

# How much does good data matter? The case of resources available to children

STUDY PAPER No. 27

Jens Bonke  
Thomas Crossley  
Lori Curtis

**The Rockwool Foundation Research Unit**

---

**How much does good data matter?  
The case of resources available to children**

**Jens Bonke  
Thomas Crossley  
Lori Curtis**

**University Press of Southern Denmark  
Odense 2009**

---

**How much does good data matter?  
The case of resources available to children**

**Study Paper No. 27**

*Published by:*

© The Rockwool Foundation Research Unit and  
University Press of Southern Denmark

Copying from this book is permitted only within  
institutions that have agreements with CopyDan,  
and only in accordance with the limitations laid  
down in the agreement

*Address:*

The Rockwool Foundation Research Unit  
Sejroegade 11  
DK-2100 Copenhagen Oe

Telephone +45 39 17 38 32

Fax +45 39 20 52 19

E-mail [forskningsenheden@rff.dk](mailto:forskningsenheden@rff.dk)

Home page [www.rff.dk](http://www.rff.dk)

ISBN 978-87-90199-31-9

ISSN 0908-3979

September 2009

Print run: 300

Printed by Special-Trykkeriet Viborg a-s

Price: 60.00 DKK, including 25% VAT

## Contents

|     |   |    |
|-----|---|----|
| 1.  | Introduction .....                                | 5  |
| 2.  | Inputs to Children in four Countries .....        | 9  |
| 2.1 | Data and Measures .....                           | 9  |
| 2.2 | Valuation of time .....                           | 11 |
| 2.3 | Income and Expenditure .....                      | 14 |
| 3.  | Results .....                                     | 17 |
| 4.  | Conclusion and Discussion .....                   | 25 |
|     | References .....                                  | 27 |
|     | Appendix I .....                                  | 31 |
|     | Theoretical Model .....                           | 31 |
|     | Appendix II .....                                 | 33 |
|     | Further Details on The Data .....                 | 33 |
|     | Danish Time Use Survey .....                      | 33 |
|     | The Danish Household Expenditure Survey .....     | 34 |
|     | The Canadian General Social Survey .....          | 34 |
|     | The Survey of Household Spending .....            | 35 |
|     | The Labour Force Survey .....                     | 35 |
|     | The UK Time-Use Survey .....                      | 35 |
|     | The UK Family Expenditure Survey .....            | 36 |
|     | The British Household Panel Survey .....          | 36 |
|     | The American time use survey .....                | 37 |
|     | Appendix III .....                                | 38 |
|     | Measures of resources available to children ..... | 38 |
|     | Income and Expenditure .....                      | 38 |



## 1. Introduction

The resources available to children, and the inputs into children's wellbeing and development, are of broad and deep policy concern. Evidence on the distribution of resources and inputs across children is therefore an important research priority. International evidence on the material deprivation of children indicates that, in many developed countries, little advancement in the 'war on child poverty or inequality' has occurred (see for example, Brewer and Gregg, 2008; Crossley and Curtis, 2006; Angeriz and Chakravarty, 2007; Dickens and Ellwood, 2003; Bradbury, Jenkins, & Micklewright, 2001). On the other hand, recent research in the area of parental time investments have reported that, contrary to popular belief, parental time devoted to children appears to be increasing, on average, despite higher labour force participation rates of mothers and mean hours worked by parents (see for example, Yeung & Glauber, 2007; Gauthier, Smeeding, & Furstenberg, 2004; Sayer, Bianchi, & Robinson, 2004; Bianchi, S., 2000). Results also suggest that, although mothers continue to devote substantially more time to 'child friendly activities', the gender gap is decreasing. The findings have been observed in Canada, the US, the UK and several other countries and authors have suggested a global trend towards an increase in parental time investment in children.

However, research in this area is hampered by data limitations. First, in terms of material standard of living, researchers typically have data on household income or expenditure. Identifying what proportion of those resources flow to children is difficult or impossible with typical income and expenditure surveys (see Crossley and Curtis, 2006, for an example and further discussion.) For this reason, in practice research that attempts to document, for example, the number of children living in poverty, applies the number of children living in households below some *household* income poverty line.

The literature that employs time-use survey data to document the time that parents spend with their children (see Kalenkoski et al., 2006; Gauthier, Smeeding & Furstenberg, 2004; Folbre et al., 2005; Mullan, 2007; Price 2007; Yeung & Glauber, 2007; Bonke & Esping-Andersen, 2008) also faces important data limitations. For example, many time-use surveys collect data from only one parent. This allows researchers to construct the marginal distribution of mothers' time with children, and the marginal distribution of fathers' time with children, but not the distribution of total parents' time with children. If, across households, mothers' and fathers' time with children is negatively correlated (as would be the case if there was a primary 'carer' in each household), then inequality in total parents' time with children will be overstated by the inequality in mothers' time and in fathers' time.

Note that in most cases, there are restrictive assumptions under which limited data give a true picture of the true extent of inequality or deprivation. For example, if the male and female parents' time spent with children is uncorrelated, then the joint distribution, and the distribution of total time spent with children, can be constructed from the marginal distributions of fathers' time with children and mothers' time with children.

This paper reports progress on an ongoing project which seeks to document how much these data limitations matter. To do this, we exploit time-use data from Canada, the US, the UK and Denmark, and expenditure data from Canada, the UK and Denmark. Time-use data from Canada and the US provide information on one parent while the UK and Danish data provide information from both parents. The Danish data can also be linked to very detailed 'register' (administrative) data. This is extremely helpful in valuing the time that parents spend with children, and therefore comparing it to material goods and services. Turning to income and expenditure data, again the Danish data provide superior information. Uniquely, the Danish expenditure data record *for whom* various expenditures were made. This allows us to directly measure goods and services flowing to children.

We use these data to address the following questions:

1. Do inequality measures differ when we are able to measure joint parental caring time rather than individual parental time (mothers or fathers)
2. To what extent does moving from quantity of time to value of time affect inequality measures? Is inequality in the value of time sensitive to whether time is valued at opportunity cost or replacement cost?
3. How does inequality in the value of time spent in childcare compare to inequality in income and consumption (or expenditure) measures?
4. Does an indication of intra-household allocation of good and services change measured inequality in consumption?

We begin our analysis by documenting inequality in standard measures of the time and material goods and services available to children in the four countries: Denmark, Canada, the U.K. and the U.S (time-use only). Here we impose the 'lowest common denominator' in our analysis, and calculate, for each country, the statistics that can be calculated from the countries' data. This analysis serves two purposes. First, the cross national comparisons are of some interest in themselves. Second, international differences provide a natural metric for assessing the magnitudes of changes in measured inequality that arise when we exploit the full possibilities of the UK and Danish data.

To preview our results, we find that the distribution of resources available to children is substantially more equitable in Denmark than the other countries, and the levels are higher, no matter the measure. Canada and the UK have similar

levels of inequality but the levels of resources are higher in Canada. The US data indicate that mean levels of resources for children are similar to those in Canada but the US distribution is the least egalitarian of the four countries. Better data seems to matter in all cases except when measuring parental caring time rather than mothers' caring time. Moving from measures of resources available in households with children to measures of resources directed at children within households increases inequality quite substantially.

The rest of the paper proceeds as follows: Section 2 provides a description of our data and methods, our results are discussed in section 3, and we discuss our conclusions in the final section.



## 2. Inputs to Children in four Countries

### 2.1 Data and Measures

#### *Time:*

In order to answer our basic questions we first examine the time parents spend with their children, often referred to as child care time. Child care time is usually understood as the time parents devote to their home-living children under the age of 18. Caring for children includes a continuum of activities (see for example, Folbre and Yoon 2005). Activities can include time *directly* dedicated to caring for one's child either as the parent's self-reported main activity (the activity the parent is directly engaged in) or as time indirectly provided to the child as the parent's self-reported secondary activity (an activity the parent is engaged in while reporting another, non-child caring main activity (e.g. a parent may report making meals as the primary activity and helping the child with home work as the secondary activity)). Finally, and more difficult to ascertain, childcare may include the time a parent feels primarily responsible for the well-being of the child (referred to as 'string attached' or 'on-call' time (Budig and Folbre, 2004; Folbre et al., 2005; Folbre and Yoon, 2005). As with most of the measures in this paper, we focus on the measure that is most commonly available in the time use data across the four countries chosen for the comparison - direct child care – child care that is the self-reported main activity of the parent.

