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THE IMPACT OF CHILDREN ON AUSTRALIAN COUPLES' WEALTH ACCUMULATION*

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Abstract

Existing estimates of the cost of raising children mainly focus on what parents spend on their children. This paper challenges the conceptual basis for this approach, and instead investigates how the presence of children impacts upon couples' wealth accumulation using the life-cycle approach and Australian household panel data. Both the results presented here for Australia and those contained in the existing literature suggest that raising a family has a very small impact upon wealth accumulation relative to the 'cost' implied from expenditure-based estimates. In reconciling these highly divergent estimates, we argue the estimates from the wealth approach make more intuitive sense on a number of fronts, with implications for families and policy.

Keywords: children, family, wealth, lifecycle model, savings

JEL classifications: J13, J22, I32

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*This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and 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 (the 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.

I. INTRODUCTION

It has been well established that strong inter-generational gradients exist in health outcomes and in socio-economic status more generally (Case, Lubotsky & Paxson, 2002; Commission on Social Determinants of Health, 2008; Hertzman, 1999). Hence any society that values equality in opportunity for upcoming generations should also care about families' resource requirements when bringing up children. Estimates of the costs of raising children are important to the design of various economic and social policies; including income support programs, guidelines for child support obligations for non-custodian parents, programs to encourage fertility rates, and for making comparisons of standards of living or setting poverty lines for families with different numbers of children (Garvey, Murphy & Osikoya, 2011; Gray & Stanton, 2010; Percival & Harding, 2007; Valenzuela, 1999). As Saunders emphasised, "clearly there is an ongoing need to ensure that the best possible estimates of the costs of children are available so as to inform public debate and policy formulation on these important issues" (1999: p. 63).

To meet this need a number of different approaches have been used to generate quantitative estimates of the costs of children. Most commonly these are based on how much families actually spend on children (the expenditure approach) or how much is 'needed' to be spent (the budget standards approach or equivalent standard of living approach). However, even at the most basic conceptual level, what constitutes a 'cost' when it comes to raising children is far from clear, especially given that children (hopefully) contribute positively to parents' utility. As noted by Pollak and Wales (1979), while children have costs associated with them they also bring benefits to parents and these benefits need to be taken into account when comparing the welfare of childless people with parents and between parents with different numbers of children.

Compounding this difficulty in defining exactly what is meant by the cost of having children is the lack of consensus on methods of estimation, for no one method has been widely accepted and adopted so far. The approach to measurement depends largely on the concept of cost that is adopted and what the figure is to be used for and, in turn, resulting estimates are highly sensitive to the method used. As Gray and Stanton noted, "there is no unambiguous 'true cost' of a child and that, in the end, it is a matter for judgement" (2010, p. 111).

Existing empirical estimates for developed countries suggest that children impose a very substantial cost upon their parents, with estimates of the annual cost of raising a child typically exceeding US$10,000. In this paper we echo the likes of Pollak and Wales (1979) and Deaton and Muellbauer (1986) in questioning the logic of seeing children as a cost, and of taking the amount spent on children as an estimate of their 'cost'.

Drawing upon the life cycle model, we propose an alternative approach to estimating the cost of children based on differences in wealth accumulation conditional on the number of children couples have had, and provide estimates of this wealth impact of children using Australian household panel data. The empirical estimates based on the wealth approach imply that the 'cost' of children is far lower than has been suggested by existing estimates based on other commonly used approaches. In reconciling these vastly different results we argue that the wealth approach is intuitively more appealing on a number of fronts, and discuss the implications for policy and for families.

II. BACKGROUND

This section firstly reviews the main approaches used to assess the cost of children and their associated empirical estimates. The review of empirical estimates is skewed towards Australian studies, as our own analysis is based upon household data from that country. A discussion of the limitations of these approaches follows and an alternative approach, based on couple's wealth accumulation, is proposed.

Existing approaches to estimating the cost of children

The main approaches used to estimate the cost of children are the expenditure approach, the budget standards approach and the equivalent living standard approach. The expenditure approach simply sums the amount of money that parents spend on their children, although some studies also consider non-monetary 'expenditure', such as parental time. The budget standards approach identifies a 'basket of goods' deemed necessary to guarantee a certain standard of living, typically a poverty line, for families of different size. The equivalent living standard approach seeks to identify the compensating level of income required for a couple with differing numbers of children to maintain the same level of utility as a like couple without children. The key methodological challenge for the budget standards approach is how to determine the equivalence scales to compare the requirements of different families. The equivalent living standards approach implies knowledge of the parents'

underlying utility function. In reality the utility function cannot be observed, and preferences are often approximated through a system of demand equations for household budget items conditional upon income and family composition.

