt & Weber, 2006, p.III). Given the much lower payment rates in Oregon than the other two states, one would expect a smaller demand response (for licensed care).

Most child care is paid for by parents rather than by government subsidies, yet the size of the subsidy program as a proportion of the market differs across states. States where the subsidy program is a larger portion of the market may see a stronger relationship between child care

¹⁷ It is important to note that as state policies with regard to payment rates change, families with different preferences for licensed versus non-licensed care may take up the subsidy, and providers may change their willingness to accept vouchers. State regulations on which providers need to be licensed will also influence the proportion in licensed care. For example, some states exempt providers from licensing if they care for children from only one family other than their own.

prices and subsidy expenditures. Throughout the 1990s spending on child care subsidies rose rapidly in California, with particularly large increases between 1998 and 2001. The study in California estimates that subsidies accounted for about 20% of the licensed child care market in 1999 (Marrufo, et al., 2003, p.58). In Minnesota, one study estimated the proportion of slots paid for (at least in part) by subsidies to be about 6% of licensed family provider slots and 10% of center slots (Minnesota Department of Human Services, 2005, p.15). In Oregon, of all children in paid center and family child care, about 7% have some or all of their child care fees paid with a subsidy. Thus, in all three states, the majority of child care is paid for by parents rather than government subsidies. Nonetheless, the share of subsidy is large enough, particularly in California, to have some impact on the private child care market.

Finally, the magnitude of a price response will depend not only on how demand changes, but in the responsiveness of providers to market forces. If the supply of child care can respond quickly, that is, if providers expand capacity or new providers open in response to an increase in demand, then price effects will be moderated. The responsiveness of supply is likely to differ for centers and for family providers, and will depend on state regulations as well as local economic factors. It is generally easier to set up a family child care business than to open a child care center because of differences in regulations. Thus, we would expect family child care supply to be more responsive than center-based supply. Of the three states, total child care supply grew most rapidly in California during its study period, while in Oregon capacity declined overall. On a per child basis, licensed capacity increased 21% in California between 1996 and 2000 (Marrufo, et al. p. 39). Capacity increased in centers in Minnesota, while capacity in licensed family homes declined, particularly in the Minneapolis-St Paul metropolitan area (Davis & Li, 2005). In Oregon, the number of slots per child under age 13 fell about 13% between 2000 and 2004. If demand increases, child care prices are likely to rise more slowly in places where supply is able to increase quickly in response. The observed change in capacity during each study, however, reflects the combined effects of a number of supply and demand factors.

In California, because of the relatively large proportion of the market funded by subsidies along with the high payment rates, we would expect the price effect to be larger compared to other states, all else equal. But at the same time, the price effect may have been offset by the rapid expansion of child care supply and by the sizeable proportion of families using non-licensed care. In Minnesota, the price effect may be higher than elsewhere due to a lower

proportion using license-exempt care and the lack of an increase in supply during the study time period. In Oregon, declining subsidy expenditures may have put downward pressure on child care prices, which was then offset by other factors such as rising rent, income and wages. With low payment rates and only a small portion of the market in subsidized care, we would expect a smaller price effect than elsewhere.

Future research

This study provides an important comparison of the factors related to child care prices in three states. The empirical results were generally consistent across the states, but for a number of reasons, we would expect the relationship between subsidy expenditures and child care prices would differ across locations (and over time). With only three states (and different time periods), we cannot fully address the question of why and how the relationship varies. Nonetheless, we have considered a number of hypotheses about how the relationship between child care subsidy expenditures and child care prices is likely to differ due to policy and market differences. First, it seems likely that in states in which a greater percentage of children on subsidy are in license-exempt care, the estimated price effect would be smaller. In addition, in places where the proportion of all child care that is subsidized is higher, any increase in subsidy expenditures would likely have a greater effect on prices. The role of subsidy payment rates is complicated because maximum payment rates will influence the use of licensed versus non-licensed care (if providers are unwilling to accept subsidy families when payment rates are low). Higher payment rates may lead to greater use of licensed child care, though the evidence from California does not, on the surface, support this hypothesis. Finally, the responsiveness of supply to any change in demand will influence the trend observed in actual child care prices. Numerous factors determine the responsiveness of supply, not least of which are regulations and policies concerning licensing, training, and other requirements for child care providers. An important topic for future research is the factors that affect the responsiveness of (licensed) child care supply to changes in demand.