We distinguish between developmental and non-developmental care, where the first category of caring includes parental involvement in children's intellectual, physical and social development (teaching, reading and playing), and the second category includes more routine activities such as feeding and dressing. This categorization is consistent with other studies in the literature (see for example: Bonke and Esping-Andersen, 2008; Stafford and Yeung, 2005; Bianchi et al., 2006, Zick et al., 2001, and Blair et al., 1994).

Across the countries of interest, the data measure the amount of time parents spend caring for all of their children without taking account of the number of children within the family, thus we divide the reported child caring time within the household by the square root of the number of children (Folbre et al, 2005; Folbre and Yoon, 2005). The implication of this non-linear transformation of the density of care is that we assume that there are some economies of scale in the production of child care, so that within a two-child family every child benefits somehow from the presence of the other child concerning how much caring s/he receives. We also implicitly assume that every child in multiple child-families gets the same amount of caring. This follows the "equity heuristic" decision rule developed by Hertwig et al. (2002) saying that parents split the resources available at a point in time

equally among their children. Several studies find evidence for the rule including Price (2007), who shows that based on the American Time Use Study (ATUS) fathers quality care (similar to our developmental care) devoted to the first versus the second-born child only varies by about 6 percent and mothers by about 9 percent. Price concludes that parents appear to allocate time equally across their children at any point in time. Whether this holds for non-developmental care is an open question but for now we assume time is equally distributed among the children in a household.

The surveys from which we draw our time-use information include the 2001 Danish Time Use Survey (DTUS), the 1998 Canadian General Social Survey (GSS), The 2000/01 UK Time Use Survey (UKTUS) and the 2003 American Time Use Survey (ATUS). In countries where multiple years of data were available (Canada and the US), the year that closest matched the Danish and UK data were chosen. In all cases, we restrict the sample to households where there are parents reporting time spent with household children. The Canadian data asks parents about the time they spend with children under the age of 15 (labelling household members 15 and over as adults) thus we attempt to limit the sample to households with children under the age of 15. This is possible in Denmark, Canada and the US; ages are grouped in the UK data (10 to 15 years of age is our best measure) therefore, we include all children up to and including the age of 15 in the UK sample. In an attempt to exclude parents who are retired persons or multi-generational or multi-family households (parental time use decisions may be very different from the 'norm'), we include parents between the ages of 18 years and 59 years and limit the sample to single family households. As the samples are small in the UK and Danish time use data, we include two-parent and lone-parent households.

In Canada and the US, one member 15 years of age or older was randomly selected in each household to answer the time-use survey providing information only on mothers' *or* fathers' child care activities. In Denmark and the UK, both parents were surveyed providing information on mothers' or fathers' or total parental child care time. Thus, we present results for the mean self-reported caring time by mothers and fathers in all four countries and total parental caring time in Denmark and the UK. The final sample sizes are presented in Table 1. For more detailed information on each survey see Appendix II.

**Table 1. Couple Households with children <16 years of age<sup>1</sup>**

|                                    | Denmark<br>DTUS 2001 | Canada<br>GSS 1998 | UK<br>UKTUS<br>2000/01 | US<br>ATUS 2003 |
|------------------------------------|----------------------|--------------------|------------------------|-----------------|
| Sample size                        | 786                  | 2,368              | 1008                   | 5,508           |
| Parents from Coupled Households    |                      | 1,964              | 760                    | 4,544           |
| Parents from One-Parent Households |                      | 414                | 248                    | 964             |
| Data collected from both parents   | Yes                  | No                 | Yes                    | No              |

<sup>1</sup> UK households contain children  $\leq 15$  years of age.

We are particularly interested in the equality of the distribution of different measures of resources available to children across countries and measures. We report the mean of each measure and the Gini Coefficient (gini). Although the gini has been criticized as a single summary measure that focuses on the middle of the distribution (Handcock and Morris, 1999), it is commonly used in the literature to measure inequality within and across countries in such diverse measures as income, education, wealth and health (see for example, Bhattacharya, Debopam, 2007; Wagstaff and van Doorslaer, 2004; Qiani and Smyth, 2008; Contoyannis and Wildman, 2007; Wolfe, 1994); its values range from zero to one with lower values indicating less inequality.

## 2.2 Valuation of time

Economists have long recognized that non-market work (including child care) has an economic value. However, valuation of non-market production and particularly unpaid childcare has been difficult. With the recent availability of good quality time-use data in many countries the topic is receiving more attention in the literature (see for example, Bonke, 1992; Folbre and Yoon, 2005; Kimmel and Connelly, 2006; Mullan, 2007; Bradbury, 2004).

There are two common approaches to valuing time in the literature; the replacement cost and the opportunity cost methods. Replacement costs necessitates answering the question – how much would a parent have to pay for alternate provision of child care (e.g. a child-care worker to provide care)? The opportunity cost approach requires parental wages as a measure of the foregone opportunity of spending time with children. Folbre and Yoon (2005) present an excellent discussion on the pros and cons of the two alternatives.

Given empirical and theoretical considerations, we utilize the opportunity cost method in this study. Empirically, there are no available measures of replacement costs in the time-use or expenditure data. Alternative data sources are used to obtain a measure of replacement costs (mean wage rates of occupations that provide services which closely match childcare activities, for example the mean housekeeper's wage or mean child-care worker's wage). The occupations are

difficult to match across countries and there is no-within country variation in the mean wage of a given occupation. Thus, our inequality measure (ginis) is the same for quantity of time and replacement value of time.

In Appendix I, we develop a very simple model to illustrate the conditions under which it might be sensible to value parental time spent with children at the parent's wage (that is, to use the opportunity cost approach to valuing time inputs). A common objection to this is that "just because a person is a good lawyer/investment banker/etc. doesn't mean they are good parent". That is of course true, but it is only relevant if the return to time spent with children is constant. If, instead, time spent with children exhibits diminishing marginal returns (as seems likely) then optimizing parents should invest time in their children up to the point where they can do more for the children by working for money. Thus on the margin, the value of time spent with children will be equal to the wage. The model formalizes this intuition.

Parental wages are available in the Danish data and the labour force participation of parents is very high, providing a true measure of the opportunity cost for fathers' and mothers' time. The value of time is calculated as the product of the wages and the time each parent spends caring for the children independently of whether both parents are giving child care at the same time. This implies that we assume a double "treatment" of child caring when produced simultaneously. As most parents in Denmark are employed we only face the problem of not having information on wages among people unemployed the full year around. In most cases, this is solved by inflating previous wages for these people by the wage increases experienced by employed people in the specific period.

The Canadian time use data provide a plethora of information on individual characteristics and labour market experiences but not wages. We turn to the 1998 Canadian Labour Force Survey<sup>1</sup> (LFS), the sampling frame for the time-use survey, to estimate a wage equation based on individual, family and labour market characteristics common to both data sets. The coefficients from the estimated wage equations from the LFS are then used to calculate wages for each individual in the time-use data given their characteristics (age, education, marital status, age of children, spouses' age, education, and labour force status if present) providing an estimated opportunity cost<sup>2</sup>.

---

<sup>1</sup> see Appendix II for further details on the Canadian Labour Force Survey.

<sup>2</sup> We recognize that sample selection bias is likely a problem in the estimation of our wages, particularly for mothers as approximately 40% do not report employment (15% for fathers). However, the typical solution to this problem is to do a Heckman type correction using an auxiliary participation equation. This entails identifying exclusion restrictions – typical candidates are marital status, the presence and age of children – as our sample is restricted to parents and the vast majority are married, these are not viable. If we believe

The data are more limited in the US and UK and we resort to calculating mean parental wages by marital status and sex for those who are working in the British Household Panel for the UK and from the ATUS-CPS file for the US. The variation between wages in the US and UK is minimal (four estimated wages: 1) married fathers, 2) married mothers, 3) single fathers, and 4) single mothers) leading to differences in the means but little differences in the Ginis between quantity and value of time.

Table 2 presents the descriptive statistics for wages used to calculate the ‘opportunity cost’ value of time. We are able to document both the mean estimated individual wage (our measure of opportunity cost comparable to the Danish measure) and the mean wage of the parental group (in italics - comparable to the US and UK measures) in the Canadian data. The estimated individual wage is about 15% less than the group wage for fathers and about 30% lower for mothers. Not surprisingly, the variation around the single measure of the group wage is much higher than that of the estimated individual wages.