Examples of Australian studies that follow the expenditure approach include a series of reports produced by the National Centre for Social and Economic Modelling (Percival and Harding 2002, 2005 & 2007; NATSEM 2013). The most recent of these estimated that a typical middle-income Australian family spends A$812,000 on raising two children from birth to 21 years. This represents an annual figure of around A$19,300 per child-year, a 50 per cent increase on Percival and Harding's 2007 estimate. Following the budget standards approach, Henman (2008) produces estimates for each capital city. Estimates of the annual cost of raising one child to age 18 in Sydney, the cheapest of the capitals, ranges from A$6,700 at a 'low cost' living standard to A$12,100 at a 'modest but adequate' living standard.

Results are often presented in terms of the implied equivalence scales that would equate welfare between families of different size. Using the demand system approach, Valenzuela (1999) estimates that in 1993-94, an Australian family with one child would require 1.18 times the income of a couple with no children. Bradbury (2008) concluded that a two-child family requires a money income 1.4 times that of a couple without children. Gray and Stanton (2010) averaged the results of equivalence scales for post-1985 Australian studies to find a range from 1.16 to 1.23 for a family with one child depending upon the methods used, increasing to between 1.58 and 1.63 for a family with three children, relative to a childless couple. Lancaster and Ray (1998) used a range of eight different budget standard and demand system approaches on a consistent dataset to highlight the sensitivity of results to alternative methods, returning estimates for an equivalence scale ranging from 1.08 to 1.33 for a family with one child.

Based on the expenditure approach, estimates of the annual cost of raising a child of US$12,290 to US$14,320 for a middle income group have been derived for the US (Lino 2012) and £10,400 per annum in the U.K. from birth to age 21 ('LV=', 2012). Using the basket of goods approach, Garvey et al. (2011) estimate that a couple in Ireland with one child would need 22 per cent more income to be as well off as a childless couple, a figure they claim to be broadly consistent with previous Irish and international estimates using a comparable methodology.

Some studies measuring the cost of children by their age have found younger children to be more costly (Bradbury 2008) whereas others (such as Garvey et al. 2011, Gray and Stanton 2010, Lino 2012) suggested the opposite. Generally, costs associated with children are estimated to be higher for higher income families when expressed in dollar terms, but lower as a percentage of income (Garvey et al., 2011; Gray & Stanton, 2010; Percival & Harding; 2007; Valenzuela, 1999). When addressed, the majority of studies support the presence of economies of scale as the number of children in the family increase, although Garvey et al. (2011) are an exception and Gray and Stanton (2010) found evidence of both economies and diseconomies of scale depending upon the number of children.

There are a number of technical issues relating to these approaches. For example, the commonly used method of standardising living standards across households based on the proportion of household income spent on food, first proposed by Engel in 1895, is thought to over-estimate the cost of children since, unlike housing, there is less scope for joint consumption of food. Numerous previous papers have canvassed these limitations (see, for example, Deaton & Muellbauer, 1986; Gray & Stanton, 2010, McDonald, 1990; Pollak & Wales, 1979; Saunders 1999) and here we focus instead on the conceptual basis for considering money spent on children as a cost.

A net-wealth approach

While many of the studies reviewed above talk of the 'cost' of raising children, there are grounds to question the logic of taking the amount spent on children as their 'cost', or the amount required to achieve an equivalent budget standard as the 'cost' of raising children. Labelling something as a cost, in common parlance, would suggest that its associated costs exceed associated benefits, a concept more accurately described as 'net cost'. And while dollar amounts provide a convenient yardstick, the concept of cost economists most often appeal to is that of opportunity cost: what is foregone, or the next most valuable use to which resources could have been put. The efficient allocation of resources is achieved when resources are invested into an economic activity up to the point that the (falling) marginal benefit of further investment equates to the (rising) marginal cost of that investment, taking account of the full opportunity costs (alternative uses) of those resources.

Such simple reflections on the concept of a 'cost' readily highlight limitations in expenditure-based estimates of the cost of raising children. These are explored more fully in the concluding discussion, but for now we draw attention to three key limitations to argue that

the impact of children on the net wealth of families provides a more intuitively appealing measure of the cost of children. Perhaps the most important of these, from a conceptual perspective, is that children provide benefits as well as costs (Ferreira, Buse & Chavas, 1998; Pollak & Wales, 1979; Scholz & Seshadri, 2009). The well-known identity in economics, Y=C+S, states that a household's income in any period is equal to consumption plus savings. Income can either be spent or saved. If the expenditure on children displaces, dollar for dollar, parents' consumption on other goods and services, but parents derive exactly the same utility from the presence of children as from that other consumption bundle, then clearly the parents' wellbeing is no lower. Accordingly, the presence of children would have no impact on net wealth (savings) as total expenditure is unchanged, while measuring the expenditure on children would imply a positive 'cost'. If, instead, the consumption foregone for each dollar spent on children left parents with lower utility, the marginal utility received from increasing their own consumption would be higher, and they would increase total consumption leading to lower savings and lower wealth.

Second, in many countries families with dependent children receive a range of benefits in the form of additional social security allowances, tax concessions and recently, in the case of Australia, even a 'baby bonus' financial payment upon the birth of a child. To the extent that income increases as a result of having children, associated expenditure can surely not be considered a 'cost'. And finally, one of the major financial impacts of children is surely the opportunity cost of foregone income incurred as a result of family commitments, typically the mother's time out of the labour force. These changes in the income side of the equation are ignored in expenditure approaches, but well accounted for by assessing the impact of children on net wealth.

