THE UNIVERSITY OF MELBOURNE

Melbourne Institute Working Paper Series

Working Paper No. 15/07

Children, Labour Supply and Childcare: Challenges for Empirical Analysis

Guyonne Kalb

MELBOURNE INSTITUTE
of Applied Economic and Social Research

Children, Labour Supply and Childcare: Challenges for Empirical Analysis*

Guyonne Kalb
Melbourne Institute of Applied Economic and Social Research
The University of Melbourne

Melbourne Institute Working Paper No. 15/07

ISSN 1328-4991 (Print)

ISSN 1447-5863 (Online)

ISBN 978-0-7340-3246-1

April 2007

* A first version of this paper was prepared for the Work, Welfare and Family session in the Economic and Social Outlook 2006 Conference at the University of Melbourne. This paper makes use of previous joint work with Denise Doiron, Suzan Ghantous, Wang-Sheng Lee and Hong Ha Vu. I am grateful to Rosanna Scutella and Thor Thoresen for their references to interesting material and to John Creedy for his comments and suggestions.

Melbourne Institute of Applied Economic and Social Research
The University of Melbourne
Victoria 3010 Australia
Telephone **(03) 8344 2100**
Fax **(03) 8344 2111**
Email **melb-inst@unimelb.edu.au**
WWW Address **http://www.melbourneinstitute.com**

Abstract

The aim of this paper is to give an overview of the important issues relating to labour supply of the primary carer in a household. Childcare plays a central role in allowing the primary carer time away from young children in the household. Therefore, childcare use is a central topic of this paper as well. There are a number of different aspects to childcare, such as price, quality, availability and type of service. This paper discusses analytical problems and challenges, taking Australian data, policy and experience as a focus, but drawing on a wide range of international empirical studies. It reports results from previous research on childcare use and labour supply, and it outlines areas requiring more study. The focus of the paper is on economic research.

1. Introduction

This paper examines the interaction of family and work. This topic has been discussed extensively in the international and national economic literature. However, research, which explicitly includes childcare choices when examining the interaction of family and work, is much less readily available in Australia. With the exception of Doiron and Kalb (2002, 2005a) and Rammohan and Whelan (2005, 2006), there has been little systematic investigation of the relationship between labour supply and childcare use in Australia. There are a number of factors to take into account when analysing this relationship. The aim of this paper is to discuss analytical problems and challenges, taking Australian data, policy and experience as a focus, but drawing on a wide range of empirical studies (while not aiming to be a comprehensive survey of the literature).

It is important to understand the factors underlying childcare demand and have (up-to-date) estimates of labour supply elasticities with respect to childcare costs as well as wage rates because these can provide useful information on the types of targeted policies which might be effective to encourage labour supply. This paper discusses a number of issues which may arise when estimating these elasticities.

First, a problem with measuring the effect of childcare costs or fees is that the observed costs are likely to be endogenous, given that they are at least partly the outcome of a choice between childcare of different qualities. This complicates the analysis of the effect of costs on childcare demand and labour supply.

Second, the availability of formal and informal childcare is important, with apparent shortages of formal childcare services in the inner suburbs of our capital cities and oversupply in outer suburbs. Although there has been little structured research into this, there is anecdotal evidence of primary carers who would like to return to work but cannot find suitable childcare. Informal childcare, that is care provided by grandparents or other relatives, is even more under-researched. In general, little is known about informal childcare.

Third, in addition to economic aspects of childcare (such as the price), non-economic aspects (such as the quality of available childcare) are also likely to be important for the economic outcomes of the household. Some international studies include this aspect in their

analysis, but in Australia, limited information is available on the quality of childcare services from which specific households can choose.

Fourth, evidence from child development studies on the effect of childcare is likely to be important for childcare choices made by households. Again, the quality of childcare should be considered explicitly in such studies. Results from such studies could inform the government on whether additional guidelines for childcare are required to ensure that a child is not only well taken care off in a physical sense but that the child's development is encouraged in the childcare environment as well. Parents' confidence in the suitability of childcare as a substitute for their own care is crucial, as it takes away one hurdle to labour force participation of primary carers.

Much of the research has focused on female labour supply, given the traditionally small role of partnered men in childcare activities. Although increasing the father's role in childrearing by giving him access to more flexible working arrangements might increase female labour force participation, this has not been analysed much.[1] Given that couples often consist of two similarly qualified individuals (with similar human capital levels), keeping more people in the labour force may be beneficial for society, even at a lower average intensity of work, especially in occupations where knowledge is quickly outdated.[2] It would be of interest to analyse whether such a policy is rational from an economic point of view.

Another related issue of importance, which is also outside the scope of the current paper, is the economics of fertility. In most studies on childcare and labour supply, the presence of children is treated as an exogenous characteristic. However, in reality, in most cases there is a conscious choice to have (or not have) children (possibly influenced by policies regarding

[1] A few countries have put policies in place to encourage the fathers' participation in childrearing. For example, Norway and Sweden both have parental leave schemes in which part of the leave is set aside for paternity leave, 5 weeks in Norway and 3 months in Sweden. In Norway about 18 percent of men voluntarily use more than the mandatory part. (See http://www.oecd.org/dataoecd/16/18/37423694.pdf, http://www.ilo.org/public/english/bureau/inf/magazine/54/daddy.htm, http://www.nav.no/1073749118.cms (in Norwegian) and http://en.wikipedia.org/wiki/Parental_leave.)

[2] At the household level, sharing the caring and earning responsibilities may be beneficial, since specialisation in home production or paid work appears less rational now than it did a few decades ago, given more equal male and female levels of education and pre-children work experience. Sharing these responsibilities is likely to reduce the risk of joblessness for households. At the individual level, specialisation in home production may prove to be expensive in the longer term due to increased divorce rates. Predicted lifetime incomes, allowing for different labour force participation patterns and using observed divorce rates, could be calculated to obtain some insight in the individual cost of specialisation.

families and childcare), violating this assumption of exogeneity. That is, the choice is not only between childcare and employment. This choice has been preceded by choices made at an earlier stage regarding the decision to have children and at what point in the life cycle to have children.[3] It could be argued that the presence of children can be treated as exogenous once they are born, given that it is an irreversible choice. However, the underlying characteristics which influenced the decision to have children often do not change, leading parents to value parental and non-parental childcare differently. This value of childcare is independent of the financial cost of childcare and may depend on the relative amounts of parental and non-parental childcare used. Estimating a model taking into account fertility choices and timing would be complicated, however this difference in the value placed on parental and non-parental childcare should ideally be taken into account when analysing childcare use and labour supply choices.

In this paper, we leave the above two issues of paternal childcare and fertility choices aside to focus on the substitution of parental (mostly maternal) childcare with non-parental childcare, and the effect this has on (mostly) female labour supply. Each of the sections focuses on a different and progressively more detailed aspect of family and work. Section 2 of the paper first discusses the evidence of the effect of children on labour supply. Section 3 reviews results on the effect of children and labour supply on childcare choices. Section 4 first discusses the quick increase of the cost of childcare compared with the Consumer Price Index, before summarising evidence of the effect of this cost on labour supply for a number of countries. Two other aspects of childcare, the availability and quality of childcare, are discussed in Section 5. The importance of controlling for these two aspects to estimate the effect of childcare cost on labour supply is investigated. It also discusses the relation between childcare, childcare quality and child development. The quality and availability of childcare return in Section 6 where the lack of information on these aspects, particularly for informal care, is discussed. This lack of information complicates the modelling of households' choices between different types of childcare. Section 7 concludes with a few brief remarks.