**Table 2: Wage-rates, \$us-ppp 2003<sup>1</sup>**

|                          | Denmark <sup>2</sup> |         | Canada <sup>3</sup> |                      |              |                            | UK <sup>4</sup> |                      | US <sup>5</sup> |                      |
|--------------------------|----------------------|---------|---------------------|----------------------|--------------|----------------------------|-----------------|----------------------|-----------------|----------------------|
|                          | Actual Wages         |         | Estimated           | Mean Group           |              | Mean Group                 |                 | Mean Group           |                 |                      |
|                          | Mean                 | St. Dev | Mean                | St. Dev <sup>6</sup> | <i>Mean</i>  | <i>St. Dev<sup>6</sup></i> | Mean            | St. Dev <sup>6</sup> | Mean            | St. Dev <sup>6</sup> |
| Couples                  |                      |         |                     |                      |              |                            |                 |                      |                 |                      |
| Father                   | 26,66                | 11.72   | 16.10               | 3.94                 | <i>17.58</i> | <i>7.57</i>                | <i>20.47</i>    | <i>10.34</i>         | <i>21.48</i>    | <i>12.68</i>         |
| Mother                   | 19,27                | 6.22    | 11.99               | 3.58                 | <i>13.62</i> | <i>6.50</i>                | <i>13.64</i>    | <i>30.89</i>         | <i>16.70</i>    | <i>16.02</i>         |
| Single Parents           |                      |         |                     |                      |              |                            |                 |                      |                 |                      |
| Father                   |                      |         | 14.03               | 3.43                 | <i>18.71</i> | <i>8.23</i>                | <i>23.96</i>    | <i>6.46</i>          | <i>15.79</i>    | <i>9.35</i>          |
| Mother                   |                      |         | 10.37               | 3.02                 | <i>12.22</i> | <i>6.78</i>                | <i>14.16</i>    | <i>61.53</i>         | <i>13.34</i>    | <i>8.92</i>          |
| Housekeeper <sup>7</sup> | 12.19                |         |                     |                      | <i>11.30</i> | <i>4.94</i>                | <i>12.28</i>    | <i>5.47</i>          | <i>8.55</i>     | <i>3.73</i>          |

<sup>1</sup> Wages are adjusted to 2003 values with each countries general consumer price index and then to US dollars using the OECD Purchasing Power Parity. <sup>2</sup> Actual Wages; <sup>3</sup> Estimated wages using the coefficients from a wage equation estimated from the 1998 Labour Force Survey and parental characteristics from the time-use surveys. The values in italics are mean parental wages and st. dev. by sex and marital status from the 1998 Labour Force Survey. <sup>4</sup> Mean parental wages and st. dev. by sex and marital status from the 1998 British Household Panel Survey; <sup>5</sup> Mean parental wages and st. dev. by sex and marital status from the 2003 American Time-Use Survey (CPS file). <sup>6</sup> The standard deviation for the US and the UK and italic values in Canada are the standard deviations from the calculation of the group means (there are 4 mean wages: married males, married females, single males and single females). <sup>7</sup> The housekeepers’ wage is the mean for that occupational class in the given countries data.

that the bias is related to ability or motivation (given a set of observable characteristics, those with higher ability/motivation are likely to receive higher wage offers and thus enter the labour market), our wage estimates based on observables may be an over-estimate of the opportunity cost for those not in the labour force.

### 2.3 Income and Expenditure

The surveys from which we draw information on household income and consumption are the Danish Household Expenditure Survey (DHES), the Canadian Survey of Household Spending (SHS) and the UK Family Expenditure Survey (FES). We were not able to access the US Consumer Expenditure Survey. We chose survey years to match, as closely as possible, the timeframe of the expenditure data to the time-use data. We limit our sample to households with children. We select two-parents households between 18 and 59 years of age as the Danish data provide information only on coupled households. Given the limited sample size in the DHES we utilize information on children under the age of 18. We match this with the Canadian data but are limited to a sample of children under the age of 16 in the UK.

The sample sizes and timeframe of each survey are listed in Table 3.

**Table 3: Sample Sizes for Income and Expenditure Data**

|                            | Coupled Households with children <18 years of age <sup>1</sup> |        |           |     |
|----------------------------|--|--------|-----------|-----|
|                            | Denmark  | Canada | UK        | US  |
|                            | DHES   | SHS    | FES       | CEX |
|                            | 1999-2005  | 1998   | 1999/2000 |     |
| Sample size                | 1,098  | 3,200  | 1,272     | NA  |
| Assignable goods allocated | Yes  | No     | No        | No  |

<sup>1</sup> UK households contain children ≤15 years of age.

We explore typical measures found in the poverty literature: gross household income (before taxes); net household income (after taxes); and expenditures on household goods and services. The Danish Household Expenditure Survey (DHES) contains information on for whom the expenditures were made, thus a measure of goods and services purchased for children – assignable goods. The measure includes expenditures for children on clothing (clothes and footwear), leisure (electronic equipment, sports, books, travel etc.) and on services (restaurants, personal care, etc.). As children’s welfare also depends on non-assignable goods such as the amount and quality of food, the housing situation, and other joint goods within the family, we also add the expenditures on such goods to the goods assigned to the child(ren). We therefore end up with two measures of child goods and services from the Danish data, namely the child assignable goods and services and these goods added to the joint goods of the family; assignable + non-assignable goods and services.

It is our intent to measure the resources available to children. Although the households in our income/expenditure sample are fairly homogenous (households containing only two-parents between the ages of 18 and 59 years and single children under the age of 18 (16 in the UK)), the number of children and thus needs

varies across households. We adjust for the differences in need across households with the use of an equivalence scale (as is common in the poverty literature). We divide household income and expenditure by the square root of household size (a common mid-range equivalence scale) and expenditures assignable to children by the square root of the number of children in the household. The final measure, assignable + non-assignable expenditure, is adjusted by dividing assigned child expenditures by the square root of the number of household children while using the square root of the total household size – parents and children – for the non-

**Table 4: Definitions of resources available to children**

| Child Input  | Definition  |
|--|---|
| <b>Time</b>  |   |
| Caring time  | Developmental + Non-developmental caring time/ $\sqrt{\text{no. of children}}$  |
| Developmental caring time                                      | (Total time spent: teaching the child (help with homework, guiding in activities); reading; playing; and/or talking with child) / $\sqrt{\text{no. of children}}$   |
| Non-developmental caring time                                  | (Total time spent: unspecified childcare; physical care and supervision (feeding, dressing, washing and preparing for bed, supervision indoors and outdoors); accompanying child (e.g., to a doctor, for sports, music lesson etc.); other childcare; and transporting child) / $\sqrt{\text{no. of children}}$ |
| Value of caring time (opportunity cost or parental wage rates) | (caring time * parent's wage)/ $\sqrt{\text{no. of children}}$<br>parent's wages are actual wages in Denmark, estimated wages in Canada and mean parental wages in UK and UK  |
| Value of caring time (parental and housekeeper wages)          | ((developmental care * parent's wage) + (non-developmental care*housekeeper's wage)) / $\sqrt{\text{no. of children}}$  |
| <b>Income and Consumption/Expenditure</b>                      |   |
| Gross household income   | Household Income before taxes / $\sqrt{\text{no. of family members}}$   |
| Net household income   | After tax Household Income / $\sqrt{\text{no. of family members}}$  |
| Aggregated household consumption                               | Expenditure on household goods and services/ $\sqrt{\text{no. of family members}}$  |
| Assignable goods   | Expenditure on household goods and services purchased for child/ $\sqrt{\text{no. of children}}$  |
| Assignable goods + Non-assignable goods                        | Expenditure on household goods and services purchased for child/ $\sqrt{\text{no. of children}}$ + expenditure on other household goods and services/ $\sqrt{\text{no. of family members}}$   |

assignable expenditures. We implicitly assume, as is routinely done in the literature, that there are economies of scale present and that each family member (or child for assignable goods) shares equally in the distribution of income and/or expenditure.

Finally, we attempt to examine resources (time and income/expenditure) available to children; not the resources available to households with children. The combination of restricting the sample to households with children and weighting the calculations by the product of the population weight and the number of children in the household provides us with results representative of the population of children; not the households with children (Crossley and Curtis, 2006). Definitions of our measures of resources available to children are listed in Table 4. See Appendix III for further detail.

### 3. Results

Table 5 presents our first pass at the time-use data. To review briefly, we report mean hours per month spent caring for children under the age of 15 years (16 in the UK) by mothers or fathers in Denmark, Canada, the UK and the US. The standard deviation and the gini coefficient are also reported. Total caring time is further divided into developmental caring and non-developmental caring time. We explore the added information gleaned by having a measure of total parental time (sum of mother's and father's time) in the Danish and UK results.

The first notable point is that across countries and parents (mothers, fathers and both), the mean time spent in non-developmental care (feeding, dressing, bathing, etc.) is substantially higher than in developmental care (reading, teaching, helping with homework). The difference is consistent across countries for fathers at approximately 50% higher mean non-developmental time. Mothers' mean non-developmental caring time is between 72% and 190% higher than mean developmental caring time with Denmark showing the smallest difference followed by Canada, the US and the UK.

