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# Economic Impact of the Informal Childcare Sector in Kansas

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**Abstract.** The informal childcare sector provides a significant proportion of childcare in the U.S. However, because informal sectors are not captured in our national income accounting system, the value to our economy is largely unknown. This study examines the size of the informal childcare sector in the state of Kansas. Using IMPLAN data we also calculate implicit multipliers for the sector in order to estimate the full economic effects of informal childcare on the economy of Kansas and its regions. We find that the informal childcare sector creates large economic effects compared to the formal childcare sector. More specifically, the study estimates that informal childcare created about 128,494 direct jobs within the sector, another 6,842 jobs in other sectors, and \$971.5 million in total value added in Kansas in 2005. We found that families in non-metro areas are more likely to use informal childcare than those in metro areas. As a result, even though the non-metro multipliers are smaller than those of metro areas, the informal childcare sector generates larger economic effects in non-metro areas than metro areas in general.

## 1. Introduction

### 1.1. The Informal Economy

Even in a highly developed economy such as that of the U.S., a large amount of economic activity occurs outside the formal economy. This is particularly true for childcare. Despite the growth in the formal childcare sector, many American families still depend on childcare that is not included in our formal measures of the economy. Various terms are applied to this activity, including the informal economy (Feige, 1990; Sassen, 1994; Ranis and Stewart, 1999; Brown-Lyons et al., 2001; Berg et al., 2005), the underground economy (Reed, 1985; Feige, 1990; Cebula, 1997; Schneider and Enste, 2002; Bajada and Schneider, 2005), the shadow economy (Schneider, 2004), the unreported economy (Cebula and Feige, 2012), the grey economy, the black economy (Pissarides and Weber, 1989; Lyssiotou et al., 2004), and the illegal economy. There are also numerous definitions of these sectors. Feige (1990) distinguishes between four categories of underground activities—

the illegal economy, the unreported economy, the unrecorded economy, and the informal economy. He then carefully distinguishes and defines each type.<sup>1</sup>

In this paper we include elements of each of these activities. According to Feige (1990), informal activities include those that “...circumvent the costs and are excluded from the benefits and rights incorporated in the laws and administrative rules covering property relationships, commercial licensing, labor contracts, torts, financial credit and social security systems” (p. 10). This category includes many types of non-formal childcare because of the absence of contracts and regulations. Unrecorded activity “...consists of those economic activities that circumvent the institutional rules that define the reporting requirements of government statistical

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<sup>1</sup> For additional discussion of the types of underground or non-formal economic activity, see Schneider (2004) and Schneider and Enste (2002).

agencies" (p. 9) and includes essentially all types of non-formal childcare. Some unrecorded childcare is unpaid, while much of the remainder is unreported. Unreported activities are defined as "those economic activities that circumvent or evade the institutionally established fiscal rules as codified in the tax code" (p. 7). In fact, much economic activity goes unreported with the aim of evading income and other taxes (Cebula, 2013). Not surprisingly, it is particularly difficult to enforce tax compliance by sole proprietorships, and as a result this type of economic activity, which includes a vast majority of child care providers, is more likely than other activities to go unreported (Alm and Yunus, 2009). As in other sectors of the U.S. economy, much of the non-formal childcare sector is unreported, at least partially, in order to evade taxation (Cebula, 1997; Cebula and Feige, 2012). Finally, illegal activities include "...economic activities pursued in violation of legal statutes defining the scope of legitimate forms of commerce" (p. 7). While this type of childcare is probably relatively rare, some providers do operate outside the legal parameters regarding facilities, training, insurance, the ratio of caregivers to children, and other standards. In this paper we use the term informal to include all of these types of activities.

Unrecorded economic activities are, by definition, not included in Gross Domestic Product (GDP) because payments are either not made or are unreported. As a consequence, despite numerous economic impact analyses of the formal childcare sector, few studies have made careful estimates of the economic contribution to regional or national economies of the unrecorded, illegal, and otherwise informal childcare activities. This study makes such an estimate and compares it to a study of the formal sector (Choi et al., 2009).

Because of the potential size and indirect effects of the informal childcare sector, an accurate estimate of its contribution to local economies is important. Estimates of the size of the informal sector can provide improved estimates of true GDP, National Income (NI), and employment and unemployment rates. Omission of informal sectors has long been a criticism of national economic indicators. Bivens and Volker (1986) note that omission of the aggregate informal sector in the calculation of GNP leads to bias in measures of the employment rate. For example, a shift of an informal sector job to the formal sector increases estimates of GNP and NI but does not reflect a real change in national output, employment, or wellbeing.

Previous studies of the informal economy have typically focused on the potentially negative aspects of informal-sector activities such as lost tax revenue, poor working environments (and practices), and inequitable distribution of income (Reed, 1985; Feige, 1990; Bajada and Schneider, 2005). But the informal sector has positive features as well. Given the linkage between the informal and formal economies, the informal economy ultimately stimulates the national economy. Rains and Stewart (1999) divide informal sector activities into traditional and modern informal activities. Compared to traditional informal sectors which are isolated from the rest of the economy, modern informal sectors are more capital-intensive, involve larger firms, and are more dynamic users of technology. Modern informal sectors contribute significantly to economic development by generating substantial levels of income and by contributing to the growth of an economy's output. Also, on the production side, modern informal sectors often satisfy the demand by formal sector firms for intermediate and capital goods, thus playing key roles in supply chains. According to Schneider and Enste (2002), more than two thirds of the income earned in the informal economy is spent in the formal economy. Thus, it is important that we recognize and account for the economic linkage between formal and informal sectors of the economy.

## 1.2. Informal Childcare

The role of childcare in child development and in increasing the ability of parents to enter the labor force is well established. However, the informal childcare sector is often found to be of lower quality than formal childcare. Brown-Lyons et al. (2001) found that the educational level of informal childcare providers is lower than that of formal childcare providers. Bernal and Keane (2011) show that children cared for by informal child caregivers have lower cognitive scores than children cared for by formal childcare workers. The authors explain that informal childcare providers are less likely to be trained in childcare techniques and thus are less likely to provide adequate cognitive stimulation to the children they care for. Furthermore, they point out that children in informal childcare have fewer opportunities to have stimulating interaction with other children when compared to children in formal childcare settings where the number and diversity of children is greater. Brown-Lyons et al. (2001) also discuss potential health and safety concerns in informal childcare settings. Thus, to enhance human capital and to increase the productivity of the labor

force, it is important that we find ways to improve the quality of informal childcare. An important first step is to better understand the role that informal childcare plays in our economy.