[3] A current trend for women with high education levels is to have children later in life after having established a career.

2. The presence of children and labour supply

Most labour supply studies include the age and number of children as explanatory factors in the labour force participation and hours of work decisions of individuals, in particular for mothers, who are most likely to be the primary carers in the household. In all developed countries, the effect of the presence of children in a household is to decrease the labour supply (both in terms of participation rate and hours worked) of partnered mothers and single parents. In addition, younger children tend to have a larger effect on labour supply than older children. For obvious reasons, there is a particular distinction between school-age and pre school-age children. Once children go to school, more time is available for the primary carer to take up employment outside the household. There is less need for alternative providers of care.

Birch (2005) reports the results of a number of Australian studies on female labour supply which have included information on the children in the household. All studies included indicate a negative effect on labour supply, with the effect being larger for younger children. Similar overviews could be produced for international studies. A few examples of these studies are the following. Van Soest (1995) finds effects of children on labour supply for both men and women, with the female effects being somewhat larger. Van Soest, Das and Gong (2002), Aaberge, Colombino and Strøm (1999), Fraker and Moffitt (1988), Hagstrom (1996) and Hoynes (1996) find effects for married women in the U.S. and Europe. Duncan, Giles and MacCrae (1999) find strong effects for sole parents (mostly women) and married women in the U.K. of both the age of the youngest child and the number of preschool children. In New Zealand, Kalb and Scutella (2004) find strong effects for sole parents (mostly women) and partnered women of both the age of the youngest child and the number of children.

Much lower (and often no or even positive) effects are found for partnered men. This is confirmed for Australia by Doiron and Kalb (2005a, b) and Breunig, Cobb-Clark and Gong (2005).

3. Children, labour supply and childcare

As discussed in the previous section, in most labour supply studies, the age and number of children are included as explanatory factors in the labour force participation and hours of

work decisions of individuals, in particular for mothers. However, it is not just the age and number of children, indicating someone may have a responsibility as a carer, which affect labour supply; the presence of high-quality and affordable substitutes for parental childcare are also expected to have an impact. Nevertheless, due to the additional complexity, relatively few studies include the simultaneous decision that these individuals, with pre-school children in particular, need to make regarding childcare. The childcare choice is the outcome of a sequence of decisions. The first decision primary carers have to make is whether they feel comfortable leaving their child in the care of someone else. That is, how do they value parental childcare versus non-parental childcare. The next decision is what type of alternative care is acceptable. Does it need to be a relative, such as a grandparent? What should the carer-child ratio be? What type of care is affordable? That is, after deducting childcare costs from the additional earnings, will it be worthwhile to work? As a result, a range of factors associated with the carer, the child and the available childcare services influence the decision.

Although childcare can be used for a range of reasons, from Australian data, it is clear that labour supply and childcare use are very strongly correlated. In the Child Care Survey (CCS), a survey collected by the Australian Bureau of Statistics, parents are asked for the main reason of using childcare for each child who is less than 12 years old. Table 1 lists the percentage of households who name the different reasons for at least one child in the household in 1996 and 2002. The results in 2002 are similar to the results in 1996. However, the choice of work as the main reason has increased somewhat to become the most important reason for the use of formal and informal care. Labour force participation is currently the most important driver of the demand for childcare.

Table 1 Reasons for using child care (CCS)

	CCS 2002		**CCS 1996**	
	Formal	**Informal**	**Formal**	**Informal**
Reason given as main reason for at least one child in household				
Work	44.5	46.1	42.0	46.6
Job search/study	5.4	3.8	2.5	2.1
Personal/other	10.8	38.7	15.9	49.2
Beneficial for child	42.1	10.2	42.7	4.3

Comparing childcare use by labour force status in Table 2, couple families where both parents are in the labour force and sole parents, who are in the labour force, are clearly more likely to use childcare than other family types. Based on the CCS of 1996 and 2002 and the second wave of the Household, Income and Labour Dynamics in Australia survey (HILDA) similar patterns are observed. All evidence indicates that families with parents in the labour force are substantially more likely to require non-parental childcare. A second observation is that sole parents in or out of the labour force require more childcare than comparable couple households. This is as expected, since in couple households there are two potential carers, whereas in a sole parent household there is only one carer. Therefore, whenever the sole parent is not available, outside care is needed; in particular, when preschool children are involved. This indicates that fathers in couple families take on childcare responsibilities, although in most cases they are the secondary earners.

Table 2 Percentage of households using care by labour force status of parents[a]

Labour force status:	2 workers	1 worker	No workers	**Total**
All couple families[b]				
wave 2 HILDA (2002)	70.9	40.7	27.8	57.1
Sample size (unweighted)	791	492	81	1516
CCS 2002	64.0	45.4	36.5	54.8
Sample size (unweighted)	2803	1980	375	5158
CCS 1996	69.4	46.2	34.6	57.2
Sample size (unweighted)	2761	2084	460	5305
All sole parents[b]				
wave 2 HILDA (2002)		81.2	35.0	57.6
Sample size (unweighted)		192	181	380
CCS 2002		76.8	50.7	62.1
Sample size (unweighted)		640	803	1443
CCS 1996		81.4	50.2	62.4
Sample size (unweighted)		437	679	1116

Notes: a) The numbers in the table are weighted to represent the Australian population.
b) This group includes those families with unknown labour force status.

Weighted summary statistics for the labour supply variables from the 1996 and 2002 ABS' Survey of Income and Housing Cost (SIHC) are given in Table 3. Comparing the two years provides a few interesting insights. First of all, it is evident that female labour force participation has increased in these six years, both for married women and sole parents (most of whom are women). In addition to the increased employment rate, there has been a slight increase in average working hours of those who are working. Second, this increase in labour force participation has been larger for sole parents than for married women. In fact, sole parents' labour force participation has increased substantially, with this increase being

due to an increase in employed persons and not to an increase in unemployed persons. Third, for couple families, a decrease in unemployment is observed between 1996 and 2002 for married men and women. Finally, disaggregating employment by age of the youngest child, reveals that the increase in employment is largest for parents with children under 5 years of age.

Table 3 Weighted Summary Statistics for the SIHC 1996/1997 and 2002/2003

	Couples (2002) N=1,558,900	**Couples (1996) N=1,504,300**	**Sole parents (2002) N=475,870**	**Sole parents (1996) N=414,610**
Continuous Variables	**mean**	**mean**	**mean**	**mean**
Average hours worked by head	38.516	38.325	16.092	12.861
Average hours worked by spouse	18.184	16.095		
Number of children in income unit	1.906	1.998	1.671	1.724
Dummy Variables				
Education of head				
• No qualifications	0.369	0.415	0.590	0.659
• Vocational qualification	0.302	0.284	0.200	0.193
• Diploma	0.113	0.130	0.082	0.060
• University degree	0.216	0.172	0.128	0.088
Education of spouse				
• No qualifications	0.495	0.590		
• Vocational qualification	0.219	0.175		
• Diploma	0.085	0.101		
• University degree	0.201	0.135		
Youngest child in income unit is				
between 0 and 2	0.271	0.304	0.156	0.226
between 3 and 4	0.126	0.125	0.129	0.128
between 5 and 9	0.220	0.230	0.287	0.274
between 10 and 15	0.213	0.193	0.313	0.253
Employment status head				
Non participation	0.059	0.037	0.385	0.491
Unemployed	0.037	0.059	0.102	0.096
Employed	0.904	0.905	0.512	0.413
Employment status spouse				
Non participation	0.364	0.386		
Unemployed	0.028	0.050		
Employed	0.608	0.564		

This observation in the SIHC of increased labour force participation by married mothers and sole parents, and in particular the observation that sole parents with children under 5 participate in the labour force to a substantially larger extent in 2002 than in 1996, is

consistent with the results in Table 1. Clearly, combining family and work is becoming a more important issue.

