

New estimates of the relationship between female labour supply and the cost, availability, and quality of child care

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This paper summarises new evidence from two Treasury working papers on the responsiveness of female labour supply to child care costs, availability, and quality. In one study, we drew on lessons from the literature and new detailed data to provide new estimates of the labour supply elasticity with respect to child care price for married women with young children. We found that, in contrast with previous Australian estimates, the cost of child care does have a statistically significant and negative effect on the labour supply of married mothers. This finding supports policy that reduces the costs of child care to encourage maternal labour supply. In a second study, we focused on the non-price factors and examined the impacts of subjective measures of the availability, quality, and affordability of child care on mothers' labour supply. We found that, after controlling for other factors, in geographical areas with higher reports of difficulty with availability and quality (and affordability), women with young children work fewer hours and, in particular, are more likely to work part-time instead of full-time.

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Introduction

One of the key questions which must be considered when shaping child care policies is how child care costs, availability and quality affect parents' labour supply. Current child care policies in Australia are founded on the view that high costs, poor quality and lack of availability of child care would be barriers preventing mothers from participating in the labour force. However, the degree of responsiveness of Australian women's labour supply to child care costs has been a matter of some debate. There is a view that the level of responsiveness is very low or negligible for all women with young children (slightly higher, but still very low, for sole parents). This view, largely based on a limited Australian empirical literature, runs counter to anecdotal evidence, is inconsistent with the evidence from broadly comparable overseas countries (which generally shows higher child care costs leading to reduced labour supply by women with young children), and is arguably counter-intuitive. A second observation is that the evidence on the relationship between labour supply and non-price factors such as the quality and availability of child care is limited in Australia.

Two new studies undertaken in Treasury have shed some light on these issues. In one study (Gong, Breunig and King 2010), we review the literature on the responsiveness of women's labour supply to child care costs, before providing new estimates of this labour supply elasticity with respect to gross child care price² for married women. Our study uses an alternative method and new data from the 'in-confidence' version of the Household, Income and Labour Dynamics in Australia (HILDA) Survey³. In a second study (Breunig and Gong 2010), which focuses on non-price factors, we analyse data on the responses to qualitative questions about problems which families may have experienced with the availability and quality (and affordability) of child care. We study whether these responses, aggregated at different geographical levels, have a relationship with mothers' labour supply. This article summarises the main findings from these two studies. The focus is on married women, as sample sizes limit the scope for separate analysis of sole parents.

The paper is organised as follows. In the next section we summarise findings from the review of the Australian and international literature on child care and labour supply, identifying some reasons why the labour supply responsiveness to child care costs in

2 It is important to distinguish between the gross and net child care prices of child care (see Box 1).

3 This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the authors and should not be attributed to either FaHCSIA or the Melbourne Institute.

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Australia may have been underestimated previously. In the third section, we present and discuss our new estimates of the labour supply elasticity with respect to gross child care price. In the fourth section, we briefly summarise the main findings from Breunig and Gong (2010) on the relationship between mothers' labour supply and child care availability and quality. Conclusions are drawn in the final section.

The literature on child care elasticities

Before considering the findings from the review of estimates of women's labour supply elasticities with respect to child care costs, it is useful to define just what these elasticities are, including the distinction between gross and net child care price elasticities (see Box 1).

Box 1: Gross and net child care price elasticities

The elasticity of labour supply with respect to child care price is defined as the percentage change in hours worked (labour supply) for a one per cent change in the child care price. The elasticity may be specified with respect to the gross or net price of child care.

- The gross price of child care is the price charged by the child care provider.
- The net price of child care is the price charged by the child care provider less any entitlements that the user has to government child care assistance.

It is usually assumed in economic theory that households use net prices as instruments in their decision making. Thus, a net price elasticity would be the measure that better describes the basic labour supply responsiveness to changes in the cost of child care. (A qualification does emerge, though, if the provision of assistance with child care costs comes much later than when the costs are actually paid – as has been the case with some components of Australian child care assistance at certain times. In that case, households may in fact respond partly to gross prices).