Only a limited number of studies have analysed the impact of children on wealth accumulation, including Bolin and Palsson (2001) and Scholz and Seshandri (2009), who note in their abstract "The fact that there are few papers on this topic is puzzling, since children have implications for optimal retirement planning for nearly every American household." Both of these studies are based on the lifecycle model, to which we now turn. To our knowledge, however, no previous paper has contrasted the estimates of the impact of children on net wealth with alternative estimates of the cost of raising children.

III. METHOD

The Life Cycle model

As a theoretical framework in which to analyse the impact of children on family wealth we draw upon the Life Cycle Hypothesis (LCH) attributed to Modigliani and Brumberg (1954). The basic LCH starts with the theory that, in seeking to maximise lifetime utility, individuals (or families) will smooth their consumption over the lifecycle. Thus, in periods when income is higher than the life-time average flow of income individuals will save, and dissaving will occur in periods in which income is lower than average. Both income and consumption typically follow a 'hump' shape over the life-cycle, but the consumption profile is less humped. Most obviously, people accumulate wealth during their peak working and earning years, and run wealth down during retirement as consumption exceeds income.

The LCH is not without a number of challenges, including debate on the importance of bequests (Modigliani, 1986) and the observed drop in consumption upon retirement that seems inconsistent with consumers acting with such foresight (Banks, Blundell & Preston, 1994). However, the basic theory leads to important micro- and macro-economic predictions that have found broad empirical support. Examples include the relative insensitivity of consumption to current income which is more consistent with Friedman's (1957) Permanent Income Hypothesis than the Keynesian consumption function; and aggregate savings at the national level being positively associated with the rate of growth of per capita income rather than the level of per-capita income (see, for example, Deaton, 2005; Modigliani, 1986).

In terms of the effects of the impact of children, because consumption is assumed to be higher when children are present, the LCH predicts that savings will be lower at each age following the arrival of children (and with the number of children), and in particular net savings will be lower (or dissavings greater) during the years of child-rearing. According to Modigliani, in his Nobel Prize address "… available evidence supports the LCH prediction that the amount of net worth accumulated up to any given age in relation to life resources is a decreasing function of the number of children, and that saving tends to fall with the number of children present in the household and to rise with the number of children no longer present" (1986: 304). In effect, children were seen to postpone or replace saving for retirement (Banks et al., 1994; Deaton, 2005). However, it should be noted that the significant increase in the age at which women now bear children from the time Modigliani formulated the LCH is likely to have altered these dynamics, offering more scope for families

to accumulate wealth in anticipation of having children and to smooth consumption over the life-cycle.

Data and model

To estimate the magnitude of these impacts data from the Household, Income and Labour Dynamics in Australia Survey (HILDA) are used to model, firstly, net wealth accumulation of couples over the life-cycle conditional on the number of children they have had and, secondly, changes in wealth over four-yearly intervals conditional on the presence of children. The HILDA Survey is a longitudinal survey of a representative sample of Australian households, with interviews completed annually. The set of survey instruments includes a Household Questionnaire administered to an adult member of the household and collecting information about the household unit; and individual surveys with each member of the household aged 15 or over. Data from the first ten waves of the survey, spanning the years 2001 to 2010, were available for analysis for this paper. Around 13,000 individuals from over 7,000 households have responded in each year, with year on year attrition rates averaging below 10 per cent. Detailed information on the HILDA sampling frame and survey can be found at the HILDA website (http://www.melbourneinstitute.com/hilda/) and in Watson and Wooden (2010).

In the 2002, 2006 and 2010 waves of the survey the Household Questionnaire included a 'wealth module' which collected extensive information on assets and liabilities, permitting the derivation of a 'net wealth' variable. In addition, HILDA contains a host of other variables on individual and household characteristics, including detailed information on educational attainment, labour market activities and history, and relationships. Initially a model of net wealth is estimated across the pooled-cross section of couples who are living together in a registered marriage as observed in 2002, 2006 and 2010. The sample is restricted to exclude couples living with people other than their dependent children. Potentially the one family could contribute three observations to the dataset. The model is of the form:

$$(1) \qquad Y_{jt} = \alpha + \beta X_{jt} + \gamma C_{jt} + \epsilon_{jt}$$

with subscript j denoting families and $t = 2002, 2006, 2010$. Net wealth (Y) is indexed using the Australian consumer price index to be expressed in 2010 dollars. The vector X

encompasses variables capturing the stage of the lifecycle (age, age-squared and duration of the current marriage) and other characteristics likely to impact upon permanent income, or long-term earnings capacity, and wealth accumulation (level of education, work experience, disability status and whether from non-English speaking background and English proficiency, having been in a previous marriage).