Comparing education across the two years in the SIHC, all groups appear to have larger proportions of individuals at the higher education levels. The higher education level is expected to increase labour supply.

4. The Cost of Childcare

The price of childcare is likely to be an important factor for most primary carers' labour supply decisions. It can be a substantial proportion of the additional net income for low-wage workers with preschool children, especially if household income falls in the range where Family Tax Benefit part A is withdrawn, reducing the marginal net wage rate of the secondary earner. Once the children go to school, fewer hours of childcare are required which can often be further minimised in couple households by coordinating start and finish times by the two workers.

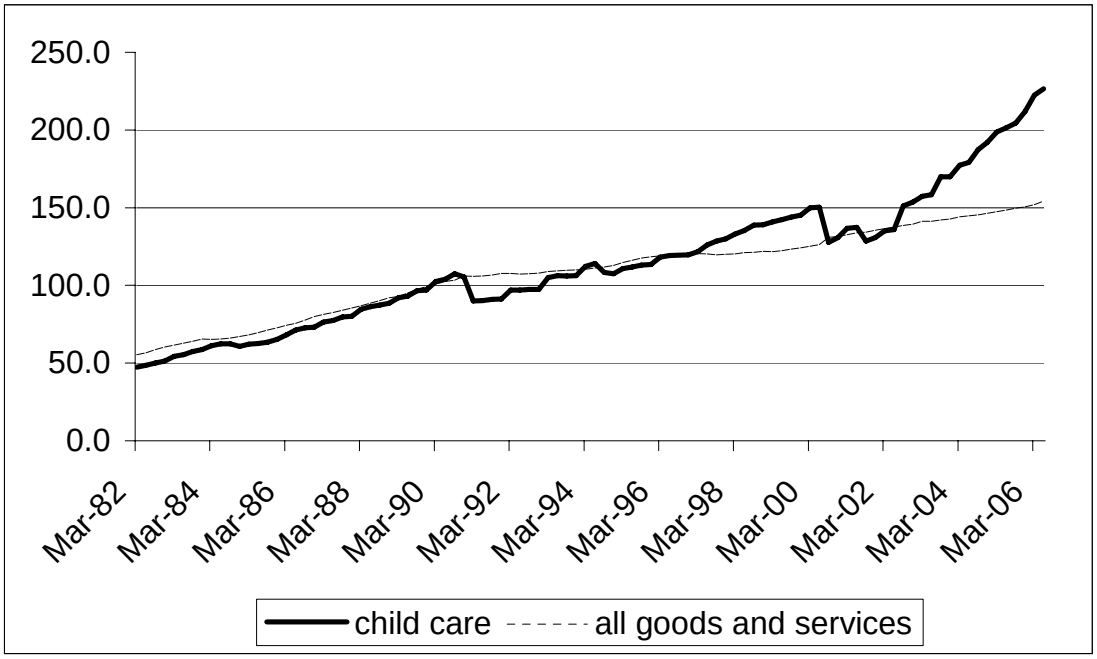
4.1 Changes in the cost of childcare over time

In recent years, the price of formal childcare has clearly increased to a much larger extent than the Consumer Price Index (see Figure 1). Up to 1997, the price increase was similar to the increase in CPI, since then the increase in the price of childcare services has been more than the average price increase. The two clear decreases in the childcare price index correspond to changes in available childcare subsidies. In 1991, childcare assistance was extended to users of childcare provided at private centres. In July 2000, a childcare subsidy supporting families on low household incomes was introduced, providing a fixed subsidy per hour of childcare use. Since then, the yearly percentage increase in the fixed subsidy has been lower than the percentage increase in formal childcare fees.

The relative increase of the cost of childcare means it may have become less affordable over recent years. Less affordable childcare could have a major impact on the labour supply of households who have no access to alternative types of childcare, such as informal care provided by relatives. Low-income households are likely to be affected the most by these price increases.

Many studies on labour supply and childcare decisions have focussed on the cost of childcare as being a major factor in the decision to participate in the labour market combined with the decision to buy childcare. The next section reviews a range of papers examining the effect of childcare cost on labour supply and discusses some of the issues associated with this type of analysis.

Figure 1: Childcare price index[4] compared to overall price index, 1982 to 2006



Source: ABS 2006, *Consumer Price Index*, Catalogue 6401.0, Tables 7a to 7l, series id A2331606F (childcare) and A2325846C (all).

4.2 The effect on labour supply

One of the most important contributions to the cost of working for families with children, in particular for families with preschool children, is the cost of childcare. Several studies have tried to allow for this important cost explicitly when examining the labour supply decisions of (mostly) mothers.

Discussions of the provision of childcare services and policies among policy makers and researchers generally presume a strong link between childcare costs and availability on the one hand, and labour supply, especially that of the mother, on the other hand. However,

[4] Note that the childcare price is net of the Child Care Benefit, which was introduced in July 2000.

results based on overseas research suggest that this link is more complicated and harder to estimate than was at first believed. In some cases, estimated labour supply responses have been smaller than expected. Empirical research based on local data, incorporating the institutions and policies in place, is necessary to shed light on the importance of this relationship and the effectiveness of policies related to childcare. Cobb-Clark, Liu and Mitchell (2000) pointed out the large degree of heterogeneity in the structure of costs, prices and forms of childcare. This highlights the importance of modelling different types of childcare and allowing for the possible endogeneity of prices.

Apps and Rees (2000) focused on the internal cost of parental childcare while many other papers deal with the external costs of childcare services. They looked at costs of children within the household and household decisions on the consumption of goods and the allocation of time. The costs of children are internal and based on the children's share of consumption as well as the opportunity cost of parental time spent in childcare. Australian data on time use allow them to separate the nonmarket time spent on leisure from parental childcare. They find that the value of parental time devoted to childcare is a substantial component of total childcare costs.

The implicit assumption being made in models dealing with only the external costs of childcare services is that one hour of leisure by a parent is equivalent, in terms of household utility, to one hour of parental care either directly from enjoyment in caring for one's children or indirectly through the input in the children's development. As long as childcare subsidies are directed solely at childcare services provided outside the home, this approach would be appropriate for the simulation of the effects of policy changes in childcare subsidies. However, this simplified specification of the behaviour of the household and the lack of data on internal costs mean that the childcare costs estimated in this type of paper constitute only part of the total costs. Clearly, a framework which captures both components of the costs would be an important extension.