A net child care price elasticity is, however, harder to estimate than a gross child care price elasticity. This is mainly because the net child care price is endogenous: it varies with labour supply and child care usage. As a result, gross price elasticities are far more commonly estimated, and the elasticity estimates discussed in this article are gross price elasticities.

A key point to note about gross child care price elasticities is that their estimated value will be specific to the policy settings for child care assistance at the time. Estimates of net price elasticities would be expected to show the same picture of sign and significance as the gross price elasticity estimates reported here, though would be expected to be a bit lower in magnitude.

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Table 1 presents a summary of estimated labour supply elasticities with respect to child care price from the Australian and international literature. First of all, we observe that the estimates of the child care price elasticity of labour supply are spread across a wide range. For example, estimates of the elasticity of employment range from zero to -0.92. Nevertheless, estimates from most of the international studies are negative and statistically significant, with the average around -0.34. This provides evidence of an economically significant negative relationship between labour supply and child care costs. The Australian estimates of elasticities are quite different to the international estimates. They are at the lower end of the spectrum and, in fact, none of the Australian estimates are significantly different from zero.

Table 1: Estimates of labour supply elasticities^(a) with respect to gross^(b) child care price from the Australian and international literature

	No. of studies	No. of estimates around zero	Estimated elasticity		
			Mean	Min	Max
Elasticity of employment					
Married mothers					
International	10*	0	-0.34	-0.92	-0.04
Australian	3	2	-0.01	-0.02	0
All	13	2	-0.27	-0.92	0
Sole parents					
International	4*	1	-0.29	-0.58	0
Australian	2	0	-0.12	-0.19	-0.05
All	6	1	-0.23	-0.58	0
Elasticity of hours worked					
Married mothers					
International	4	0	-0.34	-0.74	-0.12
Australian	3	2	-0.01	-0.02	0
All	7	1	-0.20	-0.74	0
Sole parents					
International	1	0	-0.16	-0.16	-0.16
Australian	2	0	-0.11	-0.16	-0.05
All	3	0	-0.12	-0.16	-0.05

(a) The elasticity of employment refers to the percentage change in the employment rate. The elasticity of hours worked refers to the percentage change in hours worked, including the employment changes covered by the elasticity of employment.

(b) The elasticities from one study, the Australian estimates by Rammohan and Whelan (2005), are not strictly gross price elasticities; rather, they are somewhere between gross and net price elasticities.

* In one study, elasticities for two subgroups are reported.

Investigation of the methodological and data aspects of the various elasticity estimates led us to conclude that the Australian literature suffers from problems stemming from the use of limited data on child care usage and price, and also from some shortcomings in modelling approaches. In particular, the way in which child care price has been

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included in the labour supply model in previous Australian research is potentially problematic, provides an important qualification to the Australian estimates of child care cost elasticities, and is likely to be a reason why a relationship with labour supply has previously not been found.

The Australian econometric literature is small – four papers by two sets of authors, which amounts to two approaches. In the first approach (Doiron and Kalb 2005; Kalb and Lee 2008), the modelling used child care prices averaged at the state level. Since prices within a state, particularly between metropolitan and other areas, are likely to vary considerably, this has the effect of adding a large amount of measurement error into the data. State-level prices are not likely to capture the local market price to which households react when making child care and labour supply decisions. In the second approach, Rammohan and Whelan (2005 and 2007) followed Connelly (1992) and calculated the ‘hourly child care price’ as the total household child care costs incurred for all children using child care divided by the hours worked by the mother. However, this provides a problematic measure of the child care price because it varies with hours worked, even if the true child care price is constant. By construction, it is correlated with the variable it is intended to explain (hours worked), which means that it is endogenous and regression results will be unreliable.