The sum of parental time follows a similar pattern as maternal time with mean non-developmental caring time being 60% (130%) higher in Denmark (the UK) than mean developmental caring time. Using the cross-country comparisons in these measures as a metric for the within country differences, we find that Danish parents spend about 40% more non-developmental time and 100% more developmental time with their children than do UK parents. The within – country differences are about 1/3 higher than the cross-country differences (note that the cross-country differences in mean time spent with children are the greatest between Denmark and the UK).

Non-developmental caring time makes up a substantially higher proportion of total caring time, about 2/3 for mothers or fathers. For mothers, there is substantially more inequality in developmental caring time than in non-developmental time in Canada, the UK and the US (about 0.150 points or 30%) but the ginis are almost identical in Denmark. Fathers' developmental time is more unequal than non-developmental time in all cares. As a result, the gini for non-developmental time is much more in line with the gini for total caring time than developmental time except for mothers in Denmark where there is not much difference. The cross-country differences in equality for developmental care are in the order 30 to 50%, within range of the within country differences, but are slightly lower for non-developmental care by 5 to 10%.

For all countries and measures, inequality in fathers' time is substantially higher than inequality in mothers' time. Across countries, Danish parents, on average,

spend the most time with their children and the distribution across families exhibits the least inequality. Parents in the UK spend, on average, the least time with their children while Canadian and US mean times are very similar. However, the distribution of parental time across households is more equal in the UK than in Canada and the Canadian distribution is slightly more equitable than the US.

**Table 5: Equivalent Mean Monthly Caring Time. Single and Couple households with children under the age of 15 years<sup>1</sup>**

|                              |         | Hours/Month     |       |                |       |               |       |            |       |
|------------------------------|---------|-----------------|-------|----------------|-------|---------------|-------|------------|-------|
|                              |         | Denmark<br>2001 |       | Canada<br>1998 |       | UK<br>2000/01 |       | US<br>2003 |       |
|                              |         | Mean            | Gini  | Mean           | Gini  | Mean          | Gini  | Mean       | Gini  |
| <i>Mothers' Caring time</i>  |         |                 |       |                |       |               |       |            |       |
| Total Caring Time            |         | 60.59           | 0.413 | 47.64          | 0.488 | 40.64         | 0.477 | 48.57      | 0.490 |
|                              | st. dev | 47.76           |       | 45.35          |       | 38.58         |       | 44.90      |       |
| Developmental Caring Time    |         | 20.99           | 0.493 | 16.24          | 0.688 | 10.90         | 0.649 | 13.65      | 0.738 |
|                              | st. dev | 19.68           |       | 24.17          |       | 15.63         |       | 21.37      |       |
| Nondevelopmental Caring Time |         | 39.58           | 0.486 | 30.79          | 0.537 | 29.74         | 0.503 | 34.92      | 0.523 |
|                              | st. dev | 38.59           |       | 35.13          |       | 30.89         |       | 36.13      |       |
| <i>Fathers' Caring Time</i>  |         |                 |       |                |       |               |       |            |       |
| Total Caring Time            |         | 28.86           | 0.506 | 25.76          | 0.628 | 17.58         | 0.605 | 24.63      | 0.656 |
|                              | st. dev | 27.52           |       | 33.80          |       | 21.99         |       | 34.70      |       |
| Developmental Caring Time    |         | 11.40           | 0.639 | 10.52          | 0.775 | 6.89          | 0.719 | 10.17      | 0.805 |
|                              | st. dev | 15.41           |       | 19.16          |       | 11.28         |       | 21.37      |       |
| Nondevelopmental Caring Time |         | 17.46           | 0.570 | 15.23          | 0.701 | 10.69         | 0.677 | 14.46      | 0.725 |
|                              | st. dev | 20.12           |       | 24.66          |       | 15.99         |       | 25.35      |       |
| <i>Parental Caring Time</i>  |         |                 |       |                |       |               |       |            |       |
| Total Caring Time            |         | 89.44           | 0.377 |                |       | 54.14         | 0.459 |            |       |
|                              | st. dev | 62.93           |       |                |       | 48.57         |       |            |       |
| Developmental Caring Time    |         | 32.40           | 0.454 |                |       | 16.27         | 0.611 |            |       |
|                              | st. dev | 27.38           |       |                |       | 21.28         |       |            |       |
| Nondevelopmental Caring Time |         | 57.05           | 0.436 |                |       | 37.87         | 0.483 |            |       |
|                              | st. dev | 49.25           |       |                |       | 36.74         |       |            |       |

<sup>1</sup> Children are <15 years old in Denmark (434 mothers; 396 fathers; and 437 couples), Canada (1032 mothers; 932 fathers) and the US (2457 mothers; 2087 fathers); children are ≤15 years of age in the UK (987 mothers; 781 fathers; 760 couples);

Finally, within country patterns remain remarkably stable and the levels of inequality only change by about 5% when we have a measure of joint parental caring time rather than mothers' caring time (most often reported in the literature)<sup>3</sup>.

<sup>3</sup> Results not presented here indicate that the results are even more similar if lone-parent families are excluded from the analysis.

The picture is quite different if we compare fathers' caring time to joint parental caring time. Thus, the answer to our first substantive question – does inequality change when we are able to measure joint parental caring time rather than individual parental time (mothers or fathers) – is that it does not change substantially when moving from mothers' time to joint parental time however, inequality falls significantly when moving from fathers' caring time (typically only explored when examining gender differences in time allocation) to joint parental caring time.

Results for the value of time resources available to children are presented in Table 6. As previously noted, we have an estimate of opportunity cost for Denmark and Canada but a measure more akin to replacement costs in the UK and the US hence, the ginis are almost identical for quantity and value of time in the US and the UK (any difference is due to the small differences in wages across sex and marital status (see Table 2)). Also note that while the move from quantity of time to opportunity value of time increases inequality somewhat, it does not change the patterns of inequality within or across countries thus, for patterns in inequality valuing time at opportunity cost rather than replacement cost does not matter much. We now focus on the opportunity cost results from Denmark and Canada. Given that Denmark has, on average, higher wages and higher mean caring times, it is not surprising that the mean value of caring time is substantially higher there than in the other countries for mothers, fathers and both parents. Again, unsurprising given the time results, the mean value of non-developmental care is considerably higher than developmental care across countries and parent type. When moving from measuring the quantity of time spent with children to the opportunity cost of time spent with children the percentage difference between mothers and fathers falls dramatically (fathers have, on average, higher wages than mothers – see Table 2). In the Danish results, mothers spend more than twice the time with children as fathers, on average, but the mean value of that time is only about 1/3 higher. The Canadian results are similar; moms spend just under twice as much time with children as dads but the value of moms' caring time is only about 25% higher than dads<sup>4</sup>. The distribution of opportunity cost of time is more unequal than the distribution of the quantity of time for both Canada and Denmark, more so for mothers and both parents than for fathers.

The change in resource measure (quantity to value of time) leads to about a 10% increase in inequality in Denmark for mothers, fathers and both. The change leads to a 1% increase for Canadian fathers and about a 6% increase for Canadian mothers. If however we focus on inequality differences between Canada and Denmark within the different resource measures, we see an increase of about 20 to

---

<sup>4</sup> If sample-selection bias is leading to an over estimate of wages for mothers relative to fathers in the Canadian data (see footnote e) the difference may be even smaller.

25% in inequality. Thus, the change from measuring quantity to value of time within countries leads to smaller differences in inequality than measuring inequality across countries.