While using the pooled cross-sections generates a larger sample of families for the estimation, a limitation is that it is only possible to roughly approximate the number of years in which the family has had children living in the home. The proxy for child-years (the variable C) is calculated as the number of children the female in the couple has ever had multiplied by 18, but adjusted for the number and age of children currently living in the home at the time of the survey (so a 2 year old living in the family, for example, contributes 2 years rather than 18 years to this sum). This limitation is addressed in the model of changes in wealth over the four years between the wealth modules. In this case, it is possible to derive from the survey data exactly how many children resided with the family in each year and their ages.

$$(2) \qquad Y_{jt+4} - Y_{jt} = \alpha + Y_{jt} + \beta X_{jt} + \gamma \sum_{t}^{t+4} C_{jt} + \epsilon_{jt}$$

with t=2002, 2006. Hence, the dataset now represents a pooling of two sets of observations: those on changes in wealth between 2002 and 2006, and those on changes in wealth between 2006 and 2010. For each of those periods the sample is restricted to couples who remained married to one another for the four years, and a family can potentially contribute two observations to the estimation. The initial wealth holding at the commencement of the period is now added to the set of control variables and, as noted, the construction of more precise measures of the extent of child rearing during the periods are now possible. The only age restriction imposed is that both the wife and husband of the couple are aged 18 years or over.

For both models 1 and 2, a standard ordinary least squares regression model is first estimated, followed by quantile regression at the 0.25, 0.5 and 0.75 quantiles of the distribution for net wealth and the change in wealth, respectively. Whereas conventional OLS estimates the effect of a covariate on the conditional mean of the dependent variable, quantile regression, attributed to Koenker and Bassett (1978), produces estimates of the effect of the variable at

other points (quantiles) of the distribution. This is informative in cases in which the effect of variables might be expected to vary at different points of the distribution, plus quantile regression is known to be less sensitive to outliers or extreme values of the dependent variable (see Koenker & Hallock, 2001). Both these attributes are likely to be useful for the current application. All models were estimated using the STATA statistical software Version 12 (the sqreg routine in the case of the quantile regressions).

For brevity, only the results for the preferred specification are reported for both models 1 and 2, with a discussion of the sensitivity of the results to alternative specifications presented below. A total of 8,804 observations were available for estimation for model 1 and 4,286 for model 2, reduced from initial samples of 9,120 and 4,551, respectively, after allowing for missing values for some variables.

IV. RESULTS

Figure 1 depicts the general pattern of wealth accumulation over the lifecycle for married Australian couples. It is derived from the pooled cross-section of couples by averaging derived net wealth for 5-year age cohorts based on the average age of the couple. It can be seen that net wealth follows the savings and dissavings pattern as predicted by the LCH, with net wealth peaking at around A$1.3 million at age 60-65.

Figure 1: Wealth of the life-cycle, married Australian couples; 2002, 2006 and 2010.