Small sample sizes may also be a factor in the statistical insignificance of the Australian elasticity estimates. For example, Rammohan and Whelan (2005 and 2007) used a sample of 1,138 married women drawn from the second wave of HILDA, of whom only about 190 paid for child care.

New estimates of child care elasticities

The conclusions from the literature review that data and modelling issues may have affected previous Australian studies prompted us to undertake new estimates of child care elasticities for married women with young children, using improved data and alternative techniques to measure child care costs.

Data and method

Our estimates are obtained from a ‘classic’ labour supply model and based on pooled data from the latest three waves of the ‘in-confidence’ version of HILDA, covering the period from 2005 to 2007. The ‘in-confidence’ data allow for far more detailed treatment of child care costs than previous studies. Apart from using the much larger sample that is now available, the main difference in the approach from previous studies is that we use a more precise measure of child care price.

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We calculate hourly child care prices by dividing the child care expenditure per child by the hours of child care used by that child, rather than the hours worked by the mother. This departs from the approach followed by Rammohan and Whelan (2005 and 2007) in two ways: first, our price is a per child care hour price rather than a per hour worked price and, second, we calculate a price per child instead of a household average over all children. To minimise the influence of other factors related to individual choices such as quality of care, we use the average of our constructed prices at a regional level (Labour Force Survey Regions as defined by the Australian Bureau of Statistics), rather than the more aggregate state averages used by Doiron and Kalb (2005) and Kalb and Lee (2008).

Results

Our estimates are presented in Table 2. The estimated elasticity of employment with respect to gross child care price for an ‘average’ married mother with young children is -0.3, and the corresponding elasticity of hours worked is -0.7. That is, on average, if the gross child care price increases by 1 per cent, the employment rate of married mothers with young children would be expected to decrease by 0.3 per cent, and, overall, the hours worked by married mothers with young children would be expected to decrease by 0.7 per cent. Both estimates are statistically significant. The estimate for the elasticity of employment is close to the international mean, in contrast with previous Australian estimates (see Table 1). The estimated elasticity of hours worked is at the higher end of the international estimates. However, most studies do not report an elasticity of hours worked. Where they do, it is usually the case that the magnitude of the hours worked elasticity is greater than that of the employment elasticity.

Table 2: Estimated labour supply elasticities^(a) with respect to gross child care price for married women with children under the age of 13 years: Australia, 2005-07

	Gross child care price elasticity
Employment	-0.3 [-0.42, -0.15]**
Hours worked	-0.7 [-0.98, -0.32]**

(a) The elasticity of employment refers to the percentage change in the employment rate. The elasticity of hours worked refers to the percentage change in hours worked, including the employment changes covered by the elasticity of employment.

Notes: ** Significant at 5 per cent level. 95 per cent confidence intervals are in brackets. Elasticities are calculated for a married woman with the average probability of being employed (or the average hours worked) and average level of family private income (excluding her own earnings). Source: Estimated using HILDA data, see text.

Box 2: New estimates of child care price elasticity

The key finding is that, in contrast with previous Australian estimates, the cost of child care does have a significant and negative effect on the labour supply of married mothers with young children.

In terms of orders of magnitude:

- the estimated elasticity of employment with respect to gross child care price for an average married mother with young children is -0.3, and the corresponding elasticity of hours worked is -0.7.
- that is, on average, if the gross child care price increases by 1 per cent:
 - the employment rate of married mothers with young children would be expected to decrease by 0.3 per cent; and
 - the hours worked by married mothers with young children would be expected to decrease by 0.7 per cent.

It is important to note that these elasticity estimates are specified with respect to a change in the gross price of child care (as, generally, are the earlier Australian estimates). The modelling does implicitly take account of the translation of the gross price through child care assistance to net price, though the econometric estimation technique generates a gross price elasticity. The elasticity estimate, therefore, is specific to the policy settings at the time the data were gathered (2005 to 2007).