With regards to subsidy policy, this study suggests a number of research questions that need to be addressed in future research:

- Does the prevalence of non-licensed care among children on subsidy alter the association between subsidy expenditures and child care prices?
- How does the relationship between subsidy expenditures and child care prices change as the proportion of the market funded by subsidies increases?
- How do subsidy program policies with regards to maximum payment rates and copayments influence the use of non-licensed providers by subsidy families?

V. Conclusions

The overall goal of this study was to increase our understanding of the factors influencing child care prices and, based on that understanding, assess the likely impact of public child care subsidy expenditures on prices in the private child care market. Child care price trends in three states were shown to be related to a number of variables suggested by the basic economic model of supply and demand. Factors such as higher family incomes and employment rates were associated with higher child care prices as were factors related to supply such as wages and rents. Subsidy expenditures were found to be positively associated with child care prices, though in general their contribution to price increases has been small. Only in California, where subsidies increased almost 300% in a few years, did the results suggest that child care price increases associated with the rapidly increasing subsidy expenditures would exceed one percent per year.

Should we be concerned if public expenditures on subsidies affect child care prices? Evaluating the consequences of the effect on child care prices involves two key issues: affordability for families and quality of child care. On the one hand, child care price increases put increased strain on family budgets. Families with middle and low incomes who do not qualify for child care subsidies will especially feel the pinch. Yet at the same time that many families struggle with child care expenses, there are concerns about the quality of care and low levels of pay for child care workers (Center for the Child Care Workforce, 2004). Higher child care prices may allow facilities to improve compensation, which research has shown to be associated with quality and stability. With higher prices, providers may also be able to improve facilities, equipment and supplies, possibly leading to higher quality care. Given the long-run societal benefits from high quality child care for low-income children, improving the quality of care is an important public policy objective (Rolnick & Grunewald, 2003).

The estimated relationship between subsidy expenditures and child care prices in the three states was positive, but small in magnitude. While higher prices suggest the potential to improve quality, the magnitudes observed in these three states were not likely to be large enough on their own to have a substantial effect on overall quality in the market. At the same time, the results suggest that any decreases in subsidy expenditures would put downward pressure on child care prices. Concerns about budget deficits in many states may lead to spending cuts in child care subsidy programs. Depending on the size of these cuts, a decrease in child care demand may

make it difficult for providers to improve or maintain quality if (inflation-adjusted) prices decline.

The relationship between subsidy expenditures and prices is likely to differ depending on the characteristics of the local child care market and subsidy policies. Overall, the results of the three studies suggest that the effect of subsidies on child care prices was not large enough to distort the market. However, in locations where subsidized care is a substantial part of the market and where more subsidy families choose licensed care, the relationship between licensed prices and subsidies is likely to be stronger. While many studies have examined parents' decisions about the type of child care used, few have explicitly focused on the influence of subsidy policies on those decisions. Further research is needed to test these hypotheses.

Advocates worry that maximum subsidy payment rates act as a ceiling on the prices that providers charge. At the same time, some legislators worry that providers use subsidy payment rates to increase their prices. In general, there is a lack of understanding of how maximum payment rates are determined, their influence on the market, and the role of market rate surveys (Grobe, Weber, Davis, Kreader & Pratt, 2008). To the extent that the child care market operates competitively, the factors influencing supply and demand will determine (average) prices. Of course, it is possible that some providers use maximum payment rates to set their prices, or that in areas where markets are thin, providers set prices that are not closely tied to local supply and demand conditions. The child care market is complex, and does not perfectly fit the model of a competitive market. Yet, the results from the three studies support the view that, overall, child care markets respond to demand and supply factors. The studies find consistent relationships between economic variables and child care prices in three states. However, further research into the influence of different government policies on child care markets is needed to deepen our understanding of how child care markets work. In particular, future studies should examine how child care providers respond in terms of both price and capacity to economic and demographic trends within the context of different subsidy policy environments.