This study estimates the economic effects of the informal childcare sector on the economy of Kansas and its regions. County data for 2005 (enrollment and hourly cost data) are used to estimate the size of informal childcare in each of several regions of Kansas. This estimate of the direct economic effects is then used to calculate indirect effects using the IMPLAN input-output model.<sup>2</sup> The regional estimates of impacts were based on a method developed by Choi et al. (2009).

## 2. Previous Studies of Informal Sectors

### 2.1. Defining and Measuring Informal Sectors

There is a large research record dealing with the economic size and impact of the childcare sector, especially the formal childcare sector (see Ribeiro and Warner, 2004, and Warner and Liu, 2006, for example). These studies vary in many respects. Many studies employ input-output models to calculate the multiplier effects as well as the direct effect of the sector. The geographic foci also differ among these studies, with some focused on the region (Choi et al., 2009), while others look at the state (Child Care Division, Oregon Employment Department, 2005; National Economic Development and Law Center, 2003; Windham Child Care Association and the Peace & Justice Center, 2002; Mid-America Regional Council, 2003; Warner, 2009) or the national level by industry (Warner and Liu, 2006). Liu et al. (2004) and Liu and Warner (2009) compare each state's child care multipliers and analyze differences among the 50 states.

Some studies focus on particular issues related to the sector. For example, Ribeiro and Warner (2004) examine the economic effects of government investment in the Kansas childcare sector. They find that the leverage ratio of federal funds to state investment in the childcare sector is about 3 to 1 and that each dollar injected into the childcare sector stimulates \$1.98 in total output in the Kansas economy. Thus, they reason that each \$1 of Federal investment contributes approximately \$6 to the Kansas economy ( $3 \times \$1.98 \approx \$6.00$ ). Studies of the eco-

nomic effects of the informal childcare sector are few (Warner, 2006, Burton et al., 2002).

Several methods have been developed to estimate the size of informal sectors, but it is difficult to determine the accuracy of these methods because there is rarely enough data to directly assess their accuracy. Schneider and Enste (2002) address the issue of measuring the informal economy in general. They categorize estimation methods as direct, indirect, and model-based. The direct approach is to use well-designed sample surveys to estimate the size of the informal sector. For example, a direct approach to estimating the size of an aggregate informal sector would be to randomly choose taxpayers and compare the income they declare for income tax purposes with other indicators of income.

The indirect approach involves estimating an unobservable variable using an observable variable. It uses any of various indicators of informal sector activities. For example, a gap between national expenditure and income is an indirect indicator of the aggregate informal economy. Another indirect indicator is the difference between the income measure of GDP and the expenditure measure of GDP.

The modeling approach simultaneously considers multiple variables that might explain the informal sector. It constructs a structural equation model using observable variables related with informal sector and estimates unknown coefficients.

There have been studies of other informal sectors that inform the current study. Pratt (2007) applies input-output methodology to measure the value of non-market activities in the household using the 2005 American Time Use Survey (ATUS). He calculates how an increase in non-market (informal) activity by households affects the 2005 national GDP and interprets this as the shadow value of unpaid household time. He calculates that, at the margin, an increase of one full-time equivalent non-market worker would decrease the national GDP by \$11,173. Pratt (2009) uses an estimated implicit value to demonstrate household production within an input-output model. Integrating ATUS data with the National Income and Product Accounts (NIPA) 2006 input-output table, he demonstrates a relationship between family-care time and national output by occupation. For example, an increase of one hour of time of family care by a Management, Business, and Administrative worker decreases national output by \$71.

<sup>2</sup> The 2005 IMPLAN data is based on the 2002 national input-output model of the United States produced by the Bureau of Economic Analysis, regionalized and updated to the year 2005.

## 2.2. Estimating the Value of Informal Childcare

Estimating the value of benefits produced by the informal childcare sector is much more challenging than estimating the value of most other sectors. The economic value of any sector may be estimated on either the supply-side (cost) or the demand-side (benefit). In a well-functioning competitive market, economic theory predicts that the marginal cost of producing a good or service equals its marginal benefits to the marginal buyer. If, however, the price of a good or service is established under less than perfectly competitive conditions, the price may be higher or lower than either the marginal cost of producing the service or the marginal benefit to the buyer. A large part of informal childcare is unpaid or based on barter arrangements. Even informal childcare that is paid for may be significantly underpriced. Informal childcare providers are frequently reluctant to charge as much as formal providers (Folk, 1994; Brown-Lyons et al., 2001).

According to the 2004 Survey of Income Program Participation (SIPP) Wave 4 file, among working parents who use childcare on a regular basis, about 50 percent of children under age five are in relative care, grandparent care, sibling care, or non-relative care. Table 1 shows the percentage of families that pay for childcare and the average hourly pay for each childcare arrangement from 2004 SIPP. Families in informal childcare arrangements are less likely to pay for childcare than those in formal arrangements. Over 85 percent of children in family childcare and center care pay for childcare. But only 25.94 percent of families in relative-care arrangements pay for the childcare and only 12.28 percent pay for grandparent childcare.

The hourly payment for both formal and informal childcare varies significantly. The range of payment is especially wide in informal childcare. On average, families pay \$3.13 per hour for relative care and \$1.83 per hour for grandparent care. Families who use non-relative care pay \$3.93 per hour.

**Table 1.** Childcare Arrangements for Children Under Age 5\* and Hourly Pay in 2004.

Childcare	Childcare arrangement	Percent of children in each type of childcare arrangement**	Percent paying for care	Average amount of pay per hour*** (\$)
<b>Informal</b>	Relative care	10	25.94	3.13
	Grandparent care	31	12.28	1.83
	Sibling	3	NA	NA
	Non-relative care****	5	67.79	3.93
<b>Formal</b>	Family childcare	8	88.83	3.09
	Center care	23	85.81	3.47
	Preschool	7	74.13	3.89

Notes:

\* Living with both parents and both parents are working, or living with a single parent who is working.

\*\*The total number of observations is 2,041. Children in multiple childcare arrangements are double counted.

\*\*\*Average amount of pay per hour is estimated among parents who pay childcare.

\*\*\*\*Non-relative care includes childcare provided by friends, neighbors, babysitters, and nannies.

Source: 2004 Survey of Income Program Participation (SIPP).

