Distributional aspects of parental time with children:
Evidence from the Multinational Time Use Study (1961-2011)

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Abstract

This paper investigates parental time with children in a novel approach which provides both information on parental time investment over the entire distribution and summary measures, such as the Gini coefficient, to capture the change over time and across countries of parental time inequality. We advance previous research, which exclusively focuses on the comparison of the mean differences between groups (e.g. low vs high educated parents), by offering evidence on both within- and across group heterogeneity in parental time with children. The analysis is based on data from the Multinational Time Use Study for the last five decades in 20 countries. The sample is limited to married or cohabiting parents with young children (under 5).

The results show that inequality in paternal time investment in the last half-century has always been higher than inequality in maternal time investment, though the gap narrowed in the last decade. In addition, there is a strong correlation between the Gini coefficients for mothers’ and fathers’ care time. The Gini coefficient among low-educated parents is consistently higher than that of high-educated parents, and in the case of fathers the gap is widening. This is indicative of increasing inequality within the low-educated father group. Inequality in time investment in children correlates positively with income inequality and negatively with public expenditure on family, suggesting that children in certain countries experience multiple disadvantages. The findings also point out to large cross-national differences, the US being the most unequal country in terms of time investment in children especially in the last decade.

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1. Introduction

This paper investigates the distribution of parental time investment in children. Rather than focusing on the average time that mothers and fathers devote to their children, the goal of this study is to characterize the entire empirical distribution of parental time. We adopt summary measures, such as the Gini coefficient, to capture the evolution over time and across countries of parental time inequality, and advance previous research by offering evidence on both within- and across group heterogeneity in parental time with children. The analysis is based on data from the Multinational Time Use Study (MTUS) for the last five decades in 20 countries and the focus is on married or cohabiting parents with young children (under 5). In our analysis we use six new time diary surveys from the 2006-2011 period and bring the cross-national evidence in childcare trends up-to-date.

Income inequality and its evolution over time are currently at the centre of the academic and policy debate. Data on top incomes reveal that the share of income going to the top percentiles has increased substantially since the 1970s in English speaking countries, whereas it has followed an L-shape in continental Europe and Japan, with Sweden and other Scandinavian countries as intermediate cases (Alvaredo et al. 2013; Piketty and Saez 2003). Data on the college wage premium show that it has increased in the US (Autor 2014), whereas it has been constant or even decreasing in European countries (Crivellaro 2016). OECD data on the Gini coefficient calculated on gross incomes suggest that income inequality in advanced countries has grown almost everywhere, though at different paces. Data on 90/10 earnings ratio (Autor 2014) also points towards an increase in inequality.

In general, as argued by Atkinson (2015), income inequality of today directly affects equality of opportunity of the next generation and therefore it shapes tomorrow ex ante playing field. From this perspective, it is concerning that inequality among families with children increased more than inequality among other types of families (for the US see Western et al. 2008; Martin 2006). In parallel, spending per child has grown at a much faster rate for parents from the top income deciles, resulting in a widening gap in financial investments in children (Kornrich and Furstenberg 2013), particularly in educational and enrichment activities (Duncan and Murnane 2011). According to UNICEF (2014), since 2008 the recession has increased child poverty in many advanced industrial countries.

Though financial resources are key for children’s well-being (McLeod and Shanagan 1993; Willingham 2012; Brooks-Gunn and Duncan and 1997), there is another parental resource, which is less visible and more difficult to measure, but essential for children’s well-being: time.

