
Early Childcare Costs and Labour Force Participation

NSW Productivity Commission
Technical Research Paper

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Acknowledgement of Country

The NSW Productivity Commission acknowledges that Aboriginal and Torres Strait Islander peoples are the First Peoples and Traditional Custodians of Australia, and the oldest continuing culture in human history.

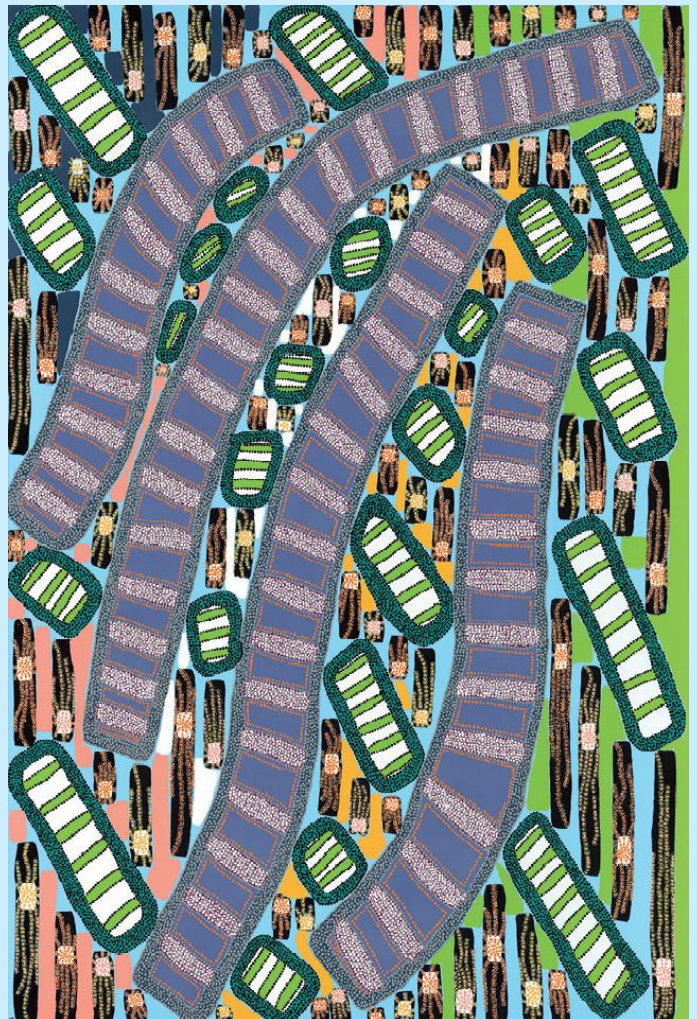
We pay respect to Elders past and present and commit to respecting the lands we walk on, and the communities we walk with.

We celebrate the deep and enduring connection of Aboriginal and Torres Strait Islander peoples to Country and acknowledge their continuing custodianship of the land, seas, and sky.

We acknowledge the ongoing stewardship of Aboriginal and Torres Strait Islander peoples, and the important contribution they make to our communities and economies.

We reflect on the continuing impact of government policies and practices and recognise our responsibility to work together with and for Aboriginal and Torres Strait Islander peoples, families, and communities, towards improved economic, social, and cultural outcomes.

Artwork: 'Regeneration' by Josie Rose



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Executive Summary

- The cost of early childcare is a consideration for how much paid work parents undertake. We have examined the sensitivity of the work choice decision of primary carers to small changes in childcare costs.¹ Our evidence suggests that working decisions are quite sensitive to childcare costs – each one per cent increase in hourly fees (excluding childcare subsidies) results in a fall in total hours worked by around 0.16 per cent. This implies that lowering childcare costs could have significant benefits for labour supply.
- Looking at the subcomponents, a one per cent rise in pre-subsidy early childcare costs lowers the labour force participation of primary carers by around 0.07 percentage points (i.e., semi-elasticity of -0.07). For those households whose primary carers are engaged in paid employment, a one per cent increase in pre-subsidy early childcare costs reduces the number of average paid hours worked by 0.04 per cent.
- Labour force participation among lower income households appears to be less sensitive to pre-subsidy early childcare costs. This is likely consistent with the impact of childcare subsidy schemes, as subsidies are gradually lessened as household income increases.
- The results in this paper are broadly similar to findings in the existing domestic literature. This paper builds upon prior studies by updating previous estimates drawing on Australian microdata – Household, Income and Labour Dynamics in Australia (HILDA) Survey – over the period 2009 to 2020.
- Some things to note with our empirical approach:
 - This paper focuses on early childcare costs and so does not consider the impact of childcare costs for school-age children. The estimates in this paper are therefore aimed at helping analyse the economic impact of policies that influence the cost of early childcare.
 - The modelling does not translate gross to net childcare prices and so is specific to the childcare subsidy settings during the period 2009 to 2020. Note that any substantial changes to the childcare subsidy schemes may generate different elasticity estimates.² This is consistent with the approach typically taken in the existing literature and reflects the modelling challenges of childcare subsidies being contingent on labour force participation (i.e., household income).
 - For couple households, the modelling does not consider the impact of early childcare prices on the labour supply decisions of non-primary carers.
 - An examination of the potential loss of long-term earnings for parents that leave the labour force while they look after their young children is beyond the scope of the paper.
- The results are robust to several empirical approaches and can help evaluate the economic costs associated with policies that may influence the costs of early childcare.