## 2.2. Methods for Valuing Non-market Services

Placing a value on self-provided, unpaid, or bartered services has challenged economists for some time. Much of the economic research in this area to date has revolved around household production activities. As a result, several methods of valuing unpaid household services have been proposed and tested. Most previous studies have focused on valuing unpaid labor. In this study we are interested in valuing labor plus the services of facilities and other

inputs used to produce informal childcare, although labor clearly comprises a majority of these inputs.

Several estimation methods have been developed to measure the value of unpaid services. These include the market replacement cost, opportunity cost, value-added, and contingent valuation approaches. In this study we use a version of the market replacement cost approach, but first we describe the other approaches for comparison purposes.

The opportunity cost approach values unpaid work using an estimate of the individual's market

wage if they were not performing the unpaid service and is based on the observed wage of workers who closely match the unpaid worker's skills and other relevant attributes (Sharp and Abdel-Ghany, 1997). The advantage of the opportunity cost approach is that it is based on actual market wages. However, the opportunity cost approach may underestimate the value of unpaid work by ignoring the fringe benefits (Folbre and Yoon, 2008) and in the case where caregivers are retired (Vaus et al., 2003). Most importantly, this is a cost-side approach and may have little relationship to the value of the service to the buyer.

The value-added approach measures the cumulative contribution of inputs to the final output. In the study of household meal preparation, Bivens and Volker (1986) used the average expenditure for meals purchased outside the home and subtracted the weekly cost of preparing the food at home (fuel consumption and household durables) to get the mean weekly value added of labor and profits in the meal preparation. Using this approach the authors calculated that the unmeasured value added of meals prepared within the household was equal to almost 7 percent of GNP in 1977. Dulaney et al. (1992) compared the value-added approach<sup>3</sup> and the market wage rate approach and found that the latter exceeded the imputed value added by labor by about 43 percent.

The contingent valuation method involves the valuation of non-market products by directly asking people how much they are willing to pay (WTP) to reduce the time devoted to producing the non-market product (Quah, 1987). In other cases people are asked how much they are willing to accept (WTA) for providing additional units of the service (Berg et al., 2005; Dulaney et al., 1992). Quah (1987) compared the hourly value of household production with previous studies using the market replacement cost approach. The contingent valuation approach predicted lower values than those from the market replacement cost approach. Like the opportunity cost and value-added approaches, this approach provides a supply-side estimate and generally underestimates the demand-side value of childcare services.

The market replacement approach estimates the value of non-market work by calculating the value of comparable market services—what the buyer would have to pay to get the service with comparable quality from a market source. For example, in a study of household activities, Peskin (1982) estimated the market cost of two replaceable services—general housekeepers and providers of special household services. The specialist approach uses the market value of similar services in the market such as cooking, childcare, and cleaning. Each activity is then valued using a specialist's wage, in this case a cook, a childcare worker, and a cleaner. Folbre and Yoon (2008) estimate the value of unpaid childcare for households with at least one child under age 13 using the market replacement cost approach. In their study, they categorized childcare activities into supervisory care, direct care, and indirect care. The value of the various childcare activities was then based on the average wage rate of similar occupations. Using this approach they found that the hourly value of unpaid childcare work is \$10.27 for women and \$8.61 for men in 2003. They also show that the average yearly value of unpaid childcare for women is twice the average annual income from market work.

Market replacement cost has the advantage that it is simple to use when there is a similar occupation in the market. But it is problematic if appropriate market wage information is not available. There are several other disadvantages of using market replacement cost. Quality differences between market work and unpaid household work often exist. Unpaid household workers may be of lower or higher quality compared to market workers, in which case the market replacement cost method will overestimate or underestimate unpaid work, respectively. In addition, if it is possible to perform several activities simultaneously (child care and laundering, for example), it is not clear which activity should be used as the basis for valuation. Finally, the market cost of services such as this should include wages, expenses, and profits. A specialist wage, on the other hand, only includes labor costs and thus would be an underestimate of the unpaid service.

<sup>3</sup> Dulaney et al. (1992) interviewed 480 Missoula, Montana, urban area households in 1985. They categorized household outputs with 8 different items and applied the market prices of comparative products for household outputs. After deducting the cost of intermediate inputs used to produce household output, they imputed the value added of household outputs.

### 3. Data and methods

#### 3.1. Estimating the Implicit Value of Informal Childcare

In this study we employed the market replacement approach to estimate the implicit value of informal childcare. This assumes that the value of informal childcare to the buyer is equal to the value (and market price) of formal childcare if it were available. Implicitly, the market replacement cost approach assumes that the informal childcare and formal childcare are perfect substitutes, which is rarely true in practice. On one hand, formal childcare may be higher valued than informal care because it is regulated and inspected and involves professional workers. On the other hand, informal childcare may be more valuable because the caregivers receive direct utility from the process and may be more attentive to the children.

We adapt the market replacement approach to match the unique characteristics of the informal childcare sector. In particular, childcare services vary according to the age of the child, the time of year, and the location of the family. The total yearly expenditure for informal childcare is estimated differently for preschool children (ages 0-4) and school-age children (ages 5-12)<sup>4</sup>.

First, we base our estimates on a 48-week year and assume that on average school-age children are cared for by their parents during the remaining 4 weeks. Cappizano et al. (2002) notes that during the summer many school-age children spend time at home with their parents for one or two week intervals.<sup>5</sup> The rest of the 4 weeks per year allows for spring recess, winter recess, and annual vacation time.

Next we assume that preschool children require 9 hours of care per day for 48 weeks per year, whereas the needs of school-age children would differ between the periods when school is in session and the non-school periods. During the school year (about 36 weeks), school-age children require part-time care (5 to 20 hours per week), while during non-school periods (12 weeks) they require full-time care (45 hours per week).

In this study full-time childcare is defined as 26.25 hours per week for 48 weeks, i.e., the weighted average of full-time weekly hours during the school year (20 hours<sup>6</sup> for 36 weeks) and full-time weekly hours during the summer (45 hours for 12 weeks). On this basis the study estimates that the total informal childcare hours required are 2160 hours per year for preschool children and 1,260 hours per year for school-age children.