Time investment in children, particularly at early ages, has significant life-long consequences, as it affects the children human capital accumulation process, as well as their psychological well-being. Individual skill formation is a dynamic process, characterized by strong complementarities between early and late investments in human capital (Cunha et al. 2006; Cunha and Heckman 2010; Shonkoff and Phillips 2000) and parental time, especially maternal time, is shown to play an important role in producing children abilities. In fact, this is one of the rare issues on which there is a broad consensus among sociologists, economists and psychologists. There is now accumulated longitudinal evidence that consistently shows that educational activity with parents is the most productive input for a child’s cognitive skill development (Fiorini and Keane 2014; Kalb and Van Ours 2014). Del Boca et al. (2012) stress that parental time is more important for the cognitive development of children than money expenditure. Bernal and Keane (2010, 2011) find that, on average, the substitution of maternal time with other sources of care produces negative and rather sizable effects on children's skills; however, they also stress that this effect is driven by the substitution of
maternal time of highly educated mothers with low quality child care. Del Boca et al. 2012 document the salience of early maternal time inputs for later life outcomes (see also the seminal work by Becker [1981] 1991; Brilli 2015; Carneiro and Heckman 2003; and Leibowitz 1974). In the child development/ psychology literature, Conger, Conger and Martin (2010); Conger and Donellan (2007), Bradley and Crowyn (2004); Lamb and Lewis (2010); Pleck and Masciadrelli (2004) support the importance role of time investment for skill development and so does sociological and ethnographic research (Amato and Gilberth 1999; Lareau 2011. For a review, see Putnam 2015; Waldfogel 2006).

Previous research consistently shows that average time spent in primary childcare activities has increased substantially between the 1980s and 1990s across the advanced industrialized countries, such as the US (Altintas 2016, Bianchi, Robinson and Milkie 2006; Chalasani 2007; Sayer, Bianchi and Robinson 2004), the Netherlands (Bianchi, Robinson, and Milkie 2004), Canada (Zuzanek 2001; Gauthier, Smeeding and Furstenberg 2004), the UK (Sayer, Bianchi and Robinson 2004), and Australia (Bittman 1999, 2004; Craig, Powell and Symth 2014). The results from Gershuny’s (2000) analysis of 20 countries, Gauthier, Smeeding and Furstenberg’s (2004) analysis of 16 countries, and Guryan, Hurst and Kearney’s analysis of 13 countries confirmed the trends in increased childcare time, especially since the 1980s. There is also a consensus in the literature that high-educated parents spend more time in childcare than low-educated parents (Altintas 2016; Craig and Mullan 2010; Leibowitz 1974; Guryan, Hurst and Kearney 2008; Hill and Stafford 1985; Kalenkoski, Ribbar and Stratton et al. 2005; Monna and Gauthier 2008; Sayer, Gauthier and Furstenberg 2004) and devote a larger amount of time in developmentally salient activities (Altintas 2015, Hofferth and Sandberg 2001; Bianchi and Robinson 1997; Craig, Powell, and Smyth 2014; Guryan, Hurst and Kearney 2008; Monna and Gauthier 2008) as opposed to routine/ basic care activities.

The fact that more educated parents spend more time with their children, especially in human capital enhancing activities, points towards a potential reinforcement in the intergenerational transmission of inequality, beside that working through financial resources. Indeed, this evidence, along with other demographic trends such as marital dissolution which play at the disadvantage of children born to low-educated households, have led some scholars to speculate that raising averages might be “masking greater heterogeneity among parents than in the past” (Sayer, Bianchi and Robinson 2004: 32), “concealing possible polarization of parents,” (Monna and Gauthier 2008: 647) and, therefore, potentially contributing to “diverging destines” of children (McLanahan 2004).

However, the exclusive focus of the current research on the behaviour of parental time at the mean can only provide a partial picture of the evolution of inequality in parental time investment in children. Indeed, the focus on average time obscures what happens along the entire distribution. Previous studies showed a growing education-gap in time investment in children (Altintas 2016; Sullivan 2010; Ramey and Ramey 2010) but the analysis is limited to the comparison of the mean of two groups –high and low educated-, and provides no insight on potential within-group heterogeneity.