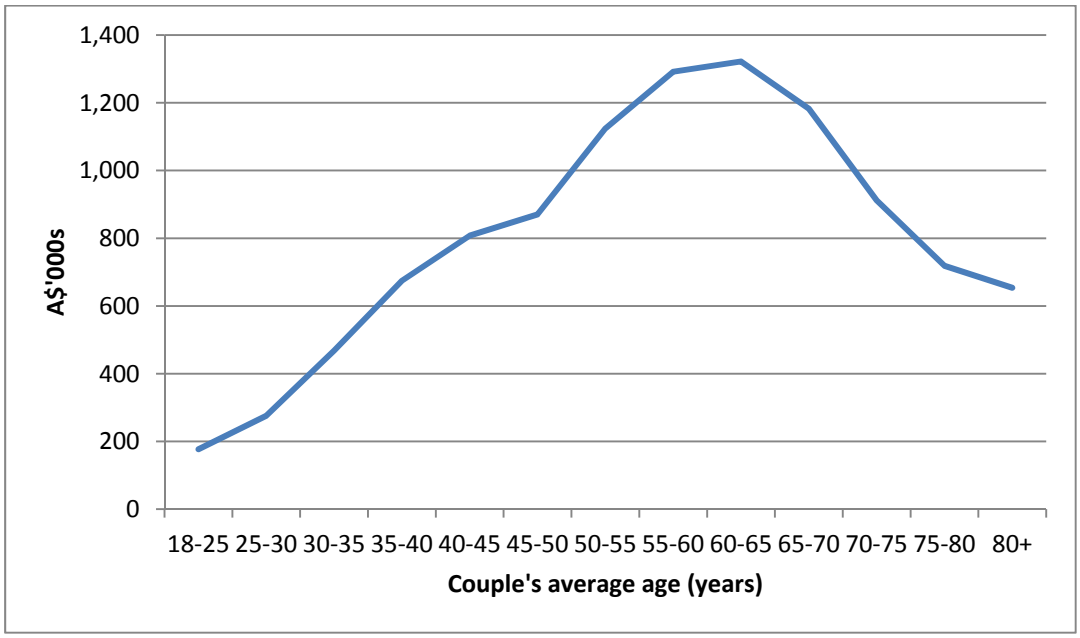

Table 1 presents the regression estimates for couple's net wealth. The average net wealth for the sample was $870,300 in 2010 Australian dollars. The adjusted R-squared of around 13% seems reasonable given the nature of the explanatory variable, and all control variables conform to expectations. The age variable used is the average of the husband and wife's age. Consistent with the LCH, net wealth increases with age but at a declining rate. Taking the results for the simple OLS model, the coefficients on age and age-squared imply maximum wealth is reached at an average age of 43.6 years. Additionally, net wealth increases with the duration of the marriage, and is lower if the husband has previously been married, although this effect is only weakly significant. Wealth increases strongly with educational qualifications, especially the husband's; there is a substantial penalty if the wife is from a non-English speaking background and her English proficiency is poor (the effect of this is not significant for the husband), and either partner having a work-limiting disability reduces wealth. While years of work experience may potentially be endogenous to the number of children raised, this is most likely to be problematic in the case of the wife's labour force history. A variable capturing previous years of work experience has been included for the husband only, and the couple's net wealth is estimated to increase by around $32,000 for each prior year in work. The estimates from the quantile regression follow a similar pattern.

The main parameter of interest is the effect of child-years. The coefficient on this variable is significant at the 5% level in the OLS model, and at the 1% level for each of the conditional estimates at the 0.25, 0.5 and 0.75 quantiles. The OLS estimate implies a decline in net wealth of just $1,400 for each year in which a child lives with their parents. The quantile regressions generate slightly higher estimates of the decline in wealth with each 'child-year', and these increase from $1,600 per year at the 25^{th} quantile to $1,900 at the 50^{th} quantile and $2,400 at the 75^{th} quantile. Thus, there is some evidence that the presence of children has a larger impact on net wealth accumulation at the upper end of the wealth distribution, in terms of absolute dollars (but not relative to net wealth). Note that formal tests reject the hypothesis that the coefficients on child-years are equal only in the case of the difference between the estimate at the 25^{th} and 75^{th} quantiles ($F=4.42$, $P>F=0.04$).

Even the higher of these estimates of the annual impact of raising a child on net wealth stands in stark contrast to the estimates of the amount spent on a child each year, which typically exceed $10,000. This contrast is all the more striking when it is considered that the estimates of the impact on wealth encompass any effect the child has on labour force participation of the mother, something that is ignored in expenditure based estimates but must

surely be one of the major ‘costs’ associated with bringing up children. However, neither approach allows for the effect that having children or planning to have children may have had on the level of education attained by the parents.

Table 1 OLS and quantile regression estimates for couples' net wealth (in $'000s) – pooled 2002, 2006 and 2010 samples.

	OLS			*Quantile Regression*								
				Q=0.25			*Q=0.5*			*Q=0.75*		
	β		***SE***	***β***		***SE[c]***	***β***		***SE[c]***	***β***		***SE[c]***
Intercept	-1649.9	***	185.3	-884.9	***	33.4	-1189.2	***	75.7	-1422.0	***	133.2
Wave 6 (2006)	272.4	***	30.6	84.0	***	8.1	115.9	***	13.3	176.1	***	24.9
Wave 10 (2010)	229.8	***	31.3	99.7	***	12.9	130.0	***	14.9	181.7	***	27.8
Couples' age	50.8	***	8.1	31.1	***	1.6	45.8	***	3.6	55.8	***	6.4
Age squared	-0.6	***	0.1	-0.3	***	0.0	-0.5	***	0.0	-0.6	***	0.1
Years current marriage	6.8	***	2.5	5.0	***	0.7	7.4	***	0.9	9.9	***	1.9
Wife married before	5.0		47.4	-4.7		10.9	33.4	*	17.1	88.5	***	33.1
Husband married before	-82.9	*	46.5	-24.0		16.1	-15.7		17.4	-41.0		25.3
Wife's' Highest Qual: University degree	281.6	***	39.3	122.4	***	15.0	148.9	***	23.6	233.5	***	35.3
Diploma	263.6	***	46.9	118.8	***	17.3	135.4	***	22.0	250.7	***	33.5
Certificate III/IV	50.3		42.9	12.3		14.7	15.4		24.1	45.2	**	22.9
Year 12/Cert I/II	93.5	**	39.3	58.9	***	14.0	81.3	***	17.8	123.5	***	22.7
Left before Yr 12[a]	—			—			—			—		
Husb. Highest Qual: University degree	587.2	***	41.4	225.0	***	11.2	363.7	***	22.5	575.5	***	48.8
Diploma	356.2	***	48.3	145.2	***	15.7	200.9	***	18.6	270.4	***	35.2
Certificate III/IV	131.3	***	34.7	84.4	***	11.2	105.0	***	15.9	117.9	***	25.8
Year 12/Cert I/II	343.3	***	48.4	105.0	***	11.9	136.2	***	13.7	244.3	***	34.0