Following is a description of the procedure used here to estimate yearly informal childcare expenditures. The total number of children in informal childcare is expressed in full-time equivalent (FTE)<sup>7</sup> units. In the calculation of total yearly expenditures, this study uses the lowest estimated informal childcare value in order to assure that the size of the sector is not overestimated. In addition, this study calculates different informal childcare expenditures in each of several regions<sup>8</sup> and for metropolitan and non-metropolitan areas of the state. The two calculations used are<sup>9</sup>:

For children ages 0-4:

$$\text{Yearly expenditure} = \text{Hourly cost} * 45 \text{ hours} * 48 \text{ weeks} * \# \text{ of children in informal childcare} \quad (1)$$

For children ages 5-12:

$$\text{Yearly expenditure} = \text{Hourly cost} * 26.25 \text{ hours} * 48 \text{ weeks} * \# \text{ of children in informal childcare} \quad (2)$$

<sup>4</sup> It is likely that our yearly expenditure estimation for children age five to twelve is slightly low because we treat 5-year olds like other school-age children. In reality some 5-year olds are not in school and thus need full-time childcare.

<sup>5</sup> Data from the 1999 National Survey of America's Families (NSAF) shows that during summer months about 30 percent of school-age children with working mothers use at least one type of organized program, including summer programs, summer school, or before- and after-school programs (Cappizano et al., 2002). During the summer, the prevalence of relative childcare use among school-age children with working mothers also increases. About 25 percent of school-age children with employed mothers relied on relative care during the school year, while the number rose to 35 percent during summer months. Furthermore, during the school year, the average weekly hours of relative care was 13.0, but this rose to 22.8 hours per week in the summer. School-age children spent 13.9 hours per week in supervisory care during the school year, but this rose to 23.2 hours in the summer.

<sup>6</sup> This study assumes that the school-age children who are in full-time informal childcare need childcare for 2 hours in the morning and 2 hours in the afternoon to fill the gap between parent's working hours and school hours 5 days per week during the school periods. In summer months, they would need informal childcare from 8 A.M. to 5 P.M.

<sup>7</sup> An FTE childcare enrollment for preschool children is defined as a child receiving care for 9 hours per day. An FTE childcare enrollment for school-age children is defined as a child receiving care for 4 hours per day in the school year and 9 hours per day in non-school week. Part-time enrollments were assumed to equal 0.5 FTE.

<sup>8</sup> The regions chosen are the seven regions defined by the Kansas Department of Commerce.

<sup>9</sup> We assume that full-time children ages 0-4 in informal childcare are cared for from 8 A.M. to 5 P.M.

### 3.2. Regional Impact Analysis

Input-output (IO) analysis is based on a simple accounting identity in which total demand equals total supply in each sector of the economy. Total demand consists of intermediate demand (output which it is used as an input by other sectors) and final demand (output that is sold to final consumers and exports).<sup>10</sup> Following is the equation for this identity:

$$X = AX + Y \quad (3)$$

where  $X$  is a vector of outputs by sector,  $A$  is the sector-by-sector technical coefficients matrix, and  $Y$  is a vector of final demands by sector. Solving for output gives the reduced form solution to the identity:

$$X = (I - A)^{-1} Y \quad (4)$$

where  $I$  is the identity matrix and  $(I - A)^{-1}$  is the matrix multiplier.

The  $(I - A)^{-1}$  matrix indicates the level of regional production in each sector due to an increase of final demand from each sector and is frequently referred to as the Leontief multiplier matrix. The technical coefficient matrix table does not include an informal childcare sector. The only solutions in such cases are to 1) construct a sector exogenous to the  $A$  matrix based on survey or secondary data on expenditure patterns of this sector, or 2) use another, closely associated sector as a proxy for the informal sector. In the absence of detailed expenditure data for the informal childcare sector we use the household sector as a proxy for informal childcare. There are two reasons that this makes sense. First, informal childcare primarily provides income to the providers (or saves income of consumers) of childcare. In both these cases, the resulting income is assumed to be used for typical household sector expenditures. Secondly, the direct expenses of informal childcare providers are related to the care, feeding, safety, transportation, and general care of the children, which again can reasonably be expected to mirror typical household sector expenditures.

The direct value of informal childcare (final demand in IO terms) is calculated by multiplying the number of children in informal childcare by the estimated hourly childcare value and the total hours of informal childcare per year. The market replacement cost is used as a proxy for the value of informal

childcare. From the various hourly childcare costs in each type of formal childcare arrangement, the lowest is used for market replacement cost.

## 4. Measuring the informal childcare sector in Kansas <sup>11</sup>

### 4.1. Data Sources and Analysis

This study used several sources of data. Our source for estimated population was the 2005 Institute for Policy and Social Research (IPSR). With this we estimated the minimum population of children who need some type of non-parental childcare. In this study, we estimated the number of children under age 13 with working parents (children who are living with both parents in households where both parents are in the labor force or living with a single parent who is in the labor force).

Next we calculate the number of children in formal childcare based on childcare enrollment data provided by the Kansas Association of Child Care Resource and Referral Agencies (KACCRRRA)<sup>12</sup>. This number was subtracted from the total number of children with working parents (see above) to yield the total number of children in informal childcare arrangements.

Based on the market replacement approach to valuing non-market services, we calculated the value of informal childcare from the Kansas formal childcare hourly cost provided by the Kansas Association of Child Care Resource and Referral Agencies (KACCRRRA).

Each of the estimates above is disaggregated into two types of sub-state regions: the seven sub regions used by KACCRRRA and metro versus non metro regions.

### 4.2 Descriptive Analysis

Based on our calculations, there were 478,725 children under the age of 13 in Kansas in 2005. Of these, 69 percent (328,176 children) were living with parents in the labor force. From the total number of children needing some type of non-parental childcare, this study estimates that 42 percent of children were enrolled in formal childcare either part-time or

<sup>10</sup> For a complete description of the input-output methodology, see Miller and Blair (2009).

<sup>11</sup> This study does not differentiate between illegal childcare activity and informal childcare. Also, self-care, which would apply to some portion among school-age children (ages 6-12), is considered as informal childcare in this study.

<sup>12</sup> The 2005 Kansas formal childcare enrollment data is collected from the survey of 25 percent of all childcare facilities. It contains the actual enrollment by age group for each type of formal childcare: childcare center, family childcare, preschool, Head Start, and school-age programs.



full-time and 78 percent of children were enrolled in informal childcare either part-time or full-time. Converted to full-time equivalents in childcare enrollment, 32 percent of children with working parents (105,316) used formal childcare and 68 percent of children (222,860) were in informal childcare arrangements.