The goal of this paper is to shift the attention from the mean of the distribution of parental time investment to the entire time distribution, documenting changes over time and variation across countries. Using the most recent available dataset of time diary surveys, we will first describe the change in the shape of the distribution of parental time over time. We will then provide summary measures of the extent of inequality such as the Gini index. The latter is a concentration index widely used as an indicator of inequality in income and wealth, but it has never been adopted to capture the extent and the evolution of inequality in time investment.
Gimenez-Nadal and Sevilla-Sanz (2012) is the only study we are aware of in which information on summary moments of the entire distribution of time are provided, but the focus is on leisure rather than on parental time with children. Last, we will correlate inequality in time investment with selected measures of the quality of childhood environment to understand if inequality in parental time is positively or negatively related to other indicators of child well being.

The paper is organized as follows: Section 2 describes the time use data. Section 3 gives the results and Section 4 concludes, providing directions for future research.

## 2. Data and methodology

The time use data used in this study comes from the Multinational Time Use Study (MTUS) which is a collection of harmonized time use diary surveys based on samples from over 20 countries from the early 1960s to the 2000s. With additional six surveys from the 2006-2011 period, we use the largest and most up-to-date time diary evidence. Time diary methodology provides the most reliable and accurate information on daily time use patterns, especially if the duration of the activities are not institutionally controlled such as with childcare (Chenu and Lesnard 2006; Kelly et al. 2015). Unlike stylized survey questions where the respondents are required to remember the total amount of time spent on or frequency of an activity, diarists contemporaneously self-describe their 24 hours without being prompted about specific activities. The diary method therefore is less prone to recall error or social desirability response bias (Bianchi, Robinson and Milkie 2006; Gershuny 2000; Harvey 1993; Juster and Stafford 1985; Robinson and Godbey 1997; perhaps Man Yee 2008).

In order to use all the available information we included as many surveys as possible from the countries of interest in our analysis. Of the 8 surveys conducted in 1965 and coming from Szalai Multinational Comparative Time Budget Research Project, only two (Belgium and Germany) are nationally representative random sample surveys. In the six other cases (Bulgaria, Czechoslovakia, Hungary, Poland, USA and Yugoslavia) the sample is drawn from one or several small to middle-sized towns and is limited to households in which at least one member was employed in the non-agricultural sector (Fisher and Gershuny 2013). Therefore the figures from the 1960s data should be interpreted with caution.

The sample of the study is limited to married or cohabiting men and women aged between 19 and 50 years who live with one child under the age of 5 years in the household. Because the data does not provide information on the relationship between the child and the respondent, we use women and men living with a child in the same household as proxies for mothers and fathers. The sample is limited to parents of young children for theoretical and data-related reasons. First, as shown previously, time spent in primary childcare is especially high during the pre-school period when children are more dependent on adult care. Second, this is the period where parental time investment is particularly salient for children’s cognitive and social skill development. Third, having a child under the age of 5 is the most common cut-off point, which minimizes the problem of lack of comparability across surveys.

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4 Australia, Belgium, Bulgaria, Canada, Czechoslovakia, Denmark, Finland, France, Germany, Hungary, Israel, Italy, Netherlands, Norway, Poland, Spain, Sweden, United Kingdom, United States, Yugoslavia/Slovenia. More information on the data and data downloads are available at: http://www.timeuse.org

5 Our robustness tests show that all our findings which we will present in Section 3 are not driven by the diary methodology (e.g. number of diary days).
We focus on childcare as primary activity. This refers to the total minutes spent in all forms of childcare activities (e.g. changing diapers, reading to a child etc.) and reported as the main activity at a specified time on a given diary day. Limiting the focus on childcare to a primary activity ignores more passive forms of childcare; hence, it is likely to underestimate the total caregiving time (Budig and Folbre 2004; Folbre and Yoon 2007; Zick and Bryant 1996). However, MTUS does not have comparable data on secondary childcare activities. Furthermore, for the purpose of investigating trends in parental time investment, keeping the focus on primary care activities is preferable because primary childcare captures the total time during which the child is the main centre of attention and direct recipient of parents’ time investment.