	OLS			Quantile Regression								
				Q=0.25			Q=0.5			Q=0.75		
	β		SE	β		SE[c]	β		SE[c]	β		SE[c]
Left before Yr 12 [a]	—			—			—			—		
Wife non-Eng bkgrnd: & English good	-89.3		75.2	-45.2	**	21.3	-93.4	***	32.2	-117.9	**	52.3
& English poor	-272.6	**	118.4	-124.2	***	34.2	-213.0	***	47.2	-235.4	***	77.0
Husband non-Eng bkgrnd: & English good	-28.4		78.5	-29.9		21.3	-2.3		27.9	-9.6		47.3
& English poor	-71.6		132.7	-39.4		40.1	22.2		55.9	18.2		84.4
Wife has disability[b]	-126.0	***	35.5	-52.2	***	11.0	-88.5	***	17.4	-121.4	***	33.1
Husband has disability[b]	-47.3		35.6	-71.2	***	13.6	-94.3	***	16.8	-127.4	***	26.7
Years in work (husband)	32.4	***	2.5	11.2	***	0.9	14.1	***	1.2	21.5	***	2.0
Total child years	-1.4	**	0.6	-1.6	***	0.2	-1.9	***	0.3	-2.4	***	0.4
Mean/ Predicted value at mean (dependent variable)	870.3			349.7			601.9			988.9		
Observations	8,804			8,804			8,804			8,804		
R-squared	0.13											
Adjusted/pseudo R-squared	0.13			0.1125			0.1303			0.1416		
F-value	59.1	***										

Notes: a. includes persons who left before completing Year 12 and have no post-school qualifications; b. definition is restricted to a long term disability that limits type of work that can be done; c. bootstrap standard error.

*p<0.10, **p<0.05, ***p<0.01

Table 2 OLS and quantile regression estimates for couples' change in net wealth (in $'000s) – 2002 to 2006 and 2006 to 2010 (pooled).

	OLS			*Quantile Regression*								
				Q=0.25			*Q=0.5*			*Q=0.75*		
	β		*SE*	*β*		*SE*[c]	*β*		*SE*[c]	*β*		*SE*[c]
Intercept	-346.2		258.1	-326.1	***	73.7	-215.3	***	75.7	257.7		123.3
Wave 6 (2006)	-228.8	***	33.2	-44.8	***	8.2	-67.5	***	7.8	-121.4	***	15.5
Initial net wealth	-0.3	***	0.0	-0.4	***	0.0	-0.2	***	0.0	0.1		0.1
Wife retired from LF	-195.0	***	62.2	-35.6	***	13.4	-48.0	***	13.6	-76.0	***	25.7
Husband retired from LF	-174.2	***	67.3	-40.1	***	15.3	-69.8	***	21.6	-128.8	***	29.1
Home owner initially	168.0	***	49.3	132.0	***	8.4	110.8	***	17.6	53.7		26.0
Couples' age	16.7		11.5	13.2	***	3.2	11.4	***	3.2	-2.8	***	4.7
Age squared	-0.2		0.1	-0.1	***	0.0	-0.1	***	0.0	0.0		0.0
Years current marriage	2.2		3.2	1.5	**	0.7	1.4	*	0.7	1.1		1.2
Wife married before	-43.2		61.5	-1.1		8.8	-8.4		15.1	3.2		28.6
Husband married before	-1.7		62.4	9.9		11.7	16.8		14.6	-7.8	***	28.3
Wife's' Highest Qual:												
University degree	129.9	***	50.4	57.3	***	15.0	88.1	***	12.6	50.4		28.9
Diploma	80.9		60.0	29.6	*	16.4	25.4		16.9	38.9		24.3
Certificate III/IV	-15.3		57.2	-2.9		7.6	-6.8		15.0	0.2	***	25.1
Year 12/Cert I/II	5.1		50.7	26.0	*	14.9	18.1		11.8	9.7		19.3
Left before Yr 12[a]	—			—			—			—		
Husb. Highest Qual:												
University degree	238.2	***	54.3	112.1	***	15.5	132.9	***	28.4	125.6		40.8
Diploma	71.4		61.6	39.7	**	15.9	27.8		19.5	-30.6	***	26.9
Certificate III/IV	39.8		45.0	28.8	***	8.1	24.4	**	11.3	-16.8	***	20.1

	OLS			Quantile Regression					
				Q=0.25			Q=0.5			Q=0.75		
	β		SE	β		SE[c]	β		SE[c]	β		SE[c]
Year 12/Cert I/II	144.1	**	63.7	24.3	*	14.5	21.9		17.3	0.4	***	32.7
Left before Yr 12 [a]	—			—			—			—		
Wife non-Eng bkgrnd:												
& English good	5.3		98.5	-39.4		25.8	-20.2		31.4	23.8		53.1
& English poor	-59.4		165.5	-19.9		29.0	-51.6	*	27.2	-5.3	***	53.5
Husband non-Eng bkgrnd:												
& English good	-50.9		105.7	23.8		21.4	17.2		23.8	14.0		52.4
& English poor	-131.5		188.8	-7.2		43.7	13.9		39.9	-8.0	***	75.4
Wife has disability[b]	-58.9		48.4	-19.3	**	9.4	-30.1	***	10.8	-24.6	***	14.5
Husband has disability[b]	-2.3		48.2	-24.6	***	9.0	-20.1	***	7.8	35.3		13.1
Years in work (husband)	8.3	**	3.4	1.0		0.7	1.3	*	0.8	2.5		0.8
Total child years	3.0		4.1	-0.6		1.1	0.7		1.0	1.6		2.5
Mean/ Predicted value at mean (dependent variable)	199.2			-161.6			65.7			370.3		
Observations	4286			4286			4286			4286		
R-squared	0.12											
Adjusted/pseudo R-squared	0.11			0.21			0.06			0.05		
F-value	21.89	***										