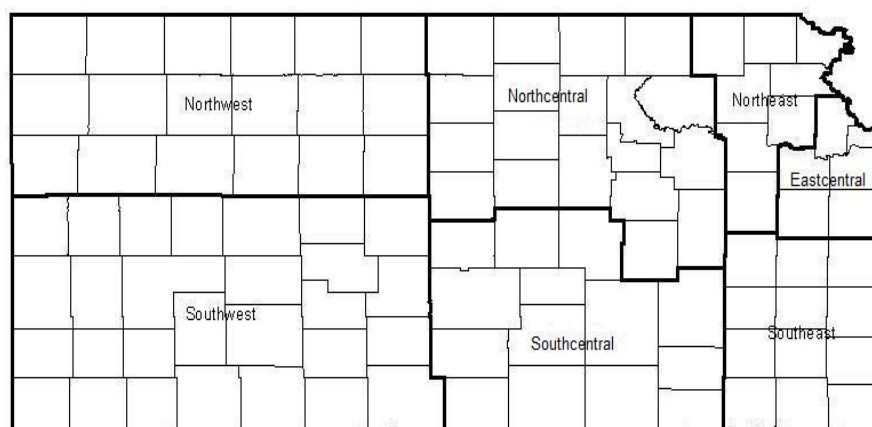
A large portion of Kansas' children lives in rural areas. Whereas about 20 percent of children under age 18 lived in rural areas of the US in 2000 (Farley and Haaga, 2005), 36 percent of Kansas' children (240,922) lived in rural areas<sup>13</sup> in 2005. Seventy percent of Kansas' rural children (118,995) live with working parents, while only 68 percent of urban children (209,180) live with working parents. Another significant difference between Kansas and the US is the rate of dependence on informal childcare.

While about 42 percent<sup>14</sup> of US children are in informal childcare settings, 78 percent of Kansas children depend on the informal childcare sector either part time or full time.

### 4.3. Regional Variations in the Sector

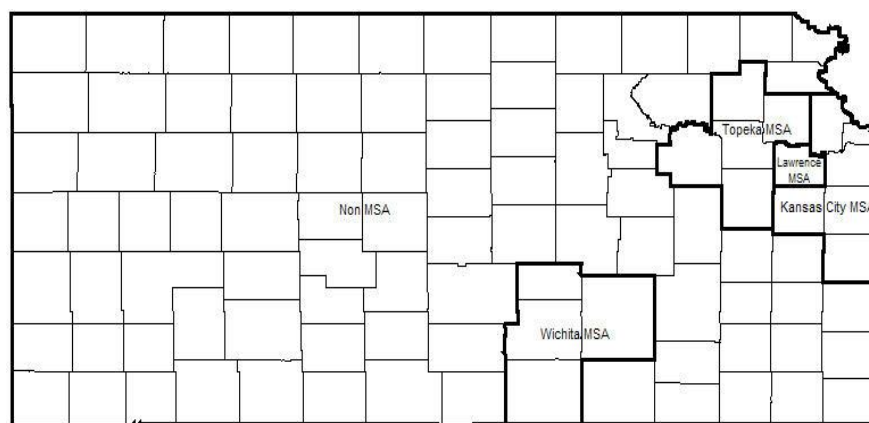
Regional childcare studies shed light on the unique local childcare sector characteristics such as childcare market features (e.g., different childcare demands and provider wage rate), local industrial linkages with the childcare sector, and various state childcare policies (e.g., childcare subsidies).

Our regional economic analysis of Kansas is based on the seven regions defined by the Kansas Department of Commerce. Estimates were also made for MSA and non-MSA portions of the state (Figures 1 and 2). In Kansas, there are four MSAs.



**Figure 1.** Kansas Department of Commerce Regional Definitions.

Source: Kansas Department of Commerce, 2009 Business Development Resource Directory.



**Figure 2.** Kansas MSA vs. non-MSA.

Source: Institute for Policy and Social Research, Kansas Statistical Abstract 2006.

<sup>13</sup> In Kansas, there are 674,110 children age under 18 in total. The percentage of children under age 13 living in rural areas was slightly lower at 35 percent (169,072). Because the comparison years are different, this comparison would differ from the real population in year 2005.

<sup>14</sup> According to 2002 Census data (Overturf, 2005), about 42 percent of children under age 14 with employed mothers are cared for by siblings, grandparents, other relatives, or other non-relatives.

#### 4.4. The Value of Informal Childcare

Most parents have a choice between formal and informal childcare. While it is likely that the costs of formal and informal care differ, depending on location and family circumstances, the value of informal care to parents who choose this option, either in terms of benefits or saved costs, must be comparable to formal care on the margin. Thus, assuming that informal and formal childcare are of comparable quality and provide consumers with equivalent value, we estimate the value of informal childcare based on reported formal childcare costs. The minimum, maximum, and weighted average market childcare costs are reported in Table 2. The formal childcare costs vary from \$1.85 to \$3.48, with an average value of \$2.48. The costs of formal childcare in Kansas' regions show most urban areas (except the Topeka metro area) have higher informal childcare values than non-metro areas<sup>15</sup>. To ensure that our estimates do not exaggerate the size of the informal sector we assume that the value of informal care equals the minimum cost of formal care in each region.

#### 4.5. Annual Informal Childcare Expenditures

The implicit expenditures on informal childcare are calculated by multiplying the full-time equivalent (FTE) number of children assumed to be in informal childcare by the average number of hours of childcare required per child, per year. This is then multiplied by the estimated hourly value of childcare. In this study we estimate that the full-time

equivalent weekly hours of informal childcare is 45 hours for infants and toddlers and 26.25 hours for school age children.<sup>16</sup> Tables 3 and 4 summarize the total yearly implicit expenditures on informal childcare. For comparison purposes the two tables also present yearly expenditures in the formal childcare sector<sup>17</sup>. In 2005, working families in Kansas implicitly spent an estimated \$592 million on informal childcare if we base the estimate on the minimum market replacement estimate. If we apply the maximum market replacement rate (\$3.48/hour), the estimate rises to \$1,112 million.

The childcare expenditures in the seven regions of the state were between 1.03 and 2.3 times the formal childcare spending. The ratio between informal childcare and formal childcare expenditure is the highest in the Southwest, where informal childcare expenditures are 2.3 times the formal childcare expenditures. The Northeast and Eastcentral spent marginally more (1.03 times) in the informal childcare sector. This reflects regional characteristics in childcare arrangements partially explained by different childcare availability and preferences.

Table 4 shows the yearly expenditures on informal childcare in metro and non-metro areas. The ratio of informal childcare expenditures to formal childcare expenditures ranges from 0.8 in the Lawrence metro to 1.3 in the aggregate non-metro area. As expected, the highest demand for informal childcare is in rural areas, but all regions had relatively large informal sectors. Parents in the Lawrence and Wichita metro areas spent less on informal childcare than on formal childcare.