In order to provide a summary measure of the inequality inherent in the distribution of parental time with children, we rely on the Gini coefficient (Gini, 1909): the coefficient ranges from 0 to 1, with 1 indicating the maximum degree of inequality and 0 denoting a situation in which there is no inequality. There are many equivalent definitions of the Gini coefficient (Yitzhaki, 1998): the most common one relates Gini to the Lorenz Curve. The Gini coefficient is the ratio of the area between the line of perfect equality and the Lorenz curve, over the area of the triangle below the line of perfect equality. The Gini coefficient is widely used as an indicator of inequality in income and wealth. We here adopt it to capture the extent and the evolution of inequality in time investment. Gimenez-Nadal and Sevilla-Sanz (2012) is the only study we are aware of in which information on summary moments of the entire distribution of time are provided, but the focus is on leisure rather than on parental time with children.

3. Results

We start by looking at the distribution of childcare time over years, pooling the information from the 20 countries we consider (see Figure 1). There is a clear rightward shift in the distribution of childcare time both for fathers and mothers over the five periods considered, indicating that the share of parents devoting a sizable amount of time to their children has increased. The distribution of childcare time for mothers in the 1980s and 1990s are very similar, whereas the pre-1980s and 2000s are noticeably different. As far as fathers are concerned, there is a sharp decline in non-participant fathers (e.g. fathers who have not reported any childcare activity at the time).

From the pre-1980 period to the 2000s average time in primary care by mothers has increased from 109 minutes, to 134, 150 and 165 minutes in each period respectively. The corresponding figures for fathers are 30, 45, 62 and 76 minutes.

Table 1 shows the Gini coefficient computed on the distribution of child care time, mean, median and standard deviation of childcare time by decade for all the countries with more than one data point. As shown in the table, with a single exception of French mothers, mean and median care time have increased substantially for both parents throughout the period. Six

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6 The Lorenz curve is a graphical device for a summary representation of a distribution. The graph of the Lorenz curve has the cumulative proportion of population on the horizontal axis and the cumulative proportion of the attribute (e.g. income, wealth or, in our case, time) on the vertical axis. Points on the Lorenz curve tell us, for instance, that the bottom 30% of the population has 20% of the attribute under exam. When all the units in the population have the same value of the attribute, the Lorenz curve is the 45 degree line and one refers to it as line of perfect equality.

7 Qualitatively, these results hold also if we pool only the data for the countries in which information is available for all the four periods – Canada, Finland, the Netherlands, UK, and US.
additional surveys from the most recent period (2006-2011) allowed us to split the 2000s into two and have a better picture of the trends in the last decade. Our findings are in line with the previous research in showing a substantial increase in parental care time in the US between the 1960s and early 2000s. In the most recent period (2006-2011), however, maternal care time seems to have plateaued, whereas fathers’ care showed a modest increase of five minutes. Canadian and Italian parents, on the other hand, continued to increase their childcare in the second half of the 2000s. In the case of Spain, we observe stability in maternal care but a large increase (25 minutes) in fathers’ care in the last decade.

When it comes to inequality, however, the patterns for mothers are always different from those of fathers in all the countries examined. First of all, inequality in childcare has always been higher among fathers than mothers (Figure 2). Second, inequality in care time among mothers is shown to be stable in the last five decades whereas, in the case of fathers, there has been a sharp decline. Finally, cross-national variation in Gini coefficient seems to be higher among fathers than mothers. Focusing on the last decade, Bulgaria, Slovenia and the US are the countries with the highest degree of inequality in childcare time as measured by the Gini coefficient. The UK is the country, which experienced the sharpest drop in the Gini coefficient for fathers in the observation period. When looking at the relationship between the Gini coefficient and the share of participants, we see that there is a very high negative correlation between the Gini coefficient and the percentage of people who report the activity (Figure A1 in the Appendix): as the number of participants in the activity increases, the Gini coefficient decreases, indicating that the pattern of inequality over time is partly driven by the change in the decision to devote time (extensive margin) rather than in the choice of how much time to devote to the activity (intensive margin).