The issue of quantity constraints linking hours of childcare and hours of work in joint labour supply childcare demand models has received little attention, with most studies using an unrestricted model of both hours of work and childcare use. Exceptions are Connelly (1992) and Kornstad and Thoresen (2002, 2006) in which it was assumed that hours of work and childcare use must be equal; Blundell et al. (2000), who estimated the

relationship between hours of work and hours of childcare for different groups; Parera-Nicolau and Mumford (2005), who impose time constraints on the father (although it is assumed he does not spend time caring for the children), mother and child; Duncan, Paull, and Taylor (2001a), who relaxed the assumption of equal hours of labour supply and childcare by allowing childcare use to exceed the mother's hours of work; and Doiron and Kalb (2005a,b), who estimated demand for childcare as a function of labour supply and then imputed childcare demand separately at the different discrete levels of labour supply including non-participation.

The latter three approaches recognised that childcare may be seen as beneficial to the child and is not solely purchased to allow mothers to work. Results from some of these studies suggest that imposing quantity constraints directly on childcare demands has potentially large effects on parameter estimates. However, there is still much contention over the appropriate form which should be used to model this constraint. In addition, the type of restriction imposed (if any) should be guided by what is observed in the data.

In the empirical work to date, a problem is that many of the data sets only include information on childcare for those households in which mothers work. Explaining the relationship between childcare demand and the decision to participate has been much more difficult because of this feature of the data. Fortunately, the Australian data sets CCS and HILDA include childcare use for all families with children under a particular age.

Self-reported prices are likely to be endogenous as parents choose among providers offering different levels of quality and other attributes (usually unobserved) along with differing price structures.[5] Therefore, controlling for variations in quality and the resulting endogeneity of prices has been an important issue in several recent overseas studies. Most of the studies on childcare demand are based on household surveys and these rarely include measures of quality or other attributes of the childcare service. Generally, the endogeneity of prices for formal care has been addressed by using variables capturing regional variations as instruments for price variations or by merging information from other sources.

[5] There are additional problems with the modelling of prices namely that observed prices are frequently zero and generally not constant as often one must buy a fixed number of hours of care in advance. For example, the hourly fee for children using 1-9 hours of care per week in a Long Day Care centre is much higher than the hourly fee for those using 10 or more hours (Powlay, 2000). For Family Day Care, there is hardly any difference between low and high amounts of usage. With the exception of selection effects into paid childcare, little work has been done on the nonlinear pricing schedules offered for childcare services. Exceptions are Ribar (1995) and Walker (1992).

Blau and Robins (1988, 1989) used regional variations in expenditures to measure price and quality changes. Kimmel (1998) and Ribar (1992, 1995) used regional variations in childcare regulations and wage levels. Blau and Robins (1988) and Leibowitz, Klerman and Waite (1992) imputed information on wages of childcare workers by state, while Duncan, Paull and Taylor (2001a, 2001b) matched information on availability of services by local authority. Other researchers have matched information from household surveys to information from care providers on fees and other attributes of care. This method uses variations from the supply side of the market to capture variations in the price-quality packages of childcare services available to households. Walker (1992), Blau and Mocan (1999), Blau and Hagy (1998) and Hagy (1998) are examples of studies using this approach.

Overseas empirical results vary considerably with the particular approach used as well as the data set. Generally, policies which reduce the costs of childcare have been found to induce an increase in both labour supply and childcare use. The responses in labour supply are quite small on average but they are stronger for people at the bottom of the income distribution so that progressive measures generally elicit a larger reaction. Anderson and Levine (1999) reviewed several econometric studies and concluded that the overall elasticity of labour force participation of mothers with regard to childcare prices lies between -0.05 and -0.35. Women with few skills are more affected than higher-skilled women. Use of childcare by employed mothers is more price sensitive than for unemployed mothers. Formal childcare is also more sensitive to price and wage effects than informal care.

A range of studies in Australia, the U.S., Canada, the U.K., Germany, The Netherlands, France, Italy, Norway, Sweden and Japan have looked at the impact of childcare costs and/or childcare prices on the probability of employment and the average number of hours worked. Table 4 presents an overview of these results reported in the form of elasticities.[6] Most studies report the elasticity with regard to the childcare costs only, accounting for childcare subsidies implicitly rather than explicitly. The elasticities are calculated for different subpopulations: single parents and married women with children of different ages,

[6] An elasticity is defined by dividing the percentage change in a variable of interest by the percentage change in the variable causing the change in the first variable; it thus measures the effect of a change. For example, a price elasticity of the demand for childcare is expressed as the percentage change in the demand for childcare (resulting from the price change) divided by the percentage change in price.

which could cause part of the differences in results. In most of the studies in Table 4, individual elasticities are calculated for each observation, which are then averaged across all observations. However, there are a few exceptions in which the elasticity is calculated at the sample means. The approach used is indicated in the table. Both approaches can hide substantial variations in elasticities between subgroups in the population.

Table 4 Summary of results from other studies on the effects of childcare prices/costs

Reference	Country (year)	Population	Estimated elasticity	
		(age of youngest child)	Participation	Average hours
Averett, Peters and Waldman (1997)	U.S. (1986)	Married women (<6)		-0.78[b]
Anderson and Levine (1999)	U.S. (1980-1994) (review)	Married women	-0.92 – 0.00	
		Single women	-0.50 – 0.00	
Blau and Hagy (1998)	U.S. (1989/90)	Married and single mothers (<7)		-0.20[a]
Blau and Robins (1988)	U.S. (1980)	Married women (<14)	-0.38[a]	
Conelly (1992)	U.S. (1984/85)	Married women (<13)	-0.20[b]	
Ribar (1992)	U.S. (1985)	Married women (<15)		-0.74[b] or -0.64[a]
Ribar (1995)	U.S. (1984/85)	Married women (<15)		-0.024 to -0.088[a]
Powell (1997)	Canada (1988)	Married women (<6)	-0.38[b]	-0.32[b]
Powell (2002)	Canada (1988)	Married women (<7)	-0.16[c,a]	
Michalopoulos and Robins (2000)[d]	Canada (1988) and U.S. (1990)	Married mothers (<5)	-0.156 (all)[a] -0.142 (US)[a] -0.203 (Canada)[a]	
Michalopoulos and Robins (2002)[d]	Canada (1988) and U.S. (1990)	Single parents (<5)	-0.26[a]	
Blundell et al. (2000)[e]	U.K. (1994-1996)	Married women :		
		-unemployed partner	-0.075[a]	-0.084[a]
		-employed partner	-0.066[a]	-0.048[a]
		Single women	-0.021[a]	-0.020[a]
Kornstad and Thoresen (2002)	Norway (1998)	Married women (1-2)	-0.12[a]	-0.14[a]
Gustafsson and Stafford (1992)	Sweden (1984)	Probability of working at least 30 hours:		
		All mothers	-0.063[a]	
		Mothers who face no childcare rationing	-1.88[a]	
Wrohlich (2004)	Germany (2002)	Married women (<6)	-0.03 (east)[a] -0.07 (west)[a]	-0.04(east)[a] -0.09 (west)[a]
Wrohlich (2006)	Germany (2001-2003)	Mothers (<3)	-0.02 [a]	-0.06 [a]
		All mothers (<7)	-0.02 [a]	-0.08 [a]
Graafland (2000)[f]	The Netherlands	Married women		-0.15
Choné et al. (2003)	France (1997)	Married women (<3)	-0.01[a]	-0.02[a]
		Married women (<7)	-0.01[a]	-0.01[a]