¹ For couple households, the primary carer is identified as the lower earning partner and for the few cases where partners earn an equal amount, the primary carer is assumed to be female. The primary carer is identified as the adult in single parent households. Around 90 per cent of primary carers in 2020 were female. Similar results are evident if primary carers are identified using hours worked rather than earnings.

² The elasticity estimates were broadly unchanged despite amendments to the childcare subsidy settings in July 2018.

1. Introduction

The cost, availability, and quality of early childcare can have a large impact on the labour supply decisions of parents. This occurs as parents weigh up the economic benefits of engaging in the workforce compared with the alternative of looking after their young children. The economic trade-off has disproportionately impacted the labour force participation decisions of women, as they have historically borne the childcaring responsibilities in households (Gong, Breunig, and King 2014). As a result, it is likely that efforts to reduce costs of formal childcare can help increase the labour force participation of women.³

Previous studies have examined the relationship between childcare costs and labour force participation in Australia. A seminal piece by Breunig, Gong, and King (2012) estimates that the elasticity of employment for married women with respect to gross childcare prices is -0.29 , and corresponding elasticity of hours worked is -0.65 . This means that if the gross childcare price increases by one per cent, the employment rate of married mothers with young children would be expected to decrease by 0.29 per cent and hours worked would decline by 0.65 per cent. The elasticity estimates made by Breunig et al (2012) continue to be used widely in studies that evaluate the economic impacts of changes to childcare costs (e.g., PwC 2016). The elasticity of employment for partnered mothers with pre-school age children was estimated to be lower at around -0.07 and corresponding elasticity of hours worked of around -0.11 (Gong and Breunig 2012).

This study builds upon the existing literature by drawing on more recent data and confining the analysis to pre-school age childcare. In particular, we evaluate the responsiveness of labour force participation (including hours worked) to changes in gross early childcare costs using Australian microdata (HILDA) over the period 2009 to 2020. In contrast to most studies, the evaluation considers the relationship of formal childcare costs and the labour force participation of primary carers, rather than restricting the analysis to partnered women.

This paper is organised as follows. Section 2 provides a brief overview of the domestic and international literature on childcare costs and labour supply. Section 3 describes the key data and method used to estimate the relationship between labour force participation and early childcare costs. Section 4 discusses the results, and Section 5 presents our conclusion.

³ NSW Treasury (2022) provides further analysis on the long-term economic and revenue impacts of policy intervention that boosts labour market outcomes for women with young children.

2. Literature

The number of Australian empirical studies that examine the responsiveness of labour supply to childcare costs is limited. A key paper by Breunig et al (2012) finds that the elasticity of employment with respect to gross childcare prices (i.e., before subsidies) is -0.29 , and corresponding elasticity of hours worked is -0.65 . Breunig et al (2012) drew on Australian microdata HILDA over the period 2005 to 2007 and included the cost of childcare for children aged 0 to 12.⁴ Applying these estimates to evaluate more recent policies could be misleading, as the elasticity estimates provided are specific to the policy settings at the time the data was collected.

More targeted research drawing on partnered women with children aged 0-4 years and gross childcare prices estimated the elasticity of employment as -0.07 , and corresponding elasticity of hours worked of -0.11 (Gong and Breunig 2012). The Gong and Breunig (2012) study drew on HILDA data over the period 2005 to 2007. The authors' elasticity estimates did not differ much when using net or gross childcare prices.