**Table 6: Value of Caring Time**

|   |         | US \$2003  |       |        |       |        |       |        |       |
|---|---------|--|-------|--------|-------|--------|-------|--------|-------|
|   |         | Couple households with children under the age of 16 years <sup>1</sup> |       |        |       |        |       |        |       |
| Value of Caring Time (opportunity cost approach using parental wages <sup>2</sup> )   |         | Denmark  |       | Canada |       | UK     |       | US     |       |
|   |         | Mean   | Gini  | Mean   | Gini  | Mean   | Gini  | Mean   | Gini  |
| <i>Mothers'</i>   |         |  |       |        |       |        |       |        |       |
| Total Caring Time   |         | 1095.19  | 0.444 | 549.19 | 0.517 | 557.75 | 0.477 | 774.65 | 0.496 |
|   | st. dev | 970.91   |       | 618.47 |       | 528.25 |       | 727.21 |       |
| Developmental Caring Time   |         | 383.08   | 0.528 | 188.53 | 0.701 | 149.61 | 0.649 | 218.91 | 0.740 |
|   | st. dev | 386.56   |       | 298.27 |       | 214.23 |       | 371.26 |       |
| Nondevelopmental Caring Time  |         | 712.11   | 0.512 | 360.67 | 0.562 | 408.13 | 0.503 | 555.74 | 0.528 |
|   | st. dev | 782.94   |       | 485.18 |       | 422.86 |       | 579.19 |       |
| <i>Fathers'</i>   |         |  |       |        |       |        |       |        |       |
| Total Caring Time   |         | 718.49   | 0.538 | 419.70 | 0.635 | 361.22 | 0.605 | 517.76 | 0.655 |
|   | st. dev | 751.32   |       | 557.48 |       | 452.62 |       | 731.10 |       |
| Developmental Caring Time   |         | 284.03   | 0.650 | 175.59 | 0.781 | 141.52 | 0.720 | 215.19 | 0.805 |
|   | st. dev | 393.43   |       | 328.65 |       | 232.77 |       | 452.21 |       |
| Nondevelopmental Caring Time  |         | 434.46   | 0.602 | 244.11 | 0.700 | 219.70 | 0.676 | 302.57 | 0.723 |
|   | st. dev | 548.53   |       | 397.63 |       | 328.20 |       | 532.64 |       |
| <i>Both Parents'</i>  |         |  |       |        |       |        |       |        |       |
| Total Caring Time   |         | 1813.69  | 0.406 |        |       | 839.88 | 0.465 |        |       |
|   | st. dev | 1400.56  |       |        |       | 762.65 |       |        |       |
| Developmental Caring Time   |         | 667.12   | 0.486 |        |       | 261.31 | 0.618 |        |       |
|   | st. dev | 608.76   |       |        |       | 346.56 |       |        |       |
| Nondevelopmental Caring Time  |         | 1146.57  | 0.463 |        |       | 578.58 | 0.488 |        |       |
|   | st. dev | 1046.82  |       |        |       | 565.45 |       |        |       |
| <i>opportunity cost*developmental time + replacement cost* non-developmental time</i> |         |  |       |        |       |        |       |        |       |
|   |         | 1090.56  | 0.377 |        |       | 741.30 | 0.464 |        |       |
|   | st. dev | 767.24   |       |        |       | 672.00 |       |        |       |

<sup>1</sup> see note 1 Table 5. <sup>2</sup> See Table 2 for descriptive statistics and explanation of wage derivation.

In the last row of Table 6, we move to a measure which values developmental time at mean parental wages and non-developmental time at replacement cost (mean housekeepers' wage). The mean value and inequality of this measure is substantially lower than the opportunity cost value of time (non-developmental time is about 2/3 of total caring time and the mean housekeepers' wage is lower, on average,

than parental wages and does not vary within countries). Thus, the answer to our second question – does moving from quantity of time to value of time affect inequality measures (if so to what extent) – is: “It Depends”. If the goal is to examine gender inequality, moving from mean quantity of time to mean value of time, measured by opportunity costs, makes a big difference in favour of males. If the goal is to examine patterns in inequality by gender within, then the change makes little difference – the percentage change across countries is about twice the percentage change within measures in a country.

Penultimately, we explore inequality in measures of material goods available to children, household income, and consumption for Denmark, Canada, and the UK, in Table 7. As discussed previously, the sample used in this section consists of coupled households with children under the age of 18 years in Denmark and Canada and coupled households with children under the age of 16 years in the UK.

First, we examine mean gross household income (first row of results) and its gini for each country. Danish two-parent households with children earn substantially more than their Canadian or UK counterparts and the distribution is more equitable. Danish couples, on average, have earnings which are about 20% higher than Canadian couples with children and almost 30% more than similar households in the UK. The higher mean is not accompanied by higher inequality in Denmark. The Danish gini is about 1/3 less than the Canadian measure and just over half of the UK’s gini. Net household income (second row of results), gives us an indication of how much the country’s social policies (taxes and transfers) matter when examining the material resources available to children. In each case, mean net household income is substantially lower than mean gross household income; Danish households remain better off than Canadian households, but only by about 5% and the UK lags behind Canada by another 7%. Within each country the distribution of net household income is more equal than that of gross household income with Canada’s gini improving by almost 14%, Denmark’s by 10% and the UK’s by about 7%.

The mean values fall further when moving from household income to a measure of resources consumed in each household (household expenditure - third row of results) and the patterns present a slightly different picture. Canadian households with children have about 40% more resources available for consumption within the household than do comparable households in the UK; they also have about 10% more than similar Danish households. While the pattern remains, Denmark most equitable and the UK the least, ginis are more similar across the countries<sup>5</sup>.

---

<sup>5</sup> The substantial differences across countries could be due to the near impossibility of matching exact components of household expenditure across surveys thus we focus more on patterns within countries rather than between countries.

Within Canada and the UK, proxying resources available to children by household consumption, rather than net household income, decreases inequality in material resources available to children by just over 0.025 points (about 10%). Unsurprisingly, the decrease in inequality by changing proxies from gross income to household expenditure is substantially larger at 0.068 points (23%) for Canada and 0.054 points or 15% for the UK. However, the change from gross household income to consumption leads the reader to opposite conclusions within Denmark; increasing the gini by 0.021 (10%) and even more surprisingly, moving from net income to consumption increases the gini by 0.041 points (diminishes equality by about 23%). These differences within countries are relatively small and are in line with the cross-country differences in each measure; inequality in gross and net incomes is about 30% lower in Denmark than Canada and inequality in consumption is basically the same in the two countries (0.222 vs 0.225). Except for Denmark where consumption inequality is higher than net income inequality, the cross-country patterns within measures are stable.

**Table 7: Equivalent Mean Monthly Household Income, Consumption and Assignable Goods (values converted to 2003 \$US at PPP)**

| Two-parent households with children under the age of 16 years <sup>1</sup> |          |         |       |        |       |      |       |
|--|----------|---------|-------|--------|-------|------|-------|
|  |          | Denmark |       | Canada |       | UK   |       |
| Money  | \$/month | Mean    | Gini  | Mean   | Gini  | Mean | Gini  |
| Gross Household Income   |          | 3073    | 0.204 | 2444   | 0.293 | 2227 | 0.354 |
|  | st. dev. | 1246    |       | 1433   |       | 2061 |       |
| Net Household Income   |          | 1988    | 0.183 | 1906   | 0.252 | 1774 | 0.329 |
|  | st. dev. | 728     |       | 943    |       | 1556 |       |
| Household Expenditure  |          | 1548    | 0.223 | 1717   | 0.225 | 1024 | 0.300 |
|  | st. dev. | 671     |       | 725    |       | 641  |       |
| Assignable goods   |          | 178     | 0.483 |        |       |      |       |
|  |          | 177     |       |        |       |      |       |
| Assignable goods + Non-assignable goods                                    |          | 1077    | 0.261 |        |       |      |       |
|  |          | 566     |       |        |       |      |       |

<sup>1</sup> Children <16 years of age in the UK.

In order to more easily view comparisons across resource measures, ginis for all measures and countries are presented in Table 8. Comparing the value of mothers' caring time (taken from Table 6) to household consumption (taken from Table 7), inequality drops by about half when measuring, on average, household consumption rather than the value of mothers' time in Canada and Denmark<sup>6</sup>. Again we focus on the difference in inequality of each measure across the two countries as an

<sup>6</sup> We use mother's time since it was demonstrated to be similar to total parental time and it is available for the two countries where we have opportunity cost valuation of time (Denmark and Canada).

indication of the relative importance of the change in measures within a country. The inequality in the value of time is about 20% higher in Canada than Denmark (0.517 vs 0.434); inequality in gross and net incomes is about 30% higher; inequality in consumption is basically the same in the two countries (0.222 vs 0.225). The inequality in the value of mother's caring time is about 2.2, 2.4 and 1.8 times that of gross income, net income and household consumption, respectively in Denmark. For Canada, values are 1.8, 2.0, and 2.3 times larger for mothers' value of time than for gross income, net income and household consumption, respectively. Thus, changing the measure of resources available to children from value of time to consumption is relatively much more important than international differences in inequality of the measures; the answer to our third substantive question – to what extent does inequality change when income/expenditure measures are used rather than the value of time.