Previous research shows a widening education-gap in childcare time (Altintas 2016; Sullivan 2010; Ramey and Ramey 2010), whereas our results in Figure 2 show a stable trend in overall inequality among mothers and a decrease in inequality among fathers. How can we reconcile these two findings? How is it possible that the across-group inequality in childcare time has increased, whereas overall inequality has not? To address this question, in Figures 3 and 4, we look at trends in inequality within education groups, distinguishing across college educated and non-college educated parents.

Focusing on the within-group inequality, first we note that inequality among college educated parents shows a stable trend in the last decades, whereas it seems to be on the rise for low-educated fathers, after having reached its minimum level in the 1990s. However, inequality among low-educated parents has always been higher than that among college-educated parents, and their share in overall population has declined. Combining these different trends, the outcome is the dynamics of overall inequality shown in Figure 2: the increase in across-group inequality and in the inequality among low-educated fathers is more than offset by the changes in the relative weight of college educated and non-college educated parents in the overall population, and by the lower level of inequality in the high-educated group.

We now turn to analyse the relationship between average time spent in childcare and inequality as measured by the Gini coefficient. We find that in countries where there is high inequality in care time, average time spent in childcare is also low (Figure 5). The negative correlation is especially strong for fathers. The evidence suggests that children living in

8 Early Hungarian data have no information on educational attainment and therefore Hungary is removed from the sample used to study trends by education.
9 Inequality in time investment in children is highest among low-educated American parents.
countries in which average time invested in child care is low face also a higher risk. In other words, receiving on average a low time investment is not compensated by lower risk of not receiving the investment. When we turn to consider the correlation between inequality in fathers’ and mothers’ care time (Figure 6), we find that there is a positive relationship between the two. In summary, the evidence suggests that children living in certain countries are more likely to be exposed to multiple risk factors.  

We finally investigate the relationship between inequality in child care time and other indicators of the quality of the early childhood environment. Our analysis provides novel evidence on the riskiness of home environments and we want to investigate how this relates to other potential measures of children opportunities. In Table 2 we report the Pearson correlation and the partial correlation between the Gini coefficient on childcare time for mothers and fathers and the Gini coefficient on disposable income, pooling data from OECD and LIS; GDP per capita in US dollar in purchasing power parity at constant 2010 prices; the poverty ratio, where the poverty line is set at 50% of median income; the mortality rate under 5; public expenditure on families as a share of GDP, and the enrolment ratio in pre-primary schooling. All the data are taken from the OECD, with the exception of the poverty rate for which the source is the World Bank, and the enrolment ratio in pre-primary education which comes from UNESCO. We find a positive and significant relation between the Gini index on childcare time and two of the income-related variables, i.e. the Gini index on disposable income and the poverty ratio. On the contrary, we find a negative and significant relationship between, on the one hand, the Gini index on child care time and, on the other hand, public expenditure on families and the enrolment ratio in pre-primary schooling. These correlations hold for both mothers and fathers, with the exception of the one with the enrolment ratio in pre-primary schooling which is not significant in the fathers’ sample. The results suggest that different indicators of poor and risky home environments reinforce each other.

4. Conclusions

Our analysis showed that inequality in paternal time investment in the last half-century has always been higher than that in maternal time investment, though the gap narrowed in the last decade. Inequality among low-educated parents is consistently higher than that of high-educated parents, and in the case of fathers the difference is increasing. Starting from the late 1990s, the Gini coefficient for low-educated fathers has been increasing, whereas the Gini for high-educated fathers has declined. This is indicative of further dispersion within the low-educated father group. There is a strong correlation between the Gini coefficients for mothers’ and fathers’ care time, increasing the risk of being exposed to low care time. The findings also point out to large cross-national differences, the US being the most unequal country in terms of time investment in children, especially in the most recent period.