Recent Australian papers have reaffirmed that labour supply is sensitive to changes in childcare prices, albeit the estimated magnitude is wide ranging. Apps et al (2016) find a negative relationship (while treating the father's labour supply as given). The results show a ten per cent increase in childcare costs lead to a 0.25 per cent reduction in the mother's working hours. Mumford et al (2020) incorporate both parent's labour supply decisions and estimate that a 1 per cent increase in childcare costs results in a greater reduction in the working hours of mothers (-0.15) in comparison to fathers (-0.08).

Previous Australian studies generally found the elasticity of labour supply and childcare costs were not significantly different from zero (see Table 2 in Appendix). Breunig et al (2012) attributes these findings to shortcomings in the econometric method and limited data on childcare usage and price.

Overall, the Australian literature estimates elasticities with respect to childcare costs between -0.65 and 0.0 for the female labour supply decision in terms of hours worked. In terms of the female labour force participation decision, the Australian literature provides elasticity estimates between -0.29 and 0.0 .

Internationally, a larger number of empirical studies have examined the responsiveness of labour supply to childcare costs – with the majority drawing on data from European countries. International studies have generally found a large negative and statistically significant labour supply elasticities with respect to childcare price. The average estimate is around -0.34 , with estimates ranging from -0.74 to -0.12 (Gong et al 2014).

⁴ For a broad summary of key literature see Table 2 in the Appendix.

3. Data

This paper uses data from the ‘restricted’ version of the HILDA Survey over the period 2009 to 2020.⁵ HILDA is an annual household-based panel survey, which started in 2001 and follows around 17,000 individuals each year. HILDA is selected due to its detailed and timely household level data on childcare cost and usage. Data prior to 2009 is excluded due to changes in the childcare subsidy schemes.⁶

The sample used in this study only includes primary carers from households with younger than school age children (aged 0-4 years) as this paper focuses on estimating the impact of early childcare costs on labour force participation of primary carers. Primary carers that are full-time students are excluded.⁷ The final data sample includes 11,822 observations across 4,918 households during the years 2009 to 2020. Data on the number of childcare subsidies received are imputed.⁸

For households that use formal childcare, the net cost of early childcare as a share of household income has risen considerably over the period 2001 to 2008 and has remained at elevated levels (Figure 1). This metric suggests that the affordability of early childcare costs has deteriorated compared to the early 2000s. Out-of-pocket formal childcare costs as a share of household income are also highest for lower-income households, despite the progressive structure of the childcare subsidy schemes since 2018 (Figure 2).

Figure 1

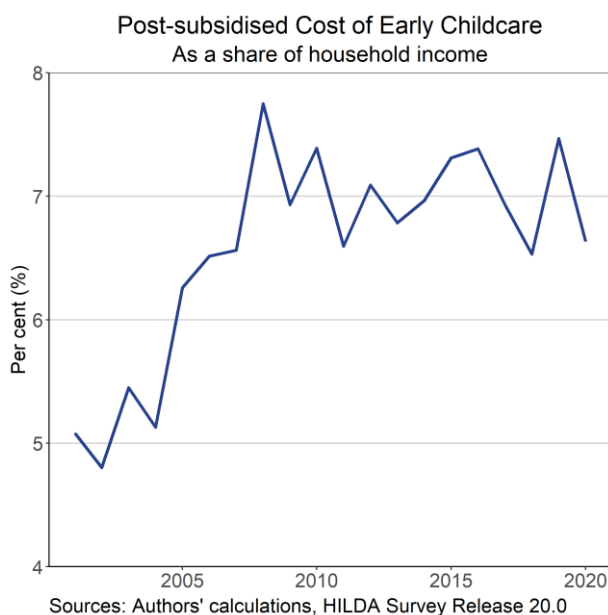
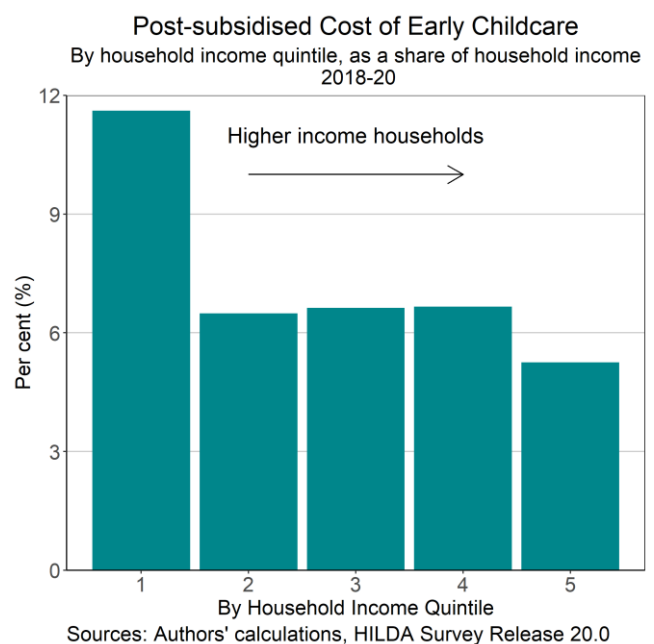


Figure 2



⁵ The restricted version provides greater details on the cost and use of formal childcare by households.