Table 4 continued

Reference	Country (year)	Population (age of youngest child)	Estimated elasticity	
			Participation	Average hours
Del Boca (2002)	Italy (1993)	Married women (with pre-school age child)	Insignificant (care is rationed) Negative (care is not rationed)	
Oishi (2002)	Japan (1998)	Married women (<7)	-0.60[b]	
Doiron and Kalb (2005a)[g]	Australia (1996/97)	Married women (<12):		
		-total	-0.020 or -0.020[a]	-0.021 or -0.034[a]
		-low wages	-0.023 or -0.047[a]	-0.027 or -0.045[a]
		-preschool child	-0.050 or -0.050[a]	-0.048 or -0.066[a]
		-p.s. child & low wages	-0.031 or -0.061[a]	-0.053 or -0.079[a]
		Lone parents (<12):		
		-total	-0.050 or -0.100[a]	-0.053 or -0.150[a]
		-low wages	-0.038 or -0.189[a]	-0.062 or -0.263[a]
		-preschool child	-0.136 or -0.136[a]	-0.175 or -0.280[a]
		-p.s. child & low wages	-0.126 or -0.000[a]	-0.216 or -0.054[a]
Rammohan and Whelan (2005)	Australia (2002)	Married women	-0.12[b]	-0.06[b]
Rammohan and Whelan (2006)	Australia (2002)	Married women	-0.28[b] (-0.06 part-time, -0.21 full-time)	

Notes: a) Evaluated at each observation and averaged across all observations. b) Evaluated at the sample means. c) This elasticity is derived from the simulation of a decrease in the formal childcare price ('center price') in Table 4 in Powell (2002). d) This elasticity is for a price change in the base model (see Table 5, page 486). e) These elasticities are derived from Tables 7 to 9 and 11 in Blundell et al. f) These results are derived from simulations using an Applied General Equilibrium model which allows for 40 different household types, providing a relatively high level of disaggregation. g) Both the results from increasing the gross price and increasing the net costs (largest effects) are presented.

Compared to the results from other studies, the results for the total sample of women in Australia are of the same sign but are quantitatively relatively small. The impacts found for Australia are closer to those found for the U.K., Germany and France than to those for the U.S. However, despite the small *average* price elasticity, childcare costs were shown to be relevant in a simulation of a policy change as proposed by the Taskforce on Care Costs (TOCC, 2006; Kalb and Lee, 2007). It showed that replacing the 30% Child Care Tax Rebate with a 50% reimbursement of childcare costs (making it independent of income tax payments) up to a maximum of $20,000 of childcare costs per family per year is expected to have substantial labour supply responses. The reforms are predicted to return just over 50% of the original additional government outlay for the increased subsidies through increased income tax and reduced income support payments arising from increased labour supply. The predicted increase in government revenue as a percentage of the original additional cost is particularly high for sole parents (nearly 100%).

Doiron and Kalb (2005a) found much higher elasticities for lone parents and more generally for low-income households than for other households in Australia.[7] This was also found for the U.S. in Michalopoulos, Robins and Garfinkel (1992). The simulation in the latter study examines the effect of introducing a policy which increases childcare subsidies for low-income households. They do not present elasticities but the simulations show that childcare subsidies aimed at the lower income groups are more effective at stimulating labour supply than subsidies benefiting households on higher incomes. The review paper by Anderson and Levine (1999) also mentions results which suggest that poorer households are more affected by changes in childcare costs.

Gustafsson and Stafford (1992) claim that the price variations in their data are substantial (and truly exogenous) due to differences in subsidies between different councils in Sweden, which are independent of the quality of care provided, given that the latter is set nationally. They argue that their data is therefore more suitable for estimating the effect of price on childcare demand than most U.S. data sets where childcare quality is highly variable and difficult to measure. Due to the rationing of childcare for many households, the effect of price is low, but once the rationing is taken into account the effect of price becomes very large.

Blundell et al. (2000) is one of the few studies to look at married men. Their results suggest that men are hardly affected at all by childcare costs. This is similar to the findings by Doiron and Kalb (2005a). The results for men are not shown in Table 4.

Many factors are likely to be involved in explaining the similarities and the differences between Australia and other countries such as the size of the costs relative to earnings, the prevalence of part-time work, and the availability of care. A careful study comparing these factors would be helpful in understanding the relationship between labour supply and childcare.

[7] Research also found that reimbursing a larger percentage of childcare costs (say 80 per cent instead of 30 per cent) increases labour supply to a larger extent than reimbursing a larger amount of childcare costs at 30 per cent (Averett, Peters and Waldman, 1997). A possible explanation for this is that low-income families, who typically would have lower childcare costs, benefit more from increasing the reimbursement percentage than from increasing the reimbursement amount, and they are typically the households with the highest labour supply elasticities.

5. Availability and quality of childcare

Non-economic aspects of childcare such as the availability and quality of childcare are important in themselves, but they may also be important when analysing the effect of childcare fees on childcare use and labour supply. These two aspects are discussed separately in the first two subsections. The quality aspect is further discussed in subsection 5.3 in relation to child development.

5.1 Availability of childcare

Convenient and affordable access to formal childcare is a pre-requisite for it being a viable alternative to parental care. A very convenient location would be the place of employment of one of the parents. Lehrer, Santero and Mohan-Neill (1991) found a positive effect of employer-sponsored childcare on hours worked and attachment to the employer in the nurses' labour market in the U.S. Employer-sponsored childcare could take the form of on-site childcare facilities, off-site childcare facilities, assistance in obtaining childcare or assistance with the cost of childcare. The effects of the different types of assistance are not analysed separately.

In several countries, there is evidence of rationing in childcare. This means that childcare is not available to all households who would like to use it. A few studies have explicitly investigated the effect of rationing. Wrohlich (2006) finds relatively small price elasticities for Germany. In her analysis, she explicitly incorporates information on whether the household is rationed or not. In a simulation, using her estimated model, she finds that increasing the number of childcare places is more effective in increasing the demand for childcare and increasing employment than a decrease in the childcare fees paid by parents. Kornstad and Thoresen (2006) ran two similar simulations, one decreasing the childcare fees and one abolishing all childcare centre queues. Their results show that decreasing childcare fees was slightly less expensive per one per cent of labour supply increase of mothers than abolishing the queues. However, abolishing the queues had no distributional effects, whereas decreasing the fees had a weak negative effect, benefiting the higher income quintiles somewhat more than the lower income quintiles.

From an analytical point of view, information on the availability of childcare is important in understanding the effect of other factors. For example, in determining the effect of price

on demand for childcare and on labour supply, it has been shown that rationing is important. Del Boca (2002) finds no significant effect of the price on labour force participation for households who are restricted in their childcare needs. However, for those who are not restricted she finds a significant negative effect of the price.

Similarly, Gustafsson and Stafford (1992) find elasticities close to zero for households where childcare is rationed, but very high negative elasticities for unrationed households. This is as expected, if households are restricted in their choice the true effect of price is difficult to measure. The high quality of childcare encourages labour supply of women, more or less independent from their spouses' incomes. The spouses' income appears to have a positive effect on the demand for childcare attenuating the negative income effect of the spouses' income on the mothers' labour supply. Households seem keen to secure a public childcare space.