Clearly, the extent to which inequality in childcare time is a concern depends also on the average time received by children and on the institutional structure and family policy context of the country. Our analysis shows that inequality in parental time investment should indeed be a concern because high levels of inequality in child care time as measured by the Gini coefficient are highly correlated with low average time received and low enrolment in pre-primary school, as well as low family policy expenditure. In the light of the corresponding evidence, the US stands out as a particularly risky environment to grow up, especially for

10 The correlation between fathers’ and mothers’ childcare time for 1965 Bulgarian data is very high and represents an outlier. For this reason we do not consider these data in Figure 6.
children born to low-educated parents. Although time spent in childcare by mothers and fathers in the most recent period is on a par with other countries, inequality in time investment in children is consistently higher in the last decade. Furthermore, the US is the only advanced country with no universal maternity leave or public childcare provision. Children born to low-educated parents in the US, therefore, are living in an environment where average childcare time is low, inequality is high and public insurance/ support is unavailable.

Our study has certain limitations, which can be addressed in future research. First of all, these results are for childcare as primary care activity only. This covers all types of care activities, where childcare is main activity. Yet, previous research shows that some developmental childcare activities (e.g. reading books to children) are more likely to be related with positive behavioural and cognitive outcomes than others (physical care). Many of the surveys used in this paper, however, do not have developmental care time as a specific activity category. With the future releases of MTUS it will be possible to investigate the distributional aspects of specific time investments. Second, the study is limited to maternal and paternal time investments only. We do not look directly at other types of time investment in children (e.g. other family members, time spent in childcare facilities etc), since we focus on the changes in parental time and capture external child care provision only by considering aggregate data on enrolment in pre-primary education. Looking more in detail to the role of other potential providers of care is an interesting future extension.

Finally, the analyses conducted in this section uncover merely descriptive trends or relationship, with no causal implications.

Despite these limitations, however, the study provides a more complete picture of child care time and how its distribution has evolved over time. It advances the literature by showing that well-documented increases in average time spent with children in the last couple of decades, conceal persistent and large inequalities. This is particularly concerning given that the inequality in time investment in children is observed during early childcare period, the most critical period for children’s social and cognitive skill development. Furthermore, our findings are likely to underestimate the extent of the problem, due to the exclusion of children living in single parent households from the analysis. The decline in paternal inequality in time investment in children in recent periods, for example, does not reflect the missing care time due to rising number of non-residential fathers, particularly in low-educated households. Persistent inequality in time investment in children in the developmentally critical period, along with rising income inequality and the absence of public support, creates a multiple risky environment for children in certain countries.

REFERENCES


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Figure 1. The distribution of childcare time by period

Mothers

Fathers
Figure 2. Gini coefficient for all parents with a child aged<5

Black labels with Times font indicate Gini for fathers
Grey labels with Arial font indicate Gini for mothers

LOESS curve for fathers
LOESS curve for mothers
Linear regression line for fathers
Linear regression line for mothers
Figure 3. Gini coefficient for mothers with a child aged <5, by education

Black labels with Times font indicate Gini for mothers with no college degree

Grey labels with Ariel font indicate Gini for mothers with college degree

LOESS curve for mothers with college degree
LOESS curve for mothers with no college degree
Figure 4. Gini coefficient for fathers with a child aged <5, by education

Grey labels with Ariel font indicate Gini for fathers with college degree.

Black labels with Times font indicate Gini for fathers with no college.

LOESS curve for fathers with college degree
LOESS curve for fathers with no college degree
Figure 5. Correlation between time spent and inequality in childcare

Mothers

Average minutes in childcare by mothers

Fathers

Average minutes in childcare fathers
Figure 6. Correlation between inequality in mothers' and fathers' childcare
Figure 1A. Correlation between non–participants (0 reporters) and gini

Mothers

Fathers