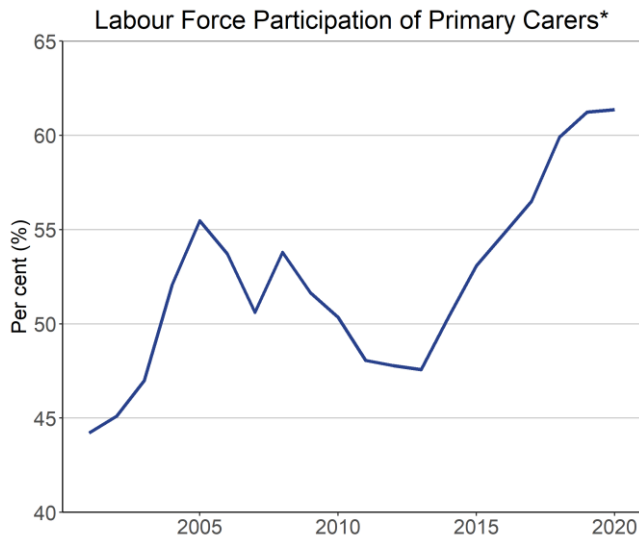
⁶ As informed by Services Australia: [Historical versions of A guide to Australian Government payments - Services Australia](#). The childcare subsidy schemes did change in July 2018 but the elasticity estimates were broadly unchanged when estimated both before and after 2018.

⁷ Further details on the sample selection program are available upon request from the authors.

⁸ Childcare subsidies are imputed for the following schemes: 'Child Care Subsidy', 'Child Care Benefits' and 'Child Care Rebate'.

The share of primary carers that are engaged in the workforce has steadily increased since 2013 (Figure 3). While participation in the labour force has increased for both genders over time, female participation is still significantly lower. For example, the average labour participation rate for male primary carers in 2020 was 85 per cent, in contrast to 57 per cent for females. Female primary carers are more likely to be in single households compared with male primary carers, which may make it more challenging to undertake paid employment.

Figure 3



*For couple households, the primary carer is identified as the individual that earn less than their partner or assumed to be the female for a small portion of households where both partners earnings are equal. The primary carer is identified as the adult in single parent households.
Sources: Authors' calculations, HILDA Survey Release 20.0

4. Method

This study estimates the elasticity of labour supply to gross childcare costs, including hours worked, using a simple pooled ordinary least squares model. A similar approach was taken by Breunig, Gong, and King (2012). The model includes the real median formal childcare care cost per hour within each Labour Force Survey Region. This variable is multiplied for each household based on the number of children they have under the age of four. Other controls include the log of actual and/or imputed wages, access to informal care, whether an individual is in a single or couple household, the gender of primary carer, unemployment rate in major statistical region, and time fixed effects to control for macroeconomic conditions. The standard errors are clustered at an individual level to account for the correlation amongst observations across the same household.

The baseline econometric results are presented in Section 5 of this paper. The results appear robust to the linearity assumption, the use of net rather than gross childcare prices (albeit econometric caveats to this specification)⁹, and fixed effects specification (results driven by variations over time rather than variations across regions). Further details on the econometric specification and robustness checks are provided in the Appendix.

There are several challenges in modelling the relationship between labour supply with respect to childcare costs:

1. **The decision to model using gross or net formal childcare cost elasticities.** Gross price of childcare is the price charged before the receipt of any subsidies. Net price of childcare is the gross price less any government subsidies received. Theoretically, the labour supply decision of households is likely to be most contingent on the net price of childcare. However, the use of net childcare price varies with labour supply and childcare usage – households receive less subsidy the higher the household income. As a result, net childcare prices are endogenous to labour supply decisions and so gross price elasticities are used most widely in the literature including this paper. The estimates of gross childcare price elasticities are still informative at assessing current policies pending there having been no major change in the childcare subsidy schemes.
2. **The use of household-level price measures of childcare is likely to be problematic.** The decision to work and the number of hours worked may depend upon the quality of childcare within a region, which is likely correlated with price. One way to address this issue is using local area averages, which provides a quality adjusted price.¹⁰ In essence, the modelling approach then assumes households react to the average price level of childcare in their area, which is somewhat exogenous compared to the quality they choose.
3. **The wage of primary carers who are not in the labour force is unobservable.** As a result, the wage of primary carers who are not employed are imputed based on their age, gender, years of work experience, highest educational attainment level, country of birth, household type (single, couple, children, no children) and geographic area.
4. **The existence of informal childcare provides an imperfect substitute for formal childcare.** This paper accounts for the use and availability of informal childcare at the household level. The rationale being that labour market decisions of households that have access to informal childcare may be less sensitive to shifts in formal childcare costs.