**Table 8: Summary of Ginis across Measures and Countries**

| Total caring time (from table 5)   | DEN   | CAN   | UK    | US    |
|--|-------|-------|-------|-------|
| Father's   | 0.506 | 0.628 | 0.605 | 0.656 |
| Mother's   | 0.413 | 0.488 | 0.477 | 0.490 |
| Both Parent's  | 0.377 |       | 0.459 |       |
| Value of Caring Time (from table 6)  |       |       |       |       |
| Father's   | 0.538 | 0.635 | 0.605 | 0.655 |
| Mother's   | 0.444 | 0.517 | 0.477 | 0.496 |
| Both Parent's  | 0.406 |       | 0.465 |       |
| Income and Expenditure (from table 7)  |       |       |       |       |
| Adjusted Gross Household Income  | 0.204 | 0.293 | 0.354 |       |
| Adjusted Net Household Income  | 0.183 | 0.252 | 0.329 |       |
| Adjusted Household Expenditure   | 0.223 | 0.225 | 0.300 |       |
| Adjusted Household Expenditure on Assignable goods and services                    | 0.483 |       |       |       |
| Adjusted Household Expenditure on Assignable and non-Assignable goods and services | 0.261 |       |       |       |

Finally, we obtain a measure of intrahousehold allocation of consumption (measured in the Danish data only). We compare adjusted household consumption to adjusted consumption of goods and services reportedly purchased directly for the child(ren) (assignable goods and services) and a middle-ground measure that includes both assignable and non-assignable goods and services (last two rows of Table 7 or 8). Inequality in unallocated household consumption is less than half that of consumption goods and services purchased for children (0.470 vs 0.222) but quite similar to the inequality in total assignable and non-assignable goods (0.260 vs 0.222 or about 15% lower). Assignable goods only make up about 20% of assignable + non-assignable goods (see Table 7). We cannot offer a cross-country comparison as a metric as none have comparable data. Moreover, whether

we examine intra-household allocation of resources directed towards children as mothers' time caring for children, the value of mothers' caring time or the value of consumption goods and service purchased for children, the inequality is about twice that of the resource measures typically used in the literature, household income or consumption. Inequality across resource measures (those directed at children vs. unallocated resources) within a country vary substantially more than the cross-country differences in the inequality in available measures. The answer to our final question - does an indication of intra-household allocation change the results substantially – is yes.

## 4. Conclusion and Discussion

To summarize, we address four substantial questions using several different data sources across four countries (Denmark, Canada, the UK and the US) and parental type (mothers, fathers or both parents). The cross-country comparisons in measures of resources available to children (parental time spent with children, the value of parental time spent with children, and household income and/or consumption) by parental type are interesting in themselves and they provide a metric when examining alternative measures of resources available to children within countries (parental time spent with children, the value of parental time, household income/consumption, consumption assignable to children within the household).

The main questions addressed are: do inequality measures differ when we are able to measure joint parental caring time rather than individual parental time (mothers or fathers)? To what extent does moving from quantity of time to value of time affect inequality measures? Is inequality in the value of time sensitive to whether time is valued at opportunity cost or replacement cost? How does inequality in the value of time spent in childcare compare to inequality in income and consumption (or expenditure) measures? Does an indication of intra-household allocation of good and services change measured inequality in consumption?

Our cross-country comparisons indicate that, no matter how we measure resources available to children, the distribution is most equal in Denmark. Means are also the higher in Denmark than the other countries for all measures except adjusted household consumption where Canada outranks Denmark. Canadian parents spend more time with their children, on average, than do UK parents but the distribution across parents is more equal in the UK. Mean caring time is similar in Canada and the US but the US distribution is the most unequal. Canadian two-parent families have higher mean incomes and consumption than their UK counterparts and they are more equally distributed.

Our within and across country comparisons indicate that: 1) the ability to measure joint parental caring time rather than mothers' caring time does not add much to the overall picture of inequality within or across countries. Moving from fathers' time with children to joint parental time increases the level of inequality substantially but does not change the patterns; 2) having a measure of opportunity cost of parental time makes a big difference if the goal is to examine gender inequality (moving from the mean quantity of time to the mean value of time decreases the difference between maternal and paternal measures substantially in favour of fathers) however, the patterns in inequality by gender within or across countries is affected to a much lesser degree; patterns remain stable when moving from replacement cost to opportunity cost; 3) measuring the value of childcaring

time rather than income and/or expenditure increases inequality substantially within Denmark and Canada and this is relatively more important than moving across countries within the measures; and 4) having measures of resources directed at children increases inequality substantially over measures of resources available within households with children. This is observed when moving from measures of household consumption to measures of consumption goods and services directed at children (in the Danish data). The same can also be observed when general measures of income and/or expenditure which are frequently measured in the child poverty and inequality literature are compared to measures of time spent with household children.

The full extent of deprivation depends on the joint distribution of material and time inputs. Simply put, if the children who receive the fewest material inputs also receive the lowest quantities of parental time input, then those children are even more disadvantaged than either of the marginal distributions would suggest. (On the other hand, if time and money inputs are negatively correlated, and at least in part substitutes in the developmental process, then the marginal distributions of time and money available to children may overstate actual inequality.) The obvious next step in the line of enquiry reported in this paper is to examine the joint distribution of material time inputs. Ideally, one would like to have detailed data on both expenditures and time use for the same households. No such data is currently available, as far as we are aware, although such data may become available in the future. In the interim, the detailed Danish register data can also be used to match observations from the Danish Expenditure Survey to observations in the Danish Time-Use Survey; this will allow us to make a preliminary assessment of the joint distribution of time and money inputs to children in the near future.

In summary, our paper indicates that better data matters in most instances and obtaining measures of resources directed at children (e.g., parental caring time or assignable consumption) leads to substantially more inequality within and across countries than do measures of resources available in households with children; intra-household allocation matters.

## References

- Angeriz, A and S. P. Chakravarty (2007). “Changing patterns of UK poverty, 1997–2004.” *Cambridge Journal of Economics* :31:995-1006.
- Bhattacharya, Debopam (2007). “Inference on inequality from household survey data.” *Journal of Econometrics* 137:674–707
- Bianchi, S.M., Robinson, J.P., & Milkie, M.A. (2006). *Changing rhythms of American family life*. New York: Russell Sage.
- Bianchi, S. (2000). “Maternal Employment and Time with Children: Dramatic Change or Surprising Continuity?” *Demography*. 37:401-14.
- Bonke, J. (1992). “Distribution of Economic Resources – Implications of Including the Household Production”. *Review of Income and Wealth*. 38 (3): 281-293.
- Bonke, J., & Browning, M. (2008). “Allocation of expenditures within the household: A new Danish survey.” Mimeo Rockwood Foundation Research Unit, Copenhagen, Denmark.
- Bonke, J. and G. Esping-Andersen (2008). “Parental Investments in children: How Educational Homogamy and Bargaining Affect Time Allocation.” DemoSoc Working Paper. Paper Number 2007-20. Universitat Pompeu Fabra. Barcelona.
- Blair, S.L., Hardesty, C.L., Morgan, C.S., & Wenk, D.A. (1994). “The influence of parental involvement on the well-being of sons and daughters.” *Journal of Marriage and Family*, 56(1): 229-234.
- Bradbury, Bruce; Jenkins, Stephen P; Micklewright, John, eds, (2001). *The dynamics of child poverty in industrialised countries*, Cambridge University Press, Cambridge, UK.
- Brewer, Mike and Paul Gregg (2008). “Eradicating Child Poverty in Britain: Welfare Reform and Children Since 1997.” The Institute for Fiscal Studies WP01/08
- Budig, Michelle, and Nancy Folbre (2004). “Activity, Proximity or Responsibility? Measuring Parental Childcare Time,” in Nancy Folbre and Michael Bittman. (eds.) *Family Time, The Social Organization of Care*, New York: Routledge.
- Connelly, R., & Kimmel, J. (2007, May/June). “Spousal influences on parents’ non-market time choices.” Paper presented at the meeting of the IZA Topic Week on Non-market Time in Economics, Bonn, Germany.

Contoyannis, Paul and John Wildman (2007). "Using Relative Distributions to Investigate the Body Mass Index in England and Canada." *Health Economics*, 16:929-944.

Crossley, Thomas F. and Lori J. Curtis (2006). "Child Poverty in Canada." *Review of Income and Wealth*, 52:237-260.

Dickens, Richard and David T. Ellwood (2003). "Child Poverty in Britain and the United States." *The Economic Journal*, 113:F219-F239

Folbre, N. & J. Yoon (2005). "The Value of Unpaid Child Care in the U.S. in 2003." Paper presented at the meetings of the Allied Social Science Ass., Boston, MA, Jan. 5, 2006.

Folbre, N., J. Yoon, K. Finnoff, A. Fuligni (2005). "By What Measure? Family Time Devoted to Children in the U.S." *Demography* 42:373-390.

