



Women's economic opportunities and the intra-household production of child human capital[☆]



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ABSTRACT

This paper exploits variation in the relative demand for male and female labour during the Great Recession to estimate the effect of women's relative economic opportunities on the resources parents allocate to children. Estimates from the American Time Use Survey suggest that a 5 percentage point increase in the female-to-male wage ratio raises parents' time with children by one hour per week. Child test scores on the Peabody Picture Vocabulary test are estimated to increase by 8 per cent of a standard deviation in response to such an increase in the wage ratio and this increase. Further analysis of our results suggests that an associated increase in female bargaining power is necessary to explain our empirical findings.

1. Introduction

The economic opportunities of married women have improved substantially over the past half century. Divorce law reform, the development of the contraceptive pill, improvements in home production technology and the increasingly widespread adoption of anti-discrimination legislation have all permitted women to participate in society on a more equal economic footing (Greenwood et al., 2005; Chiappori and Orefice, 2008; Bailey et al., 2012). This is evidenced by the substantial improvements in married women's education levels (see Table 1), and in their wages relative to those of their husbands (see Fig. 1). At the same time, the past 50 years have seen increases in the total time parents spend with children (see Fig. 1), as well as the amount spent on children's clothing and education (see Table 1).

Fig. 1 depicts the increases in parents' time with children and the female-to-male wage ratio from 1975 to 2005. A number of papers have analysed these trends in parents' time-use. Ramey and Ramey (2010a) argue that the increase is the result of a more competitive university admissions process focused on extra-curricular activities. Alternative explanations, including changes in the returns to investment in children and in preferences for "child consumption", are posited in Sacks and Stevenson (2007). In this paper we explore a different hypothesis: namely that there is a causal relationship between women's economic opportunities, as measured by the female-to-male wage ratio, and the time that parents spend with children.

The American Time Use Survey (ATUS), which commenced in 2003, is the first regular (annual) survey of time use in the United States. Using data over the period 2003–2012, this large dataset provides us with considerable power with which to estimate the effect of mothers' wages on the time they spend with their children. While this dataset shows no positive time-series relationship between the female-to-male wage ratio and parents' time with children, there is a strong positive correlation between these elements in the cross-section. By exploiting a cross-sectional relationship, rather than trending variables, estimates are thus unlikely to be contaminated by other trending variables, such as technological changes or increases in educational levels.¹ (Note, for instance, the large increase in the proportion of mothers with a college degree over 2003–2012, from 33 per cent to 43 per cent; see Table 1.) Taking this approach, our estimates suggest that an increase in the female-to-male wage ratio leads to a large and statistically significant increase in mothers' time with children. This is surprising because if we hold constant the dollar amount spent on resources for the child (including time-use), cost minimisation would suggest that an increase in the price of any productive input should reduce the demand for it.

We theoretically and empirically explore why we might observe such a relationship, using the collective model and estimates of the response in parents' time-use to changes in their wages from Bruins (2014). Our conclusion is that our results can only be rationalised by the explanation that an increase in the female-to-male wage ratio also

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¹ Close inspection of data on parents' time with children over 2003–2012 suggests that short term fluctuations are too large to distinguish clearly a continuation of the trend increase in parents' time with children observed over 1975–2005.

Table 1
Descriptive statistics.

Long-term trends		1975	1985	1995	2005
Total work ^a (h/wk)					
	Husband	57.38	57.32	55.18	52.96
	Wife	50.95	50.51	48.52	47.48
Expenditure on children ^b (\$)					
	Clothes	463	694	761	616
	Education	479	676	859	1066
College degree (%)					
	Husband	16	24	30	35
	Wife	8	16	27	35
More recent trends		2003	2006	2009	2012
Total time with children (h/wk)					
	Husband	5.75	5.88	6.03	6.76
	Wife	8.51	8.50	8.95	8.61
Educational time with children (h/wk)					
	Husband	2.77	2.84	2.86	3.46
	Wife	2.87	3.27	3.29	3.75
Hours worked (per week)					
	Husband	44.45	44.12	43.47	43.50
	Wife	36.07	36.20	35.83	36.63
Mean age					
	Husband	39.84	40.36	41.08	41.23
	Wife	37.73	38.21	38.90	38.92
Female participation rate		0.64	0.64	0.64	0.62
Median wage (\$2000)		17.55	17.08	18.46	17.37
	Wife	14.02	13.69	15.09	15.00
College degree (%)					
	Husband	35	36	37	40
	Wife	33	35	39	43
Wage ratio ^c		0.77	0.77	0.79	0.83
House price index (base year 2003)		100	144	101	99
State unemployment rate (%)		5.97	4.52	9.15	7.91

Notes: Data sources include the AHTUS and ATUS (time-use and demographic variables), Case-Shiller house price index, Bureau of Labor Statistics (state unemployment rate).

^a Figures taken from Table II Aguiar and Hurst (2007).