⁹ The use of net childcare prices may be problematic as the labour force participation and childcare prices are endogenous, reflecting the fact that the amount of subsidies received is contingent on household income.

¹⁰ Only Labour Force Survey Regions with more than three observations for formal childcare prices were included, to reduce the impact of potential outliers. Areas are based on the ASGS 2011 Statistical Area Level 4.

5. Results

The baseline results suggest that higher gross early childcare costs reduce labour market participation for primary carers (see Table 1). In particular, a one percentage point increase in real gross early childcare costs (approximately \$0.13 per hour) is estimated to reduce the probability a primary carer is employed by 0.07 percentage points. For those households whose primary carers work, a one per cent increase in pre-subsidy early childcare costs reduces the number of average hours worked by 0.04 per cent. Collectively, the results imply that a one per cent increase in early childcare costs reduces total hours worked by primary carers by around 0.16 per cent. This estimate assumes that those that drop out of the labour market due to the increased cost of childcare would otherwise work the average amount of hours of employed primary carers.¹¹ The results are robust to fixed-effects and non-linear model specifications.

Table 1: Key Estimates^(a)
Responsiveness of labour market participation to gross childcare costs (ppts)

	Employment	Hours worked
Pooled Linear Model (Baseline)	-0.071*** (0.011)	-0.042* (0.042)
Fixed-effects Model (Extension)	-0.077*** (0.008)	-0.072*** (0.017)
Non-linear (Probit) Model (Extension) ^(a)	-0.070*** (0.009)	NA

***, **, * denotes statistical significance at the 1, 5 and 10 percent level respectively. Standard errors are reported in the parentheses and are clustered at the individual level.

(a) Values reflect the average marginal effects.

Sources: Authors' calculations, HILDA Survey Release 20.0

The elasticity estimates are lower compared to Breunig et al (2012) but broadly comparable to papers that focused on the sample of pre-school aged children (Gong and Breunig 2012). This may reflect labour force participation being less responsive to childcare costs for young children (aged 0-4 years) compared with school-age childcare costs; their sample only including partnered women, who may be more sensitive to childcare costs; and the potential that the responsiveness of labour force participation and childcare costs may have declined since the mid-2000s.

Some other interesting facts from our empirical work:

- Labour force participation is four-and-a-half times more sensitive to a percentage increase in wages compared with early childcare costs.
- Results are robust if net childcare prices are used instead of gross childcare prices.¹² However, the magnitude is slightly less as a one percentage point increase in net childcare costs is correlated with a reduced probability of employment by around 0.04 percentage points. Gross elasticity estimates are preferred given labour force participation and post-

¹¹ $Reduced\ Hours = \left[Hours\ Employed\ by\ Primary\ Carers \times -\frac{0.04}{100} \right] + \left[Number\ Primary\ Carers \times \frac{0.07}{100} \times Average\ Employment\ Hours\ of\ Carers \times \left(1 - \frac{0.04}{100} \right) \right]$.

¹² Caution should be taken in interpreting these results as the translation of gross price changes to net price changes will vary with family income due to the progressive nature of childcare assistance.

subsidy childcare prices are contingent on each other, which may make the net childcare price elasticities unreliable.

- The sensitivity of employment to gross childcare costs is not statistically different amongst single or couple households with young children.
- Higher income households' employment decisions appear more sensitive to changes in gross childcare costs, possibly reflecting the progressive structure of childcare subsidies (or the fact that higher income households do not receive any subsidies).
- Access and use of informal childcare are also strongly correlated with an increase in labour force participation.

There are several limitations to our empirical approach:

- The modelling does not translate gross to net childcare prices and so is specific to the policy settings during this period (2009 to 2020);¹³ or in other words, any substantial changes to the childcare subsidy schemes may generate different elasticity estimates.
- This paper does not consider the availability and quality of childcare which is also likely to influence the take up of formal childcare and the labour supply of parents.¹⁴
- The modelling does not consider the impact of childcare prices on the labour supply decisions of both parents (for those in couple households). Higher childcare prices may also reduce the amount of labour supply for non-primary carer parents in couple households.
- We have multiplied the median childcare cost per hour by the number of children under the age of four to proxy for total early childcare costs. In practice, the childcare costs for multiple children may differ given the nature of childcare subsidies.