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Appendix Table A-1. Data sources and definitions (Oregon)

Variable	Definition	Source
Child care center average price	Average hourly price for preschool-age care at centers	Oregon Market Rate Study databases, 2000, 2002 and 2004
Licensed family child care price	Average hourly price for preschool-age care at licensed family child care providers	Oregon Market Rate Study databases, 2000, 2002 and 2004
Child population share	Percent of population under age 13	Total population and population under age 13 by county. Source: U.S. Census 2000 and census population estimation
Employment rate	Percent of labor force employed	Average employment by county Source: Oregon Employment Department
Median income	Median family income	US Dept. of Housing & Urban Development (HUD)
Average weekly wage	Mean weekly wage for all workers	Average wage for all industries by county. Source: Oregon Employment Department
Fair market rent	Fair market rent (county or MSA)	US Dept. of Housing & Urban Development (HUD)
Proportion receiving welfare	Number of children under age 18 receiving TANF as percent of all children	Oregon Department of Human Services
Child care capacity per child	Total center plus family slots per child under age 13	Estimate of Child Care Supply Oregon Child Care Research Partnership
Rural	= 1 for counties outside the Portland metropolitan area	
Subsidy expenditures	Subsidy expenditures	Sum of expenditures on work and job readiness child care subsidies. Source: Oregon Dept. of Human Services
Inflation	Inflation estimate used to deflate variables denominated in dollars	Annual urban consumer series for Portland-Salem, OR-WA Source: Bureau of Labor Statistics (BLS), U.S. Dept. of Commerce

Appendix Table A-2: Comparison of data and variables in the three studies

Variable	California	Minnesota	Oregon
Child care price (county mean)	Mean price for a child age 2 to 5 on a weekly basis	Mean price for preschool-age children on a weekly basis	Mean price for preschool-age children on an hourly basis
Subsidy percentage	Child care subsidy dollars per child age 0 to 5	Child care subsidy expenditures per child under age 5	Child care subsidy expenditures per child under 13
Child population	Ratio of preschool age children to total population	Percent of population under age 5	Percent of population under age 13
Employment rate	Share of population employed	Percent of labor force employed	Percent of labor force employed
Income	Median household income	Median family income	Median family income
Wage	Average annual wages for child care workers	Average weekly wage for all workers	Average weekly wage for all workers
Rent	Fair market rent	Fair market rent	Fair market rent
Welfare receipt	Share of preschoolers in families who receive welfare	Percent of children under age 5 in families receiving welfare	Percent of children under age 18 receiving welfare
Capacity per child	Center and family preschool enrollment per preschool-age child	Center and family slots per child under age 5	Center and licensed family slots per child under age 13
Rural indicator	In Northern California, Central California or Mother Lode regions	Not in Region 11 (Minneapolis-St Paul metropolitan area)	Not in Portland metropolitan area
Years	1992-2000, except 1997	1998-2004	2000, 2002, 2004
Inflation adjustment	Yes, but details not provided	CPI Minneapolis-St Paul	CPI Portland-Salem
<p>Note: Certain variables were not available in all states on an annual basis, such as county-level estimates of child care worker wages and estimates of the number of children in different age groups. Sources: California: Marrufo et al., 2003. Minnesota: Davis & Li, 2005; Oregon: this study.</p>			

Appendix Table A-3: Comparison of key child care subsidy policies in the three states

	California	Minnesota	Oregon
Income eligibility ceiling	225% of federal poverty level or 75% of SMI. ^a	257% of federal poverty level or 75% of SMI. ^a	185% of federal poverty level. ^e
Parental co-payments	Maximum co-pay was \$10.50 per day for full-time care, for families with incomes above 50% of state median income. ^b	At 50% of state median income, copays averaged 5-6% of income. Maximum copays at higher incomes were up to 20% of family income. ^c	Co-pays were up to 68% of family's income during the study period. ^e
Maximum provider payment rates	Set at 1.5 times the mean price in the county (which was approximately the 90 th percentile). ^b	Set at the 75 th percentile in most counties (until 2004)	Highest maximum rates were adequate to purchase 21% of slots in 2004 ^f
Waiting lists	200,000 children on waiting lists in 1998 ^b	Waiting lists in some counties.	No waiting lists are maintained.
Percent of subsidized care in licensed settings	About half of all families on subsidy used care that was licensed. ^b	In 2003, about 71% of children on subsidy were in licensed settings. ^d	37% of children on subsidy were in licensed settings. ^e
<p>Notes: ^a Long, Kirby, Kurka & Waters, 1998. ^bMarrufo, et al. 2003. ^cBased on Minnesota Department of Human Services, copay schedule, SFY2003. ^dOffice of the Legislative Auditor, 2005, p. 14. ^eDavis, Grobe, & Weber (forthcoming). ^fGrobe, Pratt & Weber, 2006, p.III.</p>			

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