**Table 2.** Hourly Formal Childcare Cost, Kansas, 2005.

Seven commerce regions	Hourly informal childcare value			Metropolitan statistical area	Hourly informal childcare value		
	Min	Max	Ave		Min	Max	Ave
Eastcentral	\$2.15	\$4.22	\$2.89	Kansas City MSA	\$2.15	\$4.36	\$2.91
Southeast	\$1.53	\$2.20	\$1.69	Lawrence MSA	\$2.06	\$3.43	\$2.60
Southwest	\$1.77	\$3.06	\$1.98	Topeka MSA	\$1.63	\$3.47	\$2.46
Southcentral	\$1.84	\$3.44	\$2.37	Wichita MSA	\$1.85	\$3.54	\$2.55
Northeast	\$1.58	\$3.26	\$2.38	Non-MSA	\$1.74	\$2.59	\$1.91
Northwest	\$1.75	\$3.02	\$2.02	State-wide	\$1.85	\$3.48	\$2.48
Northcentral	\$1.78	\$2.51	\$2.00				
State-wide	\$1.85	\$3.48	\$2.48				

<sup>15</sup> In comparison, the Kansas Department of Social and Rehabilitation Services (SRS) pays a subsidy for relative childcare providers based on 65 percent of the registered family childcare cost. This rate varies across the state and for different ages of children but averages \$1.65 per hour.

<sup>16</sup> Capizzano (2002) reports that the average relative weekly hours of relative care is 22.8 hours in the summer and 13.0 in the school year. Our estimate is thus higher than the national average.

<sup>17</sup> Formal childcare expenditure is estimated based on the average hourly cost and enrollment data for each formal childcare sector. For a more specific explanation of estimation see Choi et al. (2009).

**Table 3.** Yearly Informal Childcare Expenditure in Kansas Regions.

Region	Informal childcare hourly cost	# of children under 5 in informal childcare*	# of children ages 5-12 in informal childcare*	Informal childcare expenditure (\$ millions)	Formal childcare expenditure (\$ millions)
Eastcentral	\$2.15	13,430	54,756	\$210.6	\$204.2
Southeast	\$1.53	2,818	13,823	\$35.9	\$31.2
Southwest	\$1.77	5,053	16,978	\$57.2	\$24.5
Southcentral	\$1.84	11,222	49,983	\$160.7	\$150.2
Northeast	\$1.58	4,930	18,720	\$54.2	\$52.6
Northwest	\$1.75	956	5,862	\$16.6	\$14.6
Northcentral	\$1.78	4,888	19,442	\$62.5	\$53.6
State-wide**	\$1.85	43,297	179,564	\$591.7	\$634.6

Notes: \* # of children are full time equivalents (FTE)

\*\*Regional expenditures do not sum to state-wide expenditures because of discrepancies in the estimates of average childcare costs at the regional level.

**Table 4.** Yearly Informal Childcare Expenditure in MSAs and Non-MSA Regions.

Region	Informal childcare hourly cost	# of children under 5 in informal childcare*	# of children ages 5-12 in informal childcare*	Informal childcare expenditure (\$ millions)	Formal childcare expenditure (\$ millions)
Kansas City MSA	\$2.15	12,740	50,349	\$195.2	\$184.6
Lawrence MSA	\$2.06	874	5,015	\$16.9	\$20.5
Topeka MSA	\$1.63	4,066	15,859	\$46.8	\$46.4
Wichita MSA	\$1.85	8,735	38,333	\$124.3	\$136.5
Non-MSA	\$1.74	16,881	70,007	\$217.4	\$166.4
State-wide**	\$1.85	43,297	179,564	\$591.7	\$634.6

Notes: \* # of children are full time equivalents (FTE)

\*\*Regional expenditures do not sum to state-wide expenditures because of discrepancies in the estimates of average childcare costs at the regional level.

#### 4.6. Implicit Informal Childcare Multipliers

Sectoral multipliers are often of interest to analysts and practitioners. Comparing the size of sectoral multipliers can provide insights into the relative importance of sectors. The size of sectoral multipliers are related to the size of the regional economy, the degree of linkage among industries, the market structure in the sector, and other geographical features (Miller and Blair, 2009).

As we discussed previously, we cannot calculate multipliers for the informal childcare sector directly from the Leontief inverse since the sector is not explicit. Implicit multipliers can be calculated by forming a ratio of total to direct changes. IMPLAN data disaggregates the household sector by nine different household income levels. This study uses median household income levels in 2005 from the

U.S. Census Bureau,<sup>18</sup> assuming that the average informal childcare providers have a median household income level. Tables 5 and 6 present the implicit multipliers for the informal and formal childcare sectors in the state of Kansas and each of its regions.

The implicit output multipliers are the effects on regional output of a one dollar increase in final demand for informal childcare. The output multipliers range from 2.09 in the Southwest to 2.35 in the Eastcentral region. The Kansas City metro has the highest implicit output multiplier among the metros at 2.32. This compares to a multiplier of 2.16 for the non-metro area of the state. Statewide, each one

<sup>18</sup> 2005 household median income by county was not available. This study used the 1999 household median income inflated to 2005 dollars as a proxy.

dollar increase of final demand for informal childcare creates \$1.42 in additional output.

Output is not a good indicator of economic change because it double counts intermediate output. Value added, labor income, and employment are better indicators of economic impact. Value added is equivalent to the sector or region's contribution to GDP and is thus a key indicator. The range of implicit value-added multipliers is from 1.36 in the Southeast to 1.61 in the Eastcentral, and from 1.42 in the non-metro area to 1.61 in the Kansas City metro. A one dollar increase in total value added in the childcare sector leads to 64 cents in additional total value added in the Kansas economy.

The implicit labor income multiplier is the total increase in regional labor income from a one dollar increase of labor income in the informal childcare sector. The range of implicit labor income multipliers is from 1.18 in the Southeast to 1.32 in the Eastcentral and from 1.22 in the non-metro and Lawrence metro areas to 1.32 in the Kansas City metro. Statewide, an increase of one dollar in labor income in the informal childcare sector will generate an additional 35 cents of labor income elsewhere in the Kansas economy.

The implicit employment multipliers indicate that with the addition of one job in the informal childcare sector comes a total of 1.06 jobs in the Eastcentral and 1.03 jobs in the Southeast. Metro and non-metro regions also show a similar multiplier range from 1.04 to 1.06. The state's implicit employment multiplier is 1.06.