Despite these limitations, our results are intuitive and in line with most domestic studies in the past decade. The key econometric results are presented in Table 1 (above). Please see the appendix for further details on the econometric method, empirical results, robustness checks and extensions.

6. Conclusion

This paper estimates the responsiveness of primary carer's labour supply to formal early childcare costs over the period 2009 to 2020, drawing on HILDA data. The main contribution of this paper has been to update prior empirical studies, conducted by authors such as Breunig et al (2012) and Gong and Breunig (2012). We find that higher early formal childcare costs reduce the labour supply of primary carers, both with respect to the probability of employment and the hours worked for those that are employed. Overall, we find that a one per cent increase in early childcare costs reduces total hours worked by primary carers by around 0.16 per cent.

¹³ The elasticity estimates are largely unchanged when the Child Care Benefit and Child Care Rebate schemes were replaced by the Child Care Subsidy scheme in 2018. As a result, the combined estimated elasticity estimates are reported.
¹⁴ Previous studies have shown that self-reported measures of difficulty accessing childcare places and quality metrics are correlated with women working fewer hours, even after controlling for other factors (Breunig et al 2011).

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8. Appendix

8.1 HILDA Survey Disclaimer Notice

The following Disclaimer Notice applies to content that uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey.

This document uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The unit record data from the HILDA Survey was obtained from the Australian Data Archive, which is hosted by The Australian National University. The HILDA Survey was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views based on the data, however, are those of the authors and should not be attributed to the Australian Government, DSS, the Melbourne Institute, the Australian Data Archive, or The Australian National University, and none of those entities bear any responsibility for the analysis or interpretation of the unit record data from the HILDA Survey provided by the authors.

8.2 Summary of literature

Table 2: Summary of Key Literature

Author (year)	Title	Domestic/ International	Data	Results (elasticities unless otherwise stated)
<u>Mumford et al (2020)</u>	<i>Labour Supply and Childcare: Allowing Both Parents to Choose</i>	Domestic	HILDA	NA – Hours worked -0.15 – Participation rate Cohabiting parents with children under 5. Not clear if gross or net childcare costs used.
<u>Apps et al (2016)</u>	<i>Labor supply heterogeneity and demand for childcare of mothers with young children</i>	Domestic	HILDA	-0.25 – Hours worked -0.17 – Hours worked (net childcare costs) Gross childcare costs and cohabiting parents with children under 5.
<u>Gong & Breunig (2012)</u>	<i>Estimating Net Child Care Price Elasticities of Partnered Women with Pre-school Children Using a Discrete Structural Labour Supply-child Care Model</i>	Domestic	HILDA	-0.11 – Hours worked -0.07 – Participation rate Gross childcare costs for married mothers with children under 4.
<u>Breunig et al (2012)</u>	<i>Partnered women's labour supply and childcare costs in Australia: measurement error and the childcare price (2012)</i>	Domestic	HILDA/LFSR	-0.65 – Hours worked Gross childcare costs for cohabiting mothers with children under 13. -0.29 – Participation rate
<u>Breunig et al (2011)</u>	<i>Child Care Availability, Quality and Affordability: Are Local Problems Related to Labour Supply?</i>	Domestic	HILDA	NA – Hours worked If complaints about costs decrease by one, probability of work increases by 1.7 per cent Families with children under 13.
<u>Kalb & Lee (2008)</u>	<i>Childcare use and parents labour supply in Australia</i>	Domestic	HILDA/SIH	-0.00 – Hours worked -0.00 – Participation rate Gross childcare costs for married mothers with children under 12.
<u>Rammohan & Whelan (2007)</u>	<i>The Impact of Childcare Costs on the Full-Time/Part-Time Employment Decisions of Australian Mothers</i>	Domestic	HILDA	NA – Hours worked Gross childcare costs used. Elasticities not statistically significant. Married mothers with children under 15 years of age. -0.21 – Participation rate (full-time) -0.07 – Participation rate (part-time)
<u>Doiron & Kalb (2005)</u>	<i>Demands for Childcare and Household Labour Supply in Australia</i>	Domestic	SIH/Census of Childcare Services	-0.2 – Hours worked -0.2 – Participation rate Gross childcare costs for partnered women with children under 12.
<u>Bick (2016)</u>	<i>The Quantitative Role of Child Care for Female Labour Force Participation and Fertility</i>	International	German Socio-Economic Panel (GSOEP) - an annual household panel.	NA – Hours worked West German mothers with children under 2. Labour supply elasticity not cited, however authors state that implied elasticities are consistent with other empirical estimates.
<u>Borra (2010)</u>	<i>Childcare costs and Spanish mothers' labour force participation</i>	International	Spanish Time - Use Survey Spanish Household Budget Survey	NA – Hours worked Gross childcare costs for mothers with children under 3. -0.93 – Participation rate
<u>Loshkin & Fong (2006)</u>	<i>Women's Labour Force Participation and Child Care in Romania</i>	International	Romania Childcare and Employment Survey (RCCES) Survey of Childcare Facilities World Bank 1999	NA – Hours worked Not clear if gross or net childcare costs used. -Families with children under 6. -0.46 – Participation rate
<u>Wetzels (2005)</u>	<i>Supply and Price of Childcare and Female Labour Force Participation in the Netherlands</i>	International	Aanvullende Voorzieningen Onder-zoek (AVO) data.	NA – Hours worked Statistically non-significant female labour supply elasticity with respect to childcare costs. Mother with child 5 or younger. Net childcare costs. Author suggests this is due to substitution between formal and informal care.
<u>Andersen & Levine (1999)</u>	<i>Child Care and Mothers' Employment Decisions</i>	International	Survey of Income and Program Participation (SIPP)	NA – Hours worked Gross childcare costs for women with children under 6. -0.51 – Participation rate