Notes: a. includes persons who left before completing Year 12 and have no post-school qualifications; b. definition is restricted to a long term disability that limits type of work that can be done; c. bootstrap standard error.
*p<0.10, **p<0.05, ***p<0.01

As noted, a major limitation of this approach is the need to rely on a crude proxy for the accumulated number of years the couple has had dependent children living with them – in this case inferring 18 years for each child born to the wife. In estimating the change in net wealth between periods (model 2), the number of dependent children in residence in the household in the intervening years can be precisely determined. When pooled over the eight years, for 44% of observed couple-years there were no children present in the household, 16% had one child present, 25% two children, 11% three children and there were 4 or more children present for 4% of those observations. When the child-years are summed, 39% had no children present at any time across the four year intervals. Among those who were observed to have dependent children, the mode for the number of child-years is 8, with a maximum value of 45 dependent child-years over a four year interval.

The range of control variables is also expanded to include initial wealth holding and home-ownership status at the commencement of each 4-year the period. The results from the OLS regression returned a *positive* impact of around $4,500 for each dependent child-year on wealth accumulation. While this estimate was not statistically different from zero, it still suggests a remarkably low cost of supporting a child. One possible explanation for this result is that the linear and quadratic age specification does not adequately capture retirement patterns, so that dissaving associated with retirement is partly reflecting a stage of the life-cycle in which couples are less likely to have dependent children. Hence variables to capture whether or not the wife and husband had retired were added to the covariates. Either partner having retired from the workforce has a substantive, statistically significant and negative association with wealth accumulation. As reported in Table 2, however, the results continue to show no negative impact upon wealth accumulation arising from the presence of children within the household. A negative coefficient on the number of dependent child-years is observed only for the estimate for the 25th quantile, suggesting reduced wealth accumulation of $600 per for each year a dependent child is present, but again the estimate is not significantly different from zero.

These estimates are in no way an aberration in the context of the findings of the two existing studies we have identified that estimate the impact of children on net wealth. Scholz and Seshandri (2009) estimate that each additional child a family has had reduced net wealth of American families in 1992 by US$6,384 based on a mean regression, or by US$2,601 based on a median regression. The impact on wealth on a per 'child-year' basis must therefore be very small. Bolin and Palsson (2001) find that the impact of children on wealth accumulation

in Sweden varies markedly according to parents' gender and marital status (single, cohabiting or married) but find children to actually have a positive effect on wealth for married men and women.

Tests of specification and sensitivity

There are many potential variations to the models reported above, but scope to report only selected sets of results. A number of alternative specifications were tested, perhaps the most important of these to be modelling wealth in logarithmic rather than in linear form; and the inclusion or exclusion of years of work experience due to potential endogeneity between workforce participation and the presence of children. The resulting impact on the estimates for total child-years (β) under these and some other alternative specifications are discussed in this section.

It is common to model wealth or income distributions in logarithmic form rather than the dollar amounts. When the natural log of family net wealth at a point in time was used as the dependent variable in model 1, the adjusted R-squared improves markedly to 0.29 in the OLS regression. Moreover, the coefficients on child-years in the OLS and quantile regression are all highly significant. In the OLS regression the estimated β implies that each year a couple has a dependent child living with them reduces net wealth at the mean by $2,800, and in the quantile regression $1,900, $2,200 and $2,500 at the 25th, 50th and 75th quantiles, respectively.

A drawback of the standard logarithmic specification is that the dependent variable is not defined for families with non-positive values of net wealth, resulting in the omission of 125 observations from the regression analysis. This would be of little concern if these were random omissions, but removing those with lowest net wealth risks biasing the results and hence the linear specification was preferred. To enable couples with negative net wealth to be included, a further log transformation was defined as ln(Y) for Y≥$3; 0 for -$3<Y<$3; and –ln(Y) for Y≤-$3. The adjusted R-squared is in fact lower using this transformation (0.12) than with the linear specification, although again all estimates of β are highly significantly different from zero. The OLS regression now implies each child-year reduces wealth by $3,500 at the mean of the dependent variable, and by $2,000, $2,200 and $2,600 at the 25th, 50th and 75th quantiles, respectively.