One particular question of interest regarding these elasticity estimates is whether the level of responsiveness to child care prices varies with income: either the mother's earnings (or potential earnings) or family income. The econometric techniques used for these estimates do not, however, allow a direct answer to this question. The estimates for 2005 to 2007 do show that mothers' labour supply responds to a change in child care price vary with the family's private income (excluding her own earnings). But what this means in terms of underlying responsiveness depends in part on the translation of gross price changes to net price changes, which will vary with family income due to the means-tested nature of child care assistance. Estimation of net price elasticities would provide a better basis for understanding the relationship with income, although this work does suggest that a significant relationship between child care price and labour supply could be expected to hold across a range of incomes.

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Validation

Besides the standard testing of the econometric equations used to generate the Treasury estimates, further validation has been undertaken to help us understand the difference between these estimates and the earlier Australian estimates. Specifically, can the difference be attributed to the different estimation techniques (in particular, the enhanced treatment of child care price) or could it simply relate to the fact that the estimates refer to different time periods and use different samples of data? As noted above, a gross price elasticity is specific to policy settings, and these have changed between the two periods in question.

This question has been addressed by applying our technique and the Connelly technique (used by Rammohan and Whelan) to two time periods: 2002 to 2004 and 2005 to 2007 (the former period corresponds to that of the previous Australian estimates). A strength of our estimates is their use of more detailed child care data that are now available. These data are not available to the same extent for the earlier period, which means that our technique can not be fully applied to the earlier period. But it can be applied to a subset of the population; couples with at most one child under school-age and at most one school-aged child. This subset, termed the 'restricted sample' is about half the size of the full sample. The comparison here uses the restricted sample for both 2002 to 2004 and 2005 to 2007, and also uses the full sample for 2005 to 2007. The results are shown in Table 3.

Table 3: Validation: estimates of Australian employment elasticities^(a) with respect to child care price using alternative techniques and for two time periods (married women with children under the age of 13 years)

	Estimation approach	
	Our approach	Connelly approach
Restricted sample (b)		
2002-04 (c)	-0.1*	0.06
2005-07	-0.2**	0.02
Full sample		
2005-07	-0.3**	-0.01

(a) Elasticities are calculated for a married woman with the average probability of being employed (or the average hours worked) and average level of family private income (excluding her own earnings).

(b) The 'restricted sample' includes only those couples with at most one child under school-age and at most one school-aged child.

(c) The child care price index used is the ABS Gross Child Care Price Index for 2005 to 2007, but the CPI for 2002 to 2004 (as the specific ABS child care price index is not available for this earlier period).

Notes: ** Significant at 5 per cent level.

* Significant at 10 per cent level.

Source: Estimated using HILDA data, see text.

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Table 3 shows that our approach results in estimates of negative elasticities for both the 2002 to 2004 and 2005 to 2007 periods, which are statistically significant. It also shows that the Connelly approach does not reveal any significant relationship between the price of child care and mothers' employment for either period or sample. This supports the view that the approach used is likely to be a key reason why a relationship between child care price and labour supply has not been found previously.

Impact of child care availability, quality, and affordability on women's labour supply

Besides cost, the availability and quality of child care are also likely to affect parental decision-making over child care usage and labour supply, but empirical evidence in Australia which comprehensively investigates these multiple aspects of child care is scarce. In the second study covered by this article, Breunig and Gong (2010) have filled some of this gap by examining the relationship between subjective assessments of child care availability, quality, and affordability on women's labour supply using data from the sixth wave of the HILDA Survey (referring to 2006, the most recent data available at the time of the work).

In the HILDA Survey, people who used or had considered using child care were asked a set of questions about eight aspects of the availability, quality and costs of child care. For each question, they were asked to rate on a scale of zero (no difficulty) to ten (a great deal of difficulty) the level of difficulty faced in obtaining child care.