8.3 Modelling Approach

The relationship between early childcare costs on labour force participation is assessed using the following framework:

$$Y_{ist} = \beta_1 CCP_{ist} + \beta_2 WAGE_{ist} + \beta_3 OtherHHIncome_{ist} + \beta_4 CC_{INFORM}_{ist} + \beta_5 OTHERDEP_{ist} + \beta_6 SINGLE_{ist} + \beta_7 Gender_{is} + \beta_8 STATE_{st} + \beta_9 UE_{st} + \delta_t + \varepsilon_{ist} \quad (1)$$

where Y_{ist} is the measure of labour force participation (i.e. whether employed and log number of hours worked for those employed) for primary carer i in local area s in year t .¹⁵ CCP is the median cost of formal childcare on a per hour basis in statistical area, deflated by the annual ABS's CPI index for childcare.¹⁶ The CCP is multiplied by the number of children a household has under the age of four and is in log terms. $WAGE$ is the log of primary carer's wage and is deflated using the annual CPI index. Individuals' who are not employed have their wages imputed.¹⁷ The inclusion of wages helps identify the differing financial benefits individuals face when deciding whether to work. *OtherHHIncome* refers to all other household income excluding the labour income of primary carers. The higher amount of income received from alternative sources may reduce the extent to which individuals may elect to engage in the labour force. CC_INFORM is the number of hours on average per child that a household utilises informal childcare, with the values binned into groups of five hours. The inclusion of informal childcare can help identify the extent to which households may be reliant on formal childcare substitutes. $OTHERDEP_{ist}$ is the number of children in a household older than four years of age. The number of older children in a household is also likely to affect the labour force decisions of parents with young children. $SINGLE_{ist}$ is a dummy variable and equals one if a primary carer identifies as being single and zero otherwise. $STATE$ is a categorical variable which indicates which state a household is in. UE_{st} is the unemployment rate for persons in the same major statistical region and δ_t is the time fixed effects, both of which can help control for cyclical macroeconomic conditions.

The coefficient of interest is β_1 . If median childcare costs adversely affect the probability a primary carer is employed, then a negative coefficient should be expected. The standard errors are clustered at an individual level to account for that fact that the data has multiple observations for the same carer.

The sensitivity of the baseline specification is examined along two key dimensions.¹⁸ First, the baseline model's identification is driven by differences in observed labour force participation rates and childcare costs across geographic areas. For example, a negative relationship would likely be found if labour force participation rates were found to be lower in areas with higher childcare costs. As a robustness check, the baseline model is also estimated using a fixed-effects specification. The fixed-effects specification adds an intercept term for each individual. The relationship is then estimated by observing how individuals change their labour force participation decisions in response to changes in their local formal childcare costs.

Second, the baseline linear probability model assumes that the relationship between childcare costs and labour force participation is log-linear. To relax this assumption, we extend the baseline specification by estimating a probit model. The probit model produces results that are broadly comparable to the baseline model.