We found that most multipliers in metro areas are greater than non-metro areas. As Choi et al. (2009) demonstrate, the differences can be explained by the economies of size enjoyed by businesses in metro areas. Businesses in MSA regions have a greater ability to exploit economies of scale due to large populations and better transportation systems. Furthermore, metro regions can provide a wider variety of goods and services. This allows households and businesses to purchase the majority of goods and services within the region and produce higher multipliers.

The predominantly rural Southwest, Northwest, and Southeast regions have relatively low implicit multipliers. Compared to other areas, these three regions have relatively low populations and smaller economies (2005 Intercensal Census data from IPSR, 2002 IMPLAN).

**Table 5.** Implicit Multipliers for Informal and Formal Childcare among Kansas Regions.

	Output		Total value added		Labor income		Employment	
	formal	informal	formal	informal	formal	informal	formal	informal
<b>Eastcentral</b>	1.67	2.35	1.78	1.61	1.62	1.32	1.18	1.06
<b>Southeast</b>	1.29	2.11	1.33	1.36	1.27	1.18	1.09	1.03
<b>Southwest</b>	1.24	2.09	1.23	1.38	1.20	1.20	1.10	1.04
<b>Southcentral</b>	1.51	2.22	1.57	1.51	1.48	1.28	1.15	1.05
<b>Northeast</b>	1.45	2.22	1.51	1.49	1.41	1.26	1.14	1.04
<b>Northwest</b>	1.25	2.11	1.27	1.38	1.23	1.20	1.08	1.04
<b>Northcentral</b>	1.36	2.16	1.42	1.42	1.35	1.22	1.11	1.05
<b>State-wide</b>	1.76	2.42	1.85	1.64	1.70	1.35	1.22	1.06

Notes: Multipliers are calculated using 2005 IMPLAN data.

State-wide multipliers are generally larger than the those for regions because they include interregional feedbacks.

**Table 6.** Implicit Multipliers for Informal and Formal Childcare in MSAs & Non-MSA Areas of Kansas.

	Output		Total value added		Labor income		Employment	
	formal	informal	formal	informal	formal	informal	formal	informal
<b>Kansas City</b>	1.66	2.32	1.76	1.61	1.61	1.32	1.18	1.06
<b>Lawrence</b>	1.49	2.19	1.62	1.45	1.45	1.22	1.45	1.05
<b>Topeka</b>	1.46	2.22	1.53	1.50	1.42	1.26	1.15	1.04
<b>Wichita</b>	1.53	2.27	1.60	1.52	1.51	1.29	1.16	1.05
<b>Non-MSA</b>	1.34	2.16	1.34	1.42	1.30	1.22	1.11	1.05
<b>State-wide</b>	1.76	2.42	1.85	1.64	1.70	1.35	1.22	1.06

Note: Multipliers are calculated using 2005 IMPLAN data.

#### 4.7. Aggregate and Regional Impacts of Informal Childcare

Tables 7, 8, 9, and 10 show the economic effects of implicit expenditures on informal childcare in the seven regions and the metro and non-metro areas of the state. We also present the economic effects of the formal childcare sectors (Choi et al., 2009) to permit comparisons. Statewide, for the 70 percent (256,988) of children who were assumed to receive informal childcare, there was \$591.7 million in implicit spending<sup>19</sup> on informal childcare generating \$1,433 million in aggregate statewide output, \$972 million in total value added, and \$797 million in labor income in the Kansas economy in 2005. This compares to \$634.6 million in explicit expenditures on formal childcare for the remaining 30 percent of children which created \$1,119 million in output, \$615 million in value added, and \$376 million in labor income. Informal childcare generated 135,336 jobs in the Kansas economy. Specifically, there were 128,494 jobs in the informal childcare sector itself and an additional 6,842 jobs generated indirectly in other sectors in 2005<sup>20</sup>.

The informal sector has larger economic effects in terms of all indicators. In part this is explained by larger economic leakages in formal childcare. Formal childcare providers must spend more on facilities such as playground equipment, toys, and cribs, while more of the implicit value of informal providers is in the form of income. The larger regions enjoyed the biggest impacts in terms of all indicators because they were able to capture more of both explicit and implicit expenditures.

### 5. Conclusions

Like other informal sectors, we do not have the data necessary to make precise estimates of the size and contribution of the informal childcare sector. In this analysis we estimate the size and contribution of the informal childcare sector by first measuring the number of children served by the formal sector. By

implication, those children not in formal care must be in some type of informal arrangement.

We then estimate the value of this sector using the market replacement approach. The informal childcare sector, even when measured conservatively, is larger than the formal sector in Kansas and as such makes a very significant contribution to the overall economy. We find that the informal childcare sector is larger than the formal childcare sector in almost all regions of the state, no matter how convenient and available the formal sector. We do find, however, that there are significant differences in the size of multipliers and economic contributions across regions. In particular, rural regions are much more dependent on the informal sector.

According to Census Bureau, the 2005 GDP for the state of Kansas was \$103,305 million. Of this, the formal childcare sector accounted for \$615 million or about 0.6 percent. If we add the \$591.7 million of direct, implicit but uncounted value added from the informal childcare sector, State GDP would have been 0.6% larger. Together, the childcare sector, formal and informal, directly and indirectly, accounts for almost \$1.6 billion, or more than 1.5% of the state economy.

There are several important policy implications. First, the implicit contributions of informal childcare are large enough to distort measures of aggregate economic performance. It is likely that the informal childcare sector is counter cyclical (it grows during periods of macroeconomic contraction and declines during periods of expansion). Thus, our estimates of the severity of business cycles are exaggerated because we over-estimate the loss of jobs during downturns and the net increase in jobs during recoveries. Better estimates of this and other components of the informal economy could temper our policy responses to business cycles. More importantly, the informal childcare sector should be recognized as one of the mid-range sectors of our economy, comparable to such sectors as the social services sector or the performing arts, spectator sports, and museums sector, each of which comprise roughly 0.6% of the economy. The regulatory, educational, information, and other needs of sectors of this magnitude should be given serious attention. This is especially true given the role that childcare plays in shaping the social dimensions of our society. A sector this important certainly justifies significant public investment to assure the highest possible quality and efficiency.

Policy makers may wish to address the balance between informal and formal childcare. They may

<sup>19</sup> We assume that there is no income tax or saving from the informal childcare income.