Gauthier, Anne H., Timothy Smeeding, & Frank F. Furstenberg Jr. (2004) "Do We Invest Less Time in Children? Trends in Parental Time in Selected Industrialized Countries since the 1960s." Center for Policy Research Working Paper No. 64 Center for Policy Research, Maxwell School of Citizenship and Public Affairs, Syracuse University.

Handcock MS, Morris M. (1999). *Relative Distribution Methods in The Social Sciences*. Springer: New York.

Hertwig, R., Davis, J.N., and Sulloway, F.J. (2002). "Parental Investment: How and Equity Motive Can Produce Inequality". *Psychological Bulletin*. 128:728-745.

Kalenkoski, Charlene M., David C. Ribar, and Leslie S. Stratton (2006). "Parental Child Care in Single Parent, Cohabiting, and Married Couple Families: Time Diary Evidence from the United States and the United Kingdom" The Levy Economics Institute Working Paper Collection Working Paper No. 440.

Kimmel, Jean and Rachel Connelly (2006). "Is Mothers' Time With Their Children Home Production or Leisure?" Discussion Paper Series IZA DP No. 2058.

Mullan, K. (2007). "A Valuation of Childcare Provided by Parents in the United Kingdom: Inputs and Outputs", paper presented at the IZA Topic Week in Non-market Time (Bonn: June 2nd 2007).

- Price, J. (2007). "Parental Time, Family Income, and Child Outcomes." Paper presented at Department of Economics, Cornell University, US.
- Qian, Xiaolei and Smyth, Russell (2008). "Measuring Regional Inequality of Education in China: Widening Coast-Inland Gap or Widening Rural-Urban Gap?" *Journal of International Development*, 20:132-44.
- Sayer, L., C., S.M. Bianchi, & J.P. Robinson (2004). "Are parents investing less in children? Trends in mothers' and fathers' time with children". *American Journal of Sociology*. 10:1-43.
- Stafford, F., & Yeung, W.J. (2005). "The distribution of children's developmental resources". In D.S. Hamermesh & G.A. Pfann (Eds.), *The Economics of Time Use* (pp. 289-313). Amsterdam: Elsevier.
- Wagstaff, Adam and Eddy van Doorslaer (2004). "Overall versus socioeconomic health inequality: a measurement framework and two empirical illustrations" *Health Economics*, 13:297-301.
- Wolfe, Edward N. (1994). "Trends in Household Wealth in the United States, 1962-83 and 1983-89." *Review of Income and Wealth*, 40:143-174.
- Yeung, W. Jean & Rebecca Glauber (2007). "Children's Time Use and Parental Involvement in Low-Income Families" National Poverty Center Working Paper Series #07-03.
- Zick, C.D., Bryant, W.K., & Ôsterbacka, E. (2001). 'Mothers' employment, parental involvement, and the implications for intermediate child outcomes'. *Social Science Research*, 30:25-49.



## Appendix I

### Theoretical Model

Below we develop a simple model which shows the conditions under which it might be sensible to value parental time spent with children at the parent's wage. A common objection to this is that: "just because a person is a good lawyer/investment banker/etc. doesn't mean they are good parent". That is of course true, but it is only relevant if the return to time spent with children is constant. If, instead, time spent with children exhibits diminishing marginal returns (as seems likely) then optimizing parents should invest time in their children up to the point where they can do more for the children by working for money. Thus on the margin, the value of time spent with children will be equal to the wage. The model formalizes this intuition.

Suppose parents have a utility function that depends on their own consumption ( $C$ ) and the wealth of their child(ren) ( $W$ ):

$$U(C, W) = \sum \mu^i U^i(C, W) \quad (1)$$

where  $i$  can be 1 or 1,2 (for one or two parent families). Note that this is a unitary model because the  $\mu^i$  are fixed. It could be turned into a collective (intra-household) model by allowing the  $\mu^i$  to depend on prices and distribution factors. We do not believe this would add much to the point we want to make. We ignore leisure, so that parents divide their time between market work and a single home production task (investment in children). Again, we don't believe adding leisure would add much to the model.

The child's wealth is the sum of (bequeathed) financial wealth ( $B$ ) and human capital ( $H$ ). The child's human capital endowment is produced from parental inputs according to the production function  $H = f(X, t^1, t^2)$ .  $X$  is child goods and services which are purchased at price  $p$  (relative to consumption). The time investments of the two parents are  $t^1$  and  $t^2$ . Thus:

$$W = H + B = f(X, t^1, t^2) + B \quad (2)$$

Each parent has a time endowment ( $T$ ) and the part that is not spent investing in the child is spent in market work, at wage ( $w^i$ ) so the family faces a budget constraint:

$$C \leq \sum w^i T - pX - B - \sum w^i t^i \quad (3)$$

Combining (2) and (3) to eliminate the bequest gives the following characterization of the parents' constraints:

$$\begin{aligned}
C + W &\leq \sum w^i T + f(X, t^1, t^2) - pX - \sum w^i t^i & (4) \\
&= \sum w^i T + \pi(X, t^1, t^2)
\end{aligned}$$

Where  $\pi(X, t^1, t^2)$  is the net ‘profit’ on investments in the child. We have assumed that the bequest could be negative: if the returns to investments in human capital are sufficiently high, the parents borrow to finance these investments and bequeath debt to their child.

The parents’ problem is to maximize (1) subject to (4). It is immediately obvious from (4) that the solution to this problem involves choosing  $X, t^1$  and  $t^2$  to maximize  $\pi(X, t^1, t^2)$ . This solution to this sub-problem satisfies:

$$\pi_X = f_X - p = 0 \quad (5)$$

$$\pi_{t^i} = f_{t^i} - w^i = 0 \Rightarrow f_{t^i} = w^i \quad (6)$$

Equation (6) says that on the margin, the value of the time each parent invests in the child should be equal to that parent’s wage. Again, the result is driven by two things: first, the assumption that time investments in children have diminishing marginal return (the first book read each week is more important than the 20<sup>th</sup>), and second, the assumption that parents can always give their children cash (the bequest) so that the opportunity cost of time spent with the child is time spent earning money to give him or her.

Because of the separation between consumption and investment here, investment decisions follow from profit maximization, and have all the usual profit maximization comparative statics (negative own price effects on input demands, for example, so that hours of time with children should be decreasing in the wage.) However, these may be very difficult to test in cross-section (for example, if we allow for heterogeneity in productivity in child care that is arbitrarily correlated with wages, then we can rationalize any pattern in the data).

## Appendix II

### Further Details on The Data

We use data from several sources, namely the Danish Time-Use Survey (DTUS, 2001) and the Danish Expenditure Survey (1999-2005), the Canadian General Social Survey (GSS, 1998), the Canadian Survey of Household Spending (SHS, 1998), the UK Time-Use Survey (2000), the British Family Expenditure Survey (1999-2000) and the American Time Use Survey (ATUS, 2003). This is to measure, as best we can in each country, the use of time spent on children and the goods and services bought for children. By multiplying the time-use with the parents opportunity costs, we get two comparable measurements of parental child investment referring to nearly the same period of time.

Depending on the dataset the information refers to either one of the parents, both parents or the children as a group.

### Danish Time Use Survey

The Danish Time Use Survey (DTUS, 2001) includes data for 2,739 randomly chosen individuals. Besides collecting information on household characteristics and family composition as well as individual characteristics such as education, employment, earnings and demographic information, the survey included a time-diary component. The respondent (for cohabiting and married people also the partner) completed a weekday and weekend time-diary, identifying the primary and secondary activities for each 10-minute interval over the two days, as well as who they were together with during the activities, i.e. his/her partner, children, other people or alone. This gives a total of 1,826 diaries, 82 from single parents and 1,744 from cohabiting and married spouses with children under the age of 18 years living at home. That we only include diary information from spouses referring to the same day implies that our time use data are more reliable than in most time use surveys including the 2003 American Time Use Survey and the 1998 Canadian General Social Survey where there only one representative of the household filled out the diary (Connelly & Kimmel, 2007).

Care is measured as the aggregate number of intervals where it was performed multiplied by 10 minutes, i.e. the length of the intervals. The information refers to one weekday and one weekend day per respondent. To neutralize variation in caring across the week, weekday and weekend day information were then weighted together (weekdays multiplied by 5 and weekend days by 2 and the aggregated value divided by 7 to find an average day of the week), so an overall average of parent's time spent on child care per day becomes the unit for analysis.