For the models of the four-yearly change in net wealth, omitting non-positive values is even more problematic, and results in the loss of around 30% of the sample for estimation. In any

case, all models tested with logarithmic transformations of the change in net wealth continue to show either a positive or insignificant impact of children on wealth accumulation.

The estimates of β reported for model 1 are robust to inclusion or exclusion of the number of years in paid work for either the husband or wife - estimates of the impact of dependent child-years on net wealth in the models vary by no more than $400 across the models. As anticipated, the estimates of the cost of raising children are lower when the mother's labour force history is included, as lower levels of (age-specific) work experience are correlated with child rearing. The estimates remain insignificant for the models of change in net wealth.

Additionally, the results are insensitive to the measure of the age of the couples. In the models reported above this was based on the average age of the couple. Models using the husband's age instead of average age, and including both the husband's and wife's age (and their quadratics) separately were tested. Restricting the sample to persons aged 60 and below similarly had little impact on the findings. For the models of the change in wealth it is also possible to include age-specific child-years. There was evidence from these models that the presence of young children (0-4 years) is conducive to wealth accumulation, but estimates for children aged 5-9 years, 10-14 years and children aged 15 years and older were insignificant.

V. DISCUSSION

Typical estimates of the amount of money Australian parents do spend on their children, or 'need to spend', exceed A$10,000 per child per annum in today's dollars with recent estimates as high as $19,300. Such estimates ignore the cost of foregone earnings due to lower labour force participation, which is most relevant to mothers' potential earnings. Breusch and Gray (2004) suggest a further 31 percent of a women's lifetime income, or $247,000, could be added to account for Australian mothers' foregone earnings for one child and an additional $103,000 for a second child, implying a further cost of around $13,000 per child per annum for a 2-child family. Such studies also tend to exclude child-care costs. All in all, these computations suggest a financial impost upon parents in the vicinity of $30,000 per child per year relative to couples with no children.

In contrast, the estimates presented in this paper indicate that the wealth of couples is reduced by, at most, around $2,000 for each dependent-child year. Recalling the identity Y=C+S, increased expenditure and foregone income associated with children must also equate to lower savings and wealth. How can we possibly reconcile these starkly divergent estimates

of the cost of raising children? The charge that the net wealth regressions suffer from selection bias arising from wealthier parents being more likely to have children, or to have more children, can be dismissed since fertility is inversely related to income and, in any case, the models of couples' change in net wealth control for this.

It is true that children will often have positive effects on the income side of the equation, notably through welfare payments and tax concessions, an impact which is appropriately captured in the net-wealth approach but ignored in expenditure-based approaches. However, it seems unlikely this would more than compensate for foregone earnings. Rather, we believe it is the interaction between the presence of children in the home, income and utility that holds the key explaining this paradox.

As noted above, previous authors have adopted a utility perspective to point out the need to account for benefits of children as well as the costs when making welfare comparisons between families. In this spirit, Deaton and Muellbauer note that parents may derive utility from their own and their children's consumption: "That parents choose to have children means that the benefits of having them are greater than the costs, but it does not mean that the costs are zero" (Deaton & Muellbauer 1986 p. 725). We concur with these sentiments in as far as they suggest expenditure-based approaches may over-estimate the compensation required to maintain parental welfare constant. However, that does not fully reconcile the obvious incompatibility between the large estimates of what parents spend on their children and the minimal impact upon net wealth.

We suggest two further effects likely to be important. The first is that children are complementary to activities that are not income intensive and less subject to rivalry or 'conspicuous consumption' (Frank 1999). When children are present, nights at home with the family, a simple visit to the park, or watching your child play sport may provide enjoyment that would otherwise be gained through income-intensive pursuits, such as holidays and restaurants. This is more than a direct substitution effect - parents' own utility may increase at a lower level of consumption. Second, the value of non-market production within the household may increase substantially in the presence of children. Parents, in particular mothers, will increase their time spent cooking, cleaning, laundry, home decorating, teaching, entertaining and so on. None of the approaches would capture the actual value of any such increase in non-market production but, to the extent this substitutes for market consumption, it will be reflected in the net wealth approach.

We do not claim to have generated a definitive measure of the cost of children, and concord with the view put by others that there is no one true cost of a child. However, the net-wealth approach does offer a new dimension that is more intuitively appealing than expenditure-based approaches on a number of fronts, notably by accounting for income effects and for the potential that the benefits of children substitute for other consumption. The net-wealth approach has clear relevance for decision-making in social policy settings and for those contemplating family formation. The results challenge the common perception that children are a large financial burden. It appears that under Australia's existing institutional, taxation and social security arrangements, couple families who have children enjoy a roughly similar standard of living as couples without children, although they may allocate their expenditure very differently. And those couples contemplating starting or extending a family generally need not be put off by financial concerns. In spite of the very high expenditure-based estimates, even those on a low income can afford to have children, and to raise them comfortably. In these practical senses, and in the context of a relatively wealthy country such as Australia, the results from the net-wealth approach do challenge the extent to which expenditure based estimates relate, in any meaningful way, to the 'cost' of raising children.

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