^b Figures taken from Kornrich and Furstenberg (2013). Expenditure in 2008 dollars.

^c The wage ratio is the sample median of $wr_j := w_j^f / w_j^m$. For non-working women, wages are imputed using the model described in Appendix B.

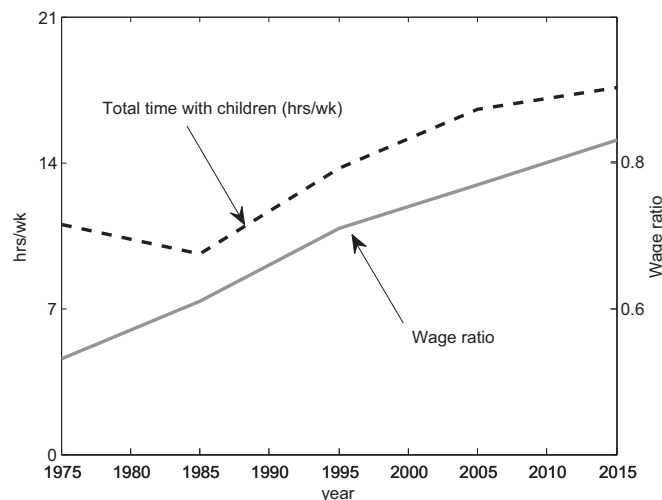


Fig. 1. Trends in parents' time with children: 1975–2015 (h/wk). Source: Time-use AHTUS; wage ratio CPS. Mothers' wage imputed for non-participants according to model in Appendix B.

improves female bargaining power. Interestingly, these predictions do suggest that both mothers' and fathers' time with children should increase along with the female-to-male wage ratio, while our estimates suggest that only mothers' time responds.

Identifying the relationship between the female-to-male wage ratio and the time parents spend with children is potentially problematic, as households in which the mother earns a higher wage (relative to her husband) may have different preferences for investing in children, or may differ on unobservables, compared with those households in which

the mother earns a lower wage. To address such problems as unobserved heterogeneity and omitted variable bias, we instrument for relative wages using a measure which reflects exogenous variation in relative labour demand, following a procedure developed by Bartik (1991), which has been used for this purpose in several other studies (see e.g., Blanchard et al., 1992; Autor and Duggan, 2003; Aizer, 2010). It should also be noted that, due to the onset of the Great Recession, which disproportionately affected industries with predominantly male labour forces, our sample period (2003–12) exhibits considerable variation in the relative demand for male and female labour.

Taking all this into account we estimate that a 5 percentage point increase in the female-to-male wage ratio leads to an increase in parental time spent with children of more than one hour per week (h/wk), with even larger responses in relation to time parents spent educating their children. We further combine our results with those of Fiorini and Keane (2014) to show that a 5 percentage point increase in the female-to-male wage ratio would have raised a five-year-old child's scores on both the Peabody Picture Vocabulary Test and Matrix Reasoning Test by 8 per cent of a standard deviation.

This paper is organised as follows. Section 2 discusses the related literature, and Section 3 the data sources. Section 4 discusses the theoretical framework for our analysis. Section 5 discusses the econometric approach used to analyse more recent, pooled cross-sectional data on time use and expenditure on children's clothing (2003–12), the results of which are presented in Section 6. A further analysis and conclusion is given in Section 7.

2. Background

2.1. Trends

The analysis undertaken in this paper is motivated by the concurrent wage ratio and time-use increases depicted in Fig. 1. Over this period we also see a large increase in expenditure on goods for children's consumption, i.e. clothes and education (see Table 1) - both in absolute terms, and as a proportion of total expenditure (Kornrich and Furstenberg, 2013).

What is less clear is whether parents' time with children has continued to increase over the past decade; close inspection of the ATUS data suggests that short-term fluctuations are too large to distinguish a clear continuation of the trend increase in parents' time with children observed over 1975–2005. However, this is not critical, as we are interested in using the ATUS to establishing a causal relationship between the female-to-male wage ratio and parents' time with children, exploiting cross-sectional variation. Fig. 2 contains local polynomial regressions of the log female-to-male wage ratio regressed on parents' time with children. These graphs demonstrate a strong positive correlation in the cross-section.

2.2. Related literature

Research demonstrates that the economic opportunities, or economic resources, of women are important determinants of the health and educational outcomes of children, particularly girls, in developing countries (see e.g. Thomas et al., 1991; Thomas, 1994; Duflo, 2000). The literature examining this relationship in developed countries is sparse, however there is some evidence to suggest this is the case in those areas as well; for instance Lundberg et al. (1997) found that switching child support benefits from father to mother in the 1970s increased household expenditure on children's clothing in the UK.

It is difficult to rationalise the unitary model of household behavior (which treats the household as a single individual) with the empirical findings of Lundberg et al. (1997), because this model provides no explicit mechanism through which variations in the ownership of household resources can influence outcomes. An alternative perspective on household decision-making is provided by the collective

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