### **The Danish Household Expenditure Survey**

The Danish Expenditure Survey (DHES) is an ongoing survey of household buying habits covering approximately 1,000 households per year. The survey consists of a self-administered accounting book ('diary') and a questionnaire ('interview'). The interview gives information about the household's expenditures on certain public goods (rent, heating, etc.) and on purchases and possession of durables (television, vehicles, etc.), whereas the diary data record all purchases of each household member during a two-week period. Moreover, in the dataset used here five columns are appended in which respondents record for whom each good was bought (except food stuffs). Specifically they can respond one of: 'mainly for her', 'mainly for him', 'mainly for the household', 'mainly for any children' or 'mainly for someone outside the household'. This allows us to give a complete picture of the distribution of all assignable goods within the household.

We only sample married or co-habiting couple households. Furthermore, to diminish heterogeneity only couples with both spouses between 18 and 59 years old are included in our sample.

The *register data* come from several registers (e.g. income register, the child data base) and cover information about age, income, education, and labor market status of all household members. The data set also contains information about children and possible former partners (age, income levels, etc.). For further details on the data set, see Bonke & Browning (2008).

### **The Canadian General Social Survey – (Cycle 12, Time Use)**

(<http://www.statcan.ca/english/Dli/Data/Ftp/gss/gssc1298.htm>  
accessed July 30, 2008)

The Canadian General Social Surveys (GSS) are periodic cross-sectional surveys used to collect information on a diverse set of policy relevant topics. Cycles 2, 7, 12 and 19 (in years 1986, 1992, 1998, 2005 respectively) collected time use information. We use the information collected in 1998 (cycle 12). The target population for the GSS is all persons living in Canada who are 15 years of age or over. The two exceptions are residents living in the Yukon or North West Territories and full-time residents of institutions. The surveys are divided equally across all months to adjust for seasonality. The sample is stratified within provinces and then telephone numbers are randomly selected without replacement and are distributed across the days of the week to provide a sample representative of the days of the week. Households are and a random person aged 15 years or over within the household is selected for the interview. Response rates are approximately 75%. Personal and household characteristics are collected along with that persons time use. Survey weights are provided to adjust for complex sampling and non-response.

### **The Survey of Household Spending**

(<http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3508&lang=en&db=IMDB&dbg=f&adm=8&dis=2>  
accessed July 31, 2008)

The Survey of Household Spending is carried out annually across Canada in the ten provinces. It surveys private households. Individuals on Indian reserves and crown lands, official representatives of foreign countries living in Canada and their families, members of the Canadian Forces living in military camps, and institutionalized populations are not surveyed. The survey covers about 98% of the population in the 10 provinces. The main purpose of the survey is to obtain detailed information about household spending during the previous calendar year. Information is also collected on income, dwelling characteristics as well as household equipment. Over 21,000 households are surveyed, the sample is a stratified, multi-stage sample selected from the Labour Force Survey (LFS) sampling frame. Survey weights are provided and used.

### **The Labour Force Survey**

(<http://www40.statcan.ca/l01/cst01/other/lfs/lfsintro.htm>  
accessed July 30, 2008)

The Canadian Labour Force Survey (LFS) was developed following the Second World War to satisfy a need for reliable and timely data on the labour market. The main objective of the survey is to provide statistics on working-age individuals who are employed, unemployed, or not in the labour force. The LFS data are used to produce standard labour market indicators in Canada. In order to accomplish its goals the survey contains a plethora of information on hours of work, industry and occupation, earnings (wages, salaries and other earnings), and demographic characteristics of the respondent and their family members. The target population is civilian, non-institutionalized population 15 years or older. Those living in institutions or on Aboriginal lands and full-time members of the Canadian Armed Forces are excluded from the survey (about 2% of the population). Responding is mandatory leading to a very large sample and very little non-response.

### **The UK Time-Use Survey**

(<http://www.statistics.gov.uk/timeuse/default.asp>  
accessed July 30, 2008)

The UK time-use survey (UKTUS) is a representative sample of the population of private households and individuals within those households in the UK. A cluster design was used within the postcode and government sectors to account for population density and socio-economic grouping of the head of the household. Selected household heads or their partners completed a household questionnaire.

All individuals aged 8 or over were asked to complete individual questionnaires, two one-day diaries and a one week work and education time sheet. The diaries were equally distributed over the days of the week and individuals were given a combination which was randomly selected. Questionnaires were used to gather background information and socio-demographics while the diaries record primary and secondary activities and details on the respondent's location, and who they were with at the time. The response rate for the time-use diaries was about 45%. Survey weights are provided and utilized.

### **The UK Family Expenditure Survey**

(<http://www.statistics.gov.uk/StatBase/Source.asp?vlnk=1385&More=Y>  
accessed July 30, 2008)

The UK Family Expenditure Survey (FES) is a voluntary sample survey of private households (defined as a group of people living at the same address who share household expenses such as food and bills) in Great Britain (Scottish offshore islands and the Isles of Scilly are excluded from the sample for cost considerations). Interviews are spread evenly across the months of the year to adjust for seasonality. The sample design is a multi-stage stratified random sample with clustering. In 1999-2000, about 6,500 households successfully completed the survey; a response rate of about 63%. A household interview is used to obtain information regarding regular payments, such as rent and mortgages, and some durables. Information on individual income, expenditures and personal characteristics (e.g. age, sex and marital status) is recorded for each household member. Survey weights are provided and utilized.

### **The British Household Panel Survey**

(<http://www.iser.essex.ac.uk/ulsc/bhps>  
accessed July 30, 2008)

We use the British Household Panel Survey (BHPS) to determine the mean wage of a housekeeper. The BHPS began in 1991 and is a multi-purpose study following the same representative sample of individuals over several years. The survey interviews every adult member of the household. The first wave consists of 5,500 households and 10,300 individuals from 250 areas of Great Britain. Samples from Scotland and Wales were added in 1999, and from Northern Ireland in 2001 making the panel representative of the UK population. For our purposes the sample included a measure of wages and occupations. Survey weights were provided and utilized.

**The American time use survey**

(see <http://www.bls.gov/tus/>  
accessed July 30, 2008)

The ATUS sample is drawn from the Current Population Survey (CPS) which surveys civilian, non-institutionalized individuals living in households in the United States. Households become eligible for the American Time Use Survey (ATUS) 2 months after completion of their eighth CPS interview. The ATUS sample is a stratified, three-stage sample to adjust for over-sampling of less-populous states in the CPS, and to ensure representation by race/ethnicity, the presence and age of children, and the number of adults in adults-only households. In the final stage, an individual at least 15 years of age is selected from each household to answer the ATUS. Representation of the weeks of the month and the days of the week are ensured in the sampling. The ATUS overall response rate averaged 57.8% in 2003. Survey weights were provided and utilized.

## **Appendix III**

### **Measures of resources available to children**

#### **Time**

We include direct, primary care only (the time parents report spending directly with the child).

We report on developmental, non-developmental and total caring time.

*Developmental care* includes, from each time-use survey, our best measure the equivalent of:

- i) teaching the child (help with homework, guiding in doing things (equivalent to code 382 in Eurostat Guidelines));
- ii) reading, playing and talking with child (entertaining, playing games, reading (equivalent to code 383 in Eurostat Guidelines)).

*Non-developmental care* includes:

- i) unspecified childcare (helped the children (equivalent to code 380 in Eurostat Guidelines));
- ii) physical care and supervision (feeding, dressing, washing and preparing for bed, supervision indoors and outdoors (equivalent to code 381 in Eurostat Guidelines));
- iii) accompanying child (accompanying child to a doctor, waiting at a sports center, music lesson etc. (equivalent to code 384 in Eurostat Guidelines));
- iv) other specified childcare (equivalent to code 389 in Eurostat Guidelines));
- v) transporting a child (equivalent to code 938 in Eurostat Guidelines)).

#### ***Total caring time***

sum of developmental and non-developmental time.

### **Income and Expenditure**

#### ***Income***

*Gross Household Income* includes income reported by all household members before taxes and transfers.

*Net Household Income* includes income reported by all household members after taxes and transfers have been accounted for.

***Expenditure***

Our household expenditure measure is the measure of total household expenditure or consumption found in the countries expenditure survey. We attempt to include household goods and services such as housing, fuel, food, alcoholic drinks, tobacco, clothing, footwear, miscellaneous, second dwelling, household goods, household services, personal goods & services, private and public transportation expenditures, leisure goods, and services. As best we can, we exclude personal taxes, personal insurance payments, and gifts and contributions.



THE ROCKWOOL FOUNDATION RESEARCH UNIT

SEJROEGADE 11

DK-2100 COPENHAGEN OE

ISBN 978-87-90199-31-9

ISSN 0908-3979