5.2 Quality of childcare

Recently, some groups in Australia have expressed concern about the increase in the number of private childcare centres relative to the number of community-based centres. One example, which is often mentioned, is the corporate chain of A.B.C. Learning Centres Limited (ABC) which has expanded substantially over recent years, taking over individual childcare centres. There appears to be a concern regarding the quality of childcare provided in such centres, and specifically in centres associated with ABC. Rush and Downie (2006) compare ABC learning centres with community based centres, based on interviews with childcare workers at the two types of childcare centres. There is variation between individual workers at each type of centre, but overall based on evidence from 77 workers at ABC, on average, workers at ABC appear to need to spend more time on administration and cleaning (and therefore have less time to spend with the children) than staff at community-based centres. In addition, concern is raised about the quality and quantity of food for children. This type of concern could make parents reluctant to use centre-based care for their children, independent of whether they can afford it. Particularly, because as overseas research shows, it is difficult for parents to assess the quality of a childcare centre themselves. Two of these studies for the U.S. are discussed below.

Blau (1999) argues that easily measured characteristics of childcare such as staff-group ratio, group size and provider training have little effect on childcare quality as is apparent from observed child development. He reviews the literature to find a wide range of outcomes, not leading to any unambiguous conclusions. In his own analysis, he includes a wide range of control variables (including lagged childcare inputs) which might affect a child's development independent from childcare quality. In addition, he controls for unobserved heterogeneity by allowing for mother fixed effects and he allows effects to vary by characteristics such as poverty or race. He concludes that the effects are often small, not significant and are as likely to be of the wrong sign as the correct sign.

Also for the U.S., Mocan (2005) focuses on the perception of quality of childcare centres by parents. He investigates whether the low quality in the centre-based childcare market could be due to information asymmetry between childcare providers and consumers (parents) regarding the quality of services. Trained observers and parents use the same set of quality measures, closely related to child development, to evaluate the centres. Individual aspects of services provided for children are classified as difficult-to-observe and easy-to-observe quality.

Comparing parent and observer ratings indicates that parents significantly over-estimate quality and that this seems mostly a scale effect. In addition, parents do not appear to utilise all available information when forming their assessments of quality. For example, parents in publicly regulated centres underestimate quality when production function estimates reveal that these centres have higher quality. Similarly, parents do not consider publicly owned status as a positive or negative signal of quality, while these centres actually produce higher levels of quality. Mocan argues that this inability of parents, to assess the level of quality of the services provided for their children, makes them unwilling to pay a premium for high quality. Due to the high cost of producing quality childcare, centres will not have an incentive to produce high quality in the absence of the demand for it.

Anderson and Levine (1999) reviewed a number of econometric studies. Little effect of policy reforms on substitution towards higher-quality childcare can be found. Also, quality and quantity appear to be substitutes at least for formal care but there are indications that existing measures of quality are not adequate in capturing important features of the trade-offs being made in this respect. Using U.S. data, Blau and Hagy (1998) argue that their

results suggest that parents do not value childcare quality highly, at least not those attributes which are defined as quality by development psychologists. However, there is evidence that parents care about some unobserved features of childcare. The explanation that due to childcare supply restrictions parents cannot follow their preferences, so observed outcomes are not the optimal outcomes from the point of view of parents, is found to be implausible given the number of centres with a wide range of attributes in each parent's area.

Controlling for price and quality selectivity, Hofferth and Wissoker (1992) find that the effect of changing staff-child ratio on the demand for centre-based care is weak and inconsistent. Parents do not seem to respond to this variable, which is one of the more easily observed measures of quality. The price of a particular type of childcare on the other hand has the straightforward effect of reducing the demand for that type of childcare. The family's income (excluding the mother's income) and the mother's wage rate have the effect of increasing the demand for centre-based care at the cost of the other types of care.

Using U.K. data, Parera-Nicolau and Mumford (2005) find a positive effect of price of childcare on labour supply, when including time constraints on the parents and children.[8] They interpret this positive effect as an indication for quality. That is, a higher price indicates a higher quality of childcare, which will lead to a higher demand. As a result, if more quality is offered labour supply is expected to increase.

5.3 Childcare quality and child development

More research into the effect of quality of childcare on child development is required to understand what type of childcare centre provides an encouraging and healthy environment for children at different ages. Outcomes from this research could be used to set childcare centre standards so that parents can be confident that the use of childcare will not disadvantage their child later in life. In addition, research into any link between labour supply and the quality of childcare would be of interest, to understand the role that quality (or perceived quality, given the difficulties of actually observing quality as a parent) has on labour supply and childcare decisions.

[8] The time constraints impose the restrictions that everyone has a limited and fixed amount of time per week. Parents cannot spend more time on leisure, childcare and labour supply than the total amount of time they have available. Children need to be looked after by a parent, be in informal or in formal care at all times.

A U.K. study by Gregg et al. (2005) into the effect of a mother's employment on the cognitive outcomes of her children in early to mid childhood finds that only full-time employment in the first 18 months of her child's life has a negative effect. This is more so for higher educated women and less so for single women. The effect also depends on the type of nonparental childcare used. The negative effect is only evident when this care consists largely of unpaid care by a relative, friend or neighbour. Furthermore, the results indicate that employment in combination with using centre-based childcare may have a positive effect on child development. These results are in line with the results discussed in Gregg et al.'s review of the U.S. literature, where a return to full-time employment in the first year is also found to have some negative effect, but later returns to employment or part-time employment appear to have no effect.

Research shows that there is a need for a fine balance between providing incentives to mothers to participate in the paid labour force and allowing women sufficient time to recover from birth and give their babies a good start in life. The U.S. situation is quite different from that of other developed countries, providing much less paid maternity leave and job-protected leave. Berger, Hill and Waldfogel (2005) mention that in several studies it was found that a third of new mothers in the U.S. return to work within 3 months after giving birth, compared to about 5 per cent in other countries, such as the U.K., Germany and Sweden. The sample used by Berger, Hill and Waldfogel sees about 63 per cent of women, who work before birth, return to work within 12 weeks of giving birth. More than half return to full-time employment. They find that such a quick return negatively affects child development and health, particularly if the return is full-time.

6. The type of childcare

An important aspect of childcare is the large degree of heterogeneity across types of care. There is considerable usage of both informal services provided by relatives, often at no monetary charge, and of highly structured, formal day care centres offering large variations in quality and in fees. The availability of services differs by age of child and region, and often in ways which are unobserved by the researcher (for example access to cost-free care by relatives or friends). For example, analysis of informal care, which is often provided without financial cost, has been problematic because of the lack of information needed to explain the availability and attributes of such care. The existing overseas research has

mainly dealt with formal care. Blau and Hagy (1998), Michalopoulos and Robins (2002, 2000) and Michalopoulos, Robins and Garfinkel (1992) are examples of the few studies which model jointly the labour supply decision and the choice of mode of childcare. In these studies, the mode of childcare and the labour supply are discrete choices. The amount of childcare used is not explicitly modelled.