The baseline results and sensitivity specifications are reported in Tables 3 and 4 below.

¹⁵ Areas are based on the ASGS 2011 Statistical Area Level 4.

¹⁶ Areas with less than three observations are excluded. However, the results are robust to changes in the minimum observation thresholds.

¹⁷ Imputed wages are based on the following Mincer econometric specification: $\ln wage_{it} = \beta_5 yearsexperience + \beta_2 yearsexperience^2 + \beta_3 gender + \beta_4 education + \beta_5 country_{of\ birth} + \beta_6 householdtype + \beta_7 Area + \delta_t + \varepsilon_{it}$

¹⁸ The baseline results are also robust if a censored regression framework is used. The baseline framework was selected for its simplicity.

Table 3: Baseline Results**Responsiveness of employment probability to gross early formal childcare costs**

	Model		
	Linear Probability	Fixed-effects	Probit ^(a)
Log real childcare price per hour	-0.071*** (0.011)	-0.077*** (0.009)	-0.070*** (0.009)
Log real wages	0.324*** (0.020)	0.000 (0.022)	0.314*** (0.027)
Log other real income	-0.056*** (0.009)	-0.157*** (0.011)	-0.054*** (0.009)
Informal childcare hours	0.106*** (0.004)	0.074*** (0.004)	0.122*** (0.005)
Number of other dependents	-0.024*** (0.007)	-0.060*** (0.010)	-0.021*** (0.005)
Gender (Female)	-0.229*** (0.018)	NA	-0.227*** (0.013)
Single	-0.120*** (0.021)	-0.077*** (0.023)	-0.120*** (0.015)
Local unemployment rate	-0.011 (0.008)	-0.006 (0.007)	-0.013** (0.006)
State effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	11,822	11,822	11,822

***, **, * denotes statistical significance at the 1, 5, and 10 percent level respectively. Standard errors are reported in the parentheses and are clustered at the individual level.

(a) Values reflect the average marginal effects.

Sources: Authors' calculations, HILDA Survey Release 20.0

Table 4: Baseline Results

Responsiveness of log hours worked to gross early formal childcare costs

	Model	
	Linear Probability	Fixed-effects
Log real childcare price per hour	-0.042* (0.022)	-0.072*** (0.017)
Log real wages	-0.203*** (0.029)	-0.457*** (0.032)
Log other real income	-0.051*** (0.017)	-0.158*** (0.018)
Informal childcare hours	0.044*** (0.006)	0.018*** (0.006)
Number of other dependents	-0.046*** (0.017)	-0.050** (0.021)
Gender (Female)	-0.494*** (0.023)	NA
Single	-0.086** (0.043)	-0.148** (0.058)
Local unemployment rate	-0.009 (0.013)	-0.009 (0.011)
State effects	Yes	Yes
Year effects	Yes	Yes
Number of observations	5,344	5,344

***, **, * denotes statistical significance at the 1, 5, and 10 percent level respectively. Standard errors are reported in the parentheses and are clustered at the individual level.

Sources: Authors' calculations, HILDA Survey Release 20.0

8.4 Extensions

The baseline model was extended to assess how the responsiveness of labour market participation and early childcare costs differs based on pre and post childcare subsidies, whether an individual is single and whether the relationship differs according to household income quintiles. The extended results are presented in Table 5.

Table 5: Extended Results

Responsiveness of employment probability to early formal childcare costs

	Extension		
	Post Childcare Subsidies	Single Versus Couple Households	Household Income Quintiles
Log real <u>post</u> subsidised childcare price per hour	-0.044*** (0.011)		
Log real childcare price per hour		-0.072*** (0.011)	-0.017 (0.018)
Single		-0.141*** (0.065)	
Log real childcare price per hour x Single		0.009 (0.027)	
Income quint 2			0.500*** (0.059)
Income quint 3			0.757*** (0.063)
Income quint 4			0.911*** (0.065)
Income quint 5			1.113*** (0.067)
Log real childcare price per hour x income quint 2			-0.056** (0.025)
Log real childcare price per hour x income quint 3			-0.056** (0.025)
Log real childcare price per hour x income quint 4			-0.048* (0.026)
Log real childcare price per hour x income quint 5			-0.064** (0.025)

***, **, * denotes statistical significance at the 1, 5 and 10 percent level respectively. Standard errors are reported in the parentheses and are clustered at the individual level. Only selected variables displayed. State and year fixed effects are included in all models.

Sources: Authors' calculations, HILDA Survey Release 20.0

Further information and contacts

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