As the responses to these questions would have been correlated with individual preferences and the decision to work or not work, they can not be included in a standard labour supply model. Our approach, instead, was to estimate a labour supply model including the 'local' average responses to the questions of all other people in the 'local' area who answered the question, while leaving out the response of the person whose labour supply was being modelled. We find evidence that in geographical areas with higher reports of difficulty with availability and quality (and affordability), after controlling for other factors, women work fewer hours and, in particular, are more likely to work part-time instead of full-time.⁴ We considered four different levels of geographical aggregation for the analysis: Statistical Local Area (SLA), Labour Force Region (LFR), Statistical Division (SD) and Major Statistical Region combined with Section of State (MSR/SOS). The results are robust to the level of aggregation used, with SD providing the highest level of statistical significance in most of the cases.

4 Breaking the population down, however, we found no effects for sole parents though this could well be attributed to the limited sample size.

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Conclusions

Child care is an active policy area that has seen a number of initiatives over recent years to improve the affordability, supply and quality of child care. There are two main forms of assistance for families to meet the costs of child care: Child Care Benefit (CCB) and the Child Care Rebate (CCR). CCB was introduced in 2000 as a means-tested payment providing assistance with the costs of up to 50 hours of approved care per week, and replaced two earlier payments. In 2007 the rate of CCB was increased by 10 per cent over and above annual indexation. CCR was originally introduced in 2005 as the Child Care Tax Rebate (CCTR). It began as a non-refundable tax offset, payable annually, which covered 30 per cent of out-of-pocket child care expenses up to a then maximum of \$4,000 per child. Changes in 2007 and 2008 saw the CCTR transformed into a transfer payment, now covering 50 per cent of out-of-pocket expenses, payable quarterly, and with the maximum rebate increased considerably from the then \$4,354 to \$7,500 per child (CCTR was renamed Child Care Rebate in 2009). One measure to address the supply of child care was the removal in 2006 of caps on the number of outside school hours care and family day care places. Most recently, the quality of child care has been a focus of attention. In 2009 the Council of Australian Governments (COAG) agreed on a National Quality Framework to be implemented progressively from 2010. This will include increased staff to child ratios, new staff qualification requirements, and a new transparent quality rating system.

Our research on labour supply elasticities with respect to the price of child care finds that the approach taken in the previous Australian econometric literature – in particular, the manner in which the price of child care has been calculated – and data limitations may have contributed to the view that women’s labour supply is not responsive to the price of child care.

Using an enhanced calculation of the price of child care, our new estimates suggest that the cost of child care does have a significant negative effect on the labour supply of married mothers with young children. This is in stark contrast with previous Australian estimates but well in line with the international evidence from comparable countries. The robustness of these new estimates has been supported by also applying the new approach to the earlier time period (2002 to 2004) that had provided the basis for the previous estimates of Australian elasticities. It is important to note that these elasticity estimates are specified with respect to a change in the gross price of child care (as generally are the earlier Australian estimates) which means that the elasticity estimates are specific to the policy settings at the time the data were collected.

The study on availability, quality, and affordability of child care supports the view that, in addition to costs, non-price aspects of child care may also be important factors affecting women’s labour supply. We find that higher levels of reported difficulty with availability, quality, and affordability of child care in a geographical area, after

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controlling for other factors, are associated with women working fewer hours and, in particular, being more likely to work part-time instead of full-time.

The research summarised in this article has used new data and techniques to advance our empirical understanding of the relationship between child care and women's labour supply. But these are still early steps. There would be scope for further improvement of the estimates covered in this research, with the availability of better data. There are also unanswered questions concerning, for example, any particular behaviour of sole parents, how the responsiveness of labour supply to child care costs varies with income, the role of informal child care, net price elasticities, and changes over time. The availability of better data has been an important element in the new research reported here, and further steps in this area of research will similarly benefit from continuing improvement in available child care data. In addition, alternative approaches that take explicit account of the tax and transfer system and allow the calculation of the net price elasticity may provide more insights into the relationship between labour supply and child care.

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