In Section 5.3, the effect of the mother's employment on child development was briefly discussed. There was some evidence that employment in the first year could have a negative effect, depending on the alternative source of childcare. Averett, Gennetian, and Peters (2005) examine the effect of using paternal childcare in the U.S. when the mother is working. They found there was no effect of paternal care compared to alternative forms of care when provided in the first year and a negative effect when provided in the second or third year of a child's life. Averett, Gennetian, and Peters provide the following possible explanations for this result. They did not control for the amount and stability of care which was provided. The group of fathers, providing care in the second and third years only, appeared to be different from the group providing care in the first year. Their care-giving role may have been prompted by economic circumstances such as unemployment, which may have its own independent effect on a child's development. Fathers may also have less access to support groups such as a play group. Interaction with other children might play an important role in a child's development.

7. Conclusion

Analysing childcare is complex due to the potential endogeneity of a large number of factors. For example, the observed price paid for childcare is at least partly the outcome of a choice between lower and higher quality childcare. When the quality is unobserved, measuring the effect of price will be difficult. Similarly, when quality is observed for a particular type of childcare it is likely to be the outcome of a choice and is thus potentially endogenous. Analysis is further complicated by the fact that many of the relevant factors in childcare choices, such as distance to close relatives or the number and type of childcare services within a convenient distance, are unobserved in the available data. In the economic literature, relatively little attention is paid to the effect of childcare on child development, but this is likely to be an important factor in the decision process. The recently started Longitudinal Study of Australian Children, which is funded by the Department of Family,

Community Services and Indigenous Affairs and managed by the Australian Institute of Family Studies, could provide valuable input into improved analyses of childcare.

The effect of increases in childcare costs is reviewed. The effects found for Australia are at the lower end of the range of elasticities found in the international literature. However, there is evidence that the effect differs substantially between households. Not surprisingly, those most affected are on low wages and have pre-school children. Therefore, the price of childcare has the potential to affect some families significantly and reduce the labour force participation of mothers. Childcare costs were shown to be relevant in a simulation of a policy change as proposed by the TOCC (TOCC, 2006; Kalb and Lee, 2007). It showed that replacing the 30% Child Care Tax Rebate with a 50% reimbursement of childcare costs (making it independent of income tax payments) up to a maximum of $20,000 of childcare costs per family per year is expected to have substantial labour supply responses.

From overseas studies, childcare rationing and the quality of childcare appear important issues. They are important in themselves and may have a direct effect on childcare demand and labour supply. In addition, not allowing for these factors can potentially affect the estimated effect of childcare fees on demand for childcare and labour supply. It was found that in the presence of rationing the price elasticity seems biased towards zero. Therefore, if rationing is an issue in Australia, the estimated price effects could have been underestimated. From the available unit record data in Australia, there is no strong evidence of rationing, but this could be explored further through external information on regions where there are childcare shortages by age group (waiting lists) and regions where there are childcare vacancies by age group.

There are several ways in which research on childcare can be moved forward in Australia. The new panel data set Longitudinal Study of Australian Children appears a promising source of information on the characteristics of childcare used by parents, linked with detailed information on the household in which the child lives. Currently only one wave is available, but one cohort of children will be followed from birth to age 6 or 7 and another cohort from age 4 to age 10 or 11. This data will provide information to study the link between childcare and child development, while controlling for the quality of childcare and a range of other important factors.

To shed some light on the choice for informal childcare, information on the presence of relatives living close to the household would be valuable. The HILDA provides information on every person living in the household, but not on the availability of a strong family or social network living in close proximity to the household. This information would be crucial to improve our understanding of the choice between formal and informal childcare, since the use of informal childcare often depends on close friends or relatives living nearby who are available to help with childcare.

Finally, detailed regional information on formal childcare availability by the relevant age groups (preferably distinguishing family day care and long day care centres) would allow researchers to control for any supply side restrictions when analysing the demand for childcare and its elasticity with respect to childcare fees. This would improve analyses of the effect of the cost of childcare on labour supply. The estimated effect is potentially dependent on the presence of childcare rationing.

References

Aaberge, R., Colombino, U. and Strøm, S. (1999), 'Labour supply in Italy: an empirical analysis of joint household decisions with taxes and quantity constraints', *Journal of Applied Econometrics*, 14, 403-22.

Anderson, P.M. and Levine, P.B. (1999), 'Child Care and Mothers' Employment Decisions', Working Paper No. 7058, National Bureau of Economic Research.

Apps, P. and Rees, R. (2000), 'Household production, full consumption and the costs of children', Discussion Paper No. 157, Institute for the Study of Labor (IZA) Bonn.

Averett, S.L., Gennetian, L.A. and Peters, H.E. (2005), 'Paternal child care and children's development', *Journal of Population Economics*, 18(3), 391-414.

Averett, S.L., Peters, H.E. and Waldman, D.M. (1997), 'Tax Credits, Labor Supply, and Child Care', *The Review of Economics and Statistics*, 79(1), 125-135.

Berger, L.M., Hill, J. and Waldfogel, J. (2005), 'Maternity leave, early maternal employment and child health and development in the US', *The Economic Journal*, 115 (February), F29–F47.

Birch, E.-R. (2005), "Studies of the Labour Supply of Australian Women: What Have We Learned?", *Economic Record*, 81(252), 65–84.

Blau, D.M. (1999), 'The Effect of Child Care Characteristics on Child Development', *The Journal of Human Resources*, 34(4), 786-822.

Blau, D.M. and Hagy, A. (1998), 'The Demand for Quality in Child Care', *Journal of Political Economy*, 106(1), 104-146.

Blau, D.M and Mocan, H.N. (1999), 'The Supply of Quality in Child Care Centers', Working Paper No. 7225, National Bureau of Economic Research.

Blau, D.M. and Robins, P.K. (1988), 'Child-Care Costs and Family Labor Supply', *Review of Economics and Statistics*, 70(3), 374-381.

Blau, D.M. and Robins, P.K. (1989), 'Fertility, Employment and Child-Care Costs', *Demography*, 26(2), 287-299.

Blundell, R., Duncan, A., McCrae, J. and Meghir, C. (2000), 'The Labour Market Impact of the Working Families' Tax Credit', *Fiscal Studies*, 21(1), 75-104.

Breunig, R., Cobb-Clarke, D. and Gong, X. (2005), 'Improving the Modeling of Couples' Labour Supply', Discussion Paper No. 1773, Institute for the Study of Labor (IZA) Bonn.

Choné, P., D. le Blanc and I. Robert-Bobée (2003), 'Female Labor Supply and Child Care in France', CESifo Working Paper No. 1059.

Cobb-Clark, D.A., Liu, A. and Mitchell, D. (2000), 'Reassessing the Role of Child Care Costs in the Work and Care Decisions of Australian Families', *Australian Bulletin of Labour*, 26(4), 279-297.

Connelly, R. (1992), 'The Effect of Childcare Costs on Married Women's Labor Force Participation', *Review of Economics and Statistics*, 74(1), 83-90.

Del Boca, D. (2002), 'Do child care costs affect labor supply?', working paper ChildD n. 18/2002, Centre for Household, Income, Labour and Demographic economics, Italy.

Doiron, D. and Kalb, G. (2002), 'Demand for Childcare Services and Labour Supply in Australian Families', *The Australian Economic Review*, 35(2), 204-213.