<sup>20</sup> The number of providers in the informal childcare sector is estimated by dividing the total number of children in the informal childcare sector by two (256,988/2=128,494). This is based on the assumption that informal childcare providers care for an average of two children. According to Burton et al.'s study (2002), the national average ratio of children to adults in informal childcare (paid relatives and paid non-relatives) was from 1.5 to 2.3, varying by age. This study estimated that there are 128,494 informal childcare providers for 256,988 children in Kansas.

decide that it is in the public interest to move more informal childcare services into the formal sector. This may require changes in the requirements for satisfying the definition of a formal childcare provider or removal of disincentives for meeting current requirements. It may require the addition of new categories of recognized childcare providers or just more emphasis on gathering information from informal providers. However, it is likely that enforcing income and other taxes on these informal childcare providers would lead to reduced numbers of providers and reduced demand by parents. On the other hand, while this study does not attempt to measure the costs and benefits of the informal childcare sector relative to the formal childcare sector, it is clear that the loss of tax revenues is partially, or fully, offset by the increased productivity of the

labor force made possible by the higher labor force participation rates.

Even if efforts are undertaken to reduce the size of the informal childcare sector it is inevitable that a very large share of childcare will remain informal, especially in rural areas where larger-scale service providers are less feasible. For that reason it is important that we understand the sector better. Much more could be done to increase our understanding of this sector's contribution to the economy and the constraints that limit this contribution. Better data on families' reliance on day care providers, and the characteristics of these providers, are needed. We need to learn more about the costs and rates of remuneration involved in informal childcare. And we need to know more about the quality of this type of childcare and how it could be improved.

**Table 7.** Output and Value-added Effects of Formal and Informal Sectors in Regions.

	Expenditure		Output		Total value added	
	formal	informal	formal	informal	formal	Informal
<b>Eastcentral</b>	\$204.2	\$210.6	\$340.3	\$494.4	\$189.6	\$338.8
<b>Southeast</b>	\$31.2	\$35.9	\$40.4	\$75.8	\$20.0	\$48.7
<b>Southwest</b>	\$24.5	\$57.2	\$30.4	\$119.3	\$17.5	\$79.1
<b>Southcentral</b>	\$150.2	\$160.7	\$226.0	\$357.5	\$120.5	\$242.4
<b>Northeast</b>	\$52.6	\$54.2	\$76.2	\$120.3	\$41.6	\$80.7
<b>Northwest</b>	\$14.6	\$16.6	\$18.2	\$35.0	\$9.2	\$22.9
<b>Northcentral</b>	\$53.6	\$62.5	\$73.0	\$135.3	\$36.6	\$89.0
<b>State-wide</b>	\$634.6	\$591.7	\$1,118.7	\$1,433.3	\$615.4	\$971.5

Notes: All values are in millions of dollars.

State-wide values for output and value-added effects are larger than the sum of regional values due to interregional effects ignored in the regional values. Regional expenditures do not sum to state-wide expenditures because of discrepancies in the estimates of average childcare costs at the regional level.

**Table 8.** Income and Employment Effects of Formal and Informal Sectors in Regions.

	Expenditure		Labor Income		Employment	
	formal	informal	formal	informal	formal	Informal
<b>Eastcentral</b>	\$204.2	\$210.6	\$116.6	\$278.6	8,529	41,543
<b>Southeast</b>	\$31.2	\$35.9	\$13.0	\$42.5	1,375	9,606
<b>Southwest</b>	\$24.5	\$57.2	\$11.0	\$68.5	747	12,471
<b>Southcentral</b>	\$150.2	\$160.7	\$74.8	\$205.4	6,313	37,792
<b>Northeast</b>	\$52.6	\$54.2	\$26.3	\$68.3	2,107	2,867
<b>Northwest</b>	\$14.6	\$16.6	\$5.9	\$19.9	604	4,112
<b>Northcentral</b>	\$53.6	\$62.5	\$23.4	\$76.4	2,438	14,265
<b>State-wide</b>	\$634.6	\$591.7	\$375.9	\$797.3	27,198	135,336

Notes: Expenditures and labor income are in millions of dollars.

State-wide values for labor income and employment effects are larger than the sum of regional values due to interregional effects ignored in the regional values. Regional expenditures do not sum to state-wide expenditures because of discrepancies in the estimates of average childcare costs at the regional level.

**Table 9.** Output and Value-added Effects of Formal & Informal Sectors in MSAs and Non-MSA areas.

	Expenditure		Output		Total value added	
	formal	informal	formal	informal	formal	informal
<b>Kansas City</b>	\$184.6	\$195.2	\$306.2	\$453.2	\$172.4	\$314.0
<b>Lawrence</b>	\$20.5	\$16.9	\$30.5	\$37.1	\$15.9	\$24.5
<b>Topeka</b>	\$46.4	\$46.8	\$68.0	\$104.2	\$37.3	\$70.1
<b>Wichita</b>	\$136.5	\$124.3	\$209.3	\$282.1	\$112.5	\$189.5
<b>Non-MSA</b>	\$166.4	\$217.4	\$222.7	\$470.6	\$118.6	\$308.7
<b>State-wide</b>	\$634.6	\$591.7	\$1,118.7	\$1,433.3	\$615.4	\$971.5

Notes: All values are in millions of dollars.

State-wide values for output and value-added effects are larger than the sum of regional values due to interregional effects ignored in the regional values. Regional expenditures do not sum to state-wide expenditures because of discrepancies in the estimates of average childcare costs at the regional level.

**Table 10.** Income and Employment Effects of Formal & Informal Sectors in MSAs and Non-MSA areas.

	Expenditure		Labor Income		Employment	
	formal	informal	Formal	informal	formal	informal
<b>Kansas City</b>	\$184.6	\$195.2	\$105.9	\$258.2	7,447	38,313
<b>Lawrence</b>	\$20.5	\$16.9	\$9.8	\$20.7	965	3,602
<b>Topeka</b>	\$46.4	\$46.8	\$23.5	\$59.2	1,861	12,177
<b>Wichita</b>	\$136.5	\$124.3	\$69.3	\$160.0	5,747	29,156
<b>Non-MSA</b>	\$166.4	\$217.4	\$75.5	\$265.6	6,331	50,909
<b>State-wide</b>	\$634.6	\$591.7	\$375.9	\$797.3	27,198	135,336

Notes: Expenditures and labor income are in millions of dollars.

State-wide values for labor income and employment effects are larger than the sum of regional values due to interregional effects ignored in the regional values. Regional expenditures do not sum to state-wide expenditures because of discrepancies in the estimates of average childcare costs at the regional level.

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