Doiron, D. and Kalb, G. (2005a), "Demands for Child care and Household Labour Supply in Australia", *Economic Record*, 81(254), 215-236.

Doiron, D. and Kalb, G. (2005b), "Effects of Child Care Demands and Policies on household Labour Supply in Australia", Policy Research Paper no. 25, the Commonwealth Department of Family and Community Services.

Duncan, A., C. Giles and J. MacCrae (1999), 'Household Labour Supply, Childcare Costs and In-Work Benefits: Modelling the Impact of the Working Families Tax Credit in the UK', Working Paper, Institute for Fiscal Studies, London.

Duncan, A., Paull, G. and Taylor, J. (2001a), 'Mothers' Employment and Use of Childcare in the United Kingdom', Working Paper No. 01/23, Institute for Fiscal Studies, London.

Duncan, A., Paull, G. and Taylor, J. (2001b), 'Price and Quality in the UK Childcare Market', Working Paper No. 01/14, Institute for Fiscal Studies, London.

Fraker, T. and Moffitt, R. (1988), 'The effect of food stamps on labor supply: a bivariate selection model', *Journal of Public Economics*, 35, 25-56.

Graafland, J.J. (2000), 'Childcare subsidies, labour supply and public finance: an AGE approach', *Economic Modelling*, 17, 209-246

Gregg, P., Washbrook, E., Propper, C. and Burgess, S. (2005) 'The effects of a mother's return to work decision on child development in the UK', *The Economic Journal*, 115 (February), F48–F80.

Gustafsson, S. and Stafford, F. (1992), 'Child Care Subsidies and Labor Supply in Sweden', *The Journal of Human Resources*, 27(1), 204-230.

Hagstrom, P.A. (1996), 'The food stamp participation and labor supply of married couples; an empirical analysis of joint decisions', *Journal of Human Resources*, 31(2), 383-403.

Hagy, A. P. (1998), 'The Demand for Child Care Quality: A Hedonic Price Theory Approach', *Journal of Human Resources*, 33(3), 683-710.

Hofferth, S.L. and Wissoker, D.A. (1992), 'Price, Quality and Income in Child Care Choice', *The Journal of Human Resources*, 27(1), 70-111.

Hoynes, H.W. (1996), 'Welfare transfers in two-parent families: labor supply and welfare participation under AFDC-UP', *Econometrica*, 64(2), 295-332.

Kalb, G. and Lee, W.-S. (2007), 'The Effect of an Alternative Childcare Subsidy on Labour Supply: A Policy Simulation', Melbourne Institute Working Paper No. 14/07, Melbourne Institute of Applied Economic and Social Research, University of Melbourne.

Kalb, G. and Scutella, R. (2004), 'Wage and Employment Rates in New Zealand from 1991 to 2001', *New Zealand Economic Papers*, 38(1), 21-47.

Kimmel, J. (1998), 'Child Care Costs as a Barrier to Employment for Single and Married Mothers', *Review of Economics and Statistics*, 80(2), 287-299.

Kornstad, T. and Thoresen, T.O. (2002), 'A Discrete Choice Model for Labor Supply and Child Care', Statistics Norway Research Department Discussion Paper No. 315, forthcoming in *Journal of Population Economics*.

Kornstad, T. and Thoresen, T.O. (2006), 'Effects of Family Policy Reforms in Norway: Results from a Joint Labour Supply and Childcare Choice Microsimulation Analysis', *Fiscal Studies*, 27(3), 339-371

Lehrer, E.L., Santero, T. and Mohan-Neill, S. (1991), 'The impact of employer-sponsored child care on female labor supply behavior: Evidence from the nursing profession', *Population Research and Policy Review*, 10, 197-212.

Leibowitz, A., Klerman, J. and Waite, L. (1992), 'Employment of New Mothers and Child Care Choice', *Journal of Human Resources*, 27(1), 112-134.

Michalopoulos, C., and Robins, P.K. (2000), 'Employment and Child-Care Choices in Canada and the United States', *Canadian Journal of Economics*, 33(2), 435-470.

Michalopoulos, C., and Robins, P.K. (2002), 'Employment and Child-Care Choices of Single-Parent Families in Canada and the United States', *Journal of Population Economics*, 15(3), 465-493.

Michalopoulos, C., Robins, P.K. and Garfinkel, I. (1992), 'A Structural Model of Labor Supply and Child Care Demand', *Journal of Human Resources*, 27(1), 166-203.

Oishi, A.S. (2002), 'The Effect of Childcare Costs on Mothers' Labor Force Participation', *Japanese Journal of Social Security*, 1(1), 51-67.

Mocan, H.N. (2005), "Can Consumers Detect Lemons? An Empirical Analysis of Information Asymmetry in the Market for Child Care", revised version of NBER Working Paper No. 8291, forthcoming in *Journal of Population Economics*.

Parera-Nicolau, A. and Mumford, K. (2005), 'Labour Supply and Childcare for British Mothers in Two-Parent Families: A Structural Approach', Discussion Paper No. 1908, Institute for the Study of Labor (IZA) Bonn.

Powell, L.M. (1997), 'The Impact of Child Care Costs on the Labour Supply of Married Mothers: Evidence from Canada', *Canadian Journal of Economics*, 30(3), 577-594.

Powell, L.M. (2002), 'Joint Labor Supply and Childcare Choice Decisions of Married Mothers', *Journal of Human Resources*, 37(1), 106-128.

Powlay, J. (2000), "Child Care Affordability", mimeo, Department of Family and Community Services.

Rammohan, A. and Whelan, S. (2005), 'Child Care and Female Employment Decisions', *Australian Journal of Labour Economics*, 8(2), 203-225.

Rammohan, A. and Whelan, S. (2006), 'Child care costs and the employment status of married Australian mothers', discussion paper no. 517, Centre for Economic Policy Research, The Australian National University.

Ribar, D.C. (1992), 'Child Care and the Labor Supply of Married Women: Reduced Form Evidence', *Journal of Human Resources*, 27(1), 134-165.

Ribar, D.C. (1995), 'A Structural Model of Child Care and the Labor Supply of Married Women', *Journal of Labor Economics*, 13(3), 558-597.

Rush, E. and Downie, C. (2006), 'ABC Learning Centres: A case study of Australia's largest child care corporation', Discussion Paper Number 87, Australia Institute.

Taskforce on Care Costs (2006), 'Where to now? 2006 TOCC Final Report', Report.

Van Soest, A. (1995), 'Structural Models of Family Labor Supply: A Discrete Choice Approach,' *Journal of Human Resources*, 30(1), 63-88.

Van Soest, A., Das, M. and Gong, X. (2002), 'A structural labour supply model with flexible preferences', *Journal of Econometrics*, 107, 345-374.

Walker, J.R. (1992), 'New Evidence on the Supply of Child Care: A Statistical Portrait of Family Providers and an Analysis of Their Fees', *Journal of Human Resources*, 27(1), 40-69.

Wrohlich, K. (2004), 'Child Care Costs and Mothers' Labor Supply: An Empirical Analysis for Germany', Discussion Paper 412, German Institute for Economic Research (DIW) Berlin.

Wrohlich, K. (2006), 'Labor Supply and Child Care Choices in a Rationed Child Care Market', Discussion Paper No. 2053, Institute for the Study of Labor (IZA) Bonn.