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Human capital investments in children – A comparative analysis of the role of parent-child shared time in selected countries

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Abstract

In this paper, we test the hypothesis of parent-child time as a form of human capital investment in children using a propensity score treatment effects approach that accounts for the possible endogenous nature of time use and human capital investment. We broaden the human capital investment notion and focus on shared time in eating, housework, leisure, and TV/video time. Furthermore, we investigate the extent to which the levels and composition of parent-child time varies across three countries: Finland, Germany, and the United States (as social democratic, conservative and liberal welfare regime). Our results reveal some cross-national differences in human capital investment and they provide mixed support for the hypothesis that non-care related parent-child time is human capital enriching. But our results also provide similarities across countries, indicating that family core functions may be common irrespective of welfare regimes.

JEL-Codes: D13, J24, C01

Keywords: Parent-child time, treatment effects, propensity score matching, Finland, Germany, USA

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1 Introduction

There is no doubt that both genes and living conditions affect children's development. Living conditions is a sum of many aspects where the family represents an important factor, especially in the younger ages. Furthermore, the society frames the living conditions for families; by the way the public infrastructure interacts with and supports families (Haveman and Wolfe 1995; Bowles et al. 2005).

Children are different in many ways and parents have different strategies for raising their kids. In general, parental involvement is comprised of three elements; interaction, availability, and responsibility (Lamb et al. 1987). A young child needs plenty of interaction and constant parental availability while an older child needs less interaction and parental availability since peers tend to become more important as children grow up. Children's upbringing calls for a long-range involvement of responsible parents. Parental interaction and availability can be measured as time spent with children while responsibility is less amenable to measurement.

Parental involvement can be seen as one form of investment in children's human capital. While an extensive literature documents the out-of-pocket investments that parents make (e.g., Lino, 2012), much less is known about their time-related investments. The few studies that link parental time to children's human capital development focus on parent-child time spent in specific activities such as shared leisure (e.g., cultural events, sporting activities), educational activities (e.g., helping with homework), and/or eating time. These studies document the positive relationship between the time parents share with children in non-care activities and developmental benefits within a single country (Buchel and Duncan 1998; Zick et al. 2001; Dubas and Gerris 2002; Crosnoe and Trinitapoli 2008). The literature suggests that when parents engage children in such activities they undertake important human capital investment.

Other scholars have undertaken comparative time use studies with the goal of assessing how different welfare regimes affect parents' time use, particularly child care time (Sayer et al. 2004; Sayer and Gornick, 2011; Craig 2005). Sayer and her colleagues find support for the hypothesis that public family policies influence both the level and relative contributions of mothers and fathers to child care time. Craig also finds that being a parent affects the workload differently across different countries.

Others have also interpreted pure child care as a measure of human capital investment (Bryant and Zick 1996; Chalasani 2007; Guryan, Hurst, and Kerney 2008). Time spent in child care comprises still a relatively narrow aspect of human capital investment in children. Hence, we want to broaden the human capital investment notion. We argue that there are a range of activities – beyond child care – that play a prominent role in parental human capital investments in children. These activities include time spent together eating, doing housework, engaging in leisure activities, and TV-watching.

In this paper, we focus on parental human capital investment by utilizing shared time with children. Furthermore, we choose Finland, Germany, and the USA to represent different types of welfare state regimes building on the work of Esping-Andersen (1999). We recognize that national welfare state regimes may be a function of citizens' preferences for human capital investment. But, modeling such endogeneity is beyond the scope of our investigation. Rather, we view our comparisons across the three countries to be descriptive only. Our more important contribution in this paper is our use of propensity score modeling that allows for endogeneity in time use choices and human capital to examine a broader range of human capital enriching activities within the family.

The paper is organized as follows. In section 2, we provide arguments for parental time use as human capital investment in their children and why such investments may vary between countries. An overview of the method used and its justifications is presented in section 3. In section 4, we describe the data sets, and in section 5, we lay out the results which are followed by a summary in section 6.

2 Human capital investment – Shared time with children

Human capital is a broad concept; and the formation of human capital is the sum of many different things. Each child inherits an initial human capital endowment from her/his parents. However, of crucial importance to a child's development are the subsequent investments that are made in her/his human capital. Parents play an important role in the formation; they invest among other things time, money, and emotional energy in their children.[1] Time spent together with children can be considered a comprehensive measure of parental input in human capital investment in children. We focus on four activities; eating, doing housework, leisure, and TV-watching.

Time spent eating is thought to be enriching if it is done with family members in part because of the nutritional and eating habits it can convey and because it provides parents with an opportunity to engage their child(ren) in conversation. Family members relate events of the day, plan and coordinate future activities, discuss their accomplishments and frustrations, etc. When family members eat together, they typically also eat a more balanced and nutritious meal (Neumark-Sztainer et al. 2003; Eizenberg et al. 2004; Traveras et al. 2005; Spear 2006).

Housework may be a form of human capital investment if the child is well supervised. The parent can teach the child specific tasks, the child learns cooperative behavior, and it fosters re-

[1] See Klevmarken (1999) for a discussion of the broad variety of direct and indirect human capital investments in children.

sponsibility. At the same time, the child also learns gender-specific behaviors and gains an awareness of the family's socioeconomic status (see Goodnow 1988 for an overview).

Leisure activities can also be a form of human capital investment. Play can promote positive development, including cognitive, linguistic, social and emotional development. Structured activities like sports, arts, music, hobbies, and organizations offer high challenge, concentration, and motivation (Larson 2001).

TV or video watching is not typically associated with positive developmental experiences for children. Unsupervised and for long hours, it is associated with among other things obesity, lower school grades and aggressive behavior (Larson 2001). But, if a parent watches TV together with a young child it may be a more positive activity.

Not only parents, but also the public sector acts as investor. Becker and Tomes (1986) argue that if parental and public investments are perfect substitutes, parental investments will be crowded out as public investments expand. If parental and public investments are not perfect substitutes, public investments might still affect parental behaviors. Regardless, the idea that parental and public investments are important inputs in their children's human capital is beyond dispute. The most directly observable form of public investment in children is education. However, the public sector also invests considerable resources in children through the choices that the politicians make about subsidies for health care, work-related child care, and other forms of family policies.

We assume that all parents want to insure that their children acquire some optimal level of human capital. Yet, countries with different welfare regimes are different in the way family life, the labor market, and the public sectors are organized. These differences may alter the decisions that parents make about the time they spend with their children in potentially human capital enhancing activities. Alternatively, cultures with strong preferences for human capital investment may develop governmental supports for such investment. While we recognize the possibility of such endogeneity, such modeling is beyond the scope of our data. Thus, we elect to draw attention to cross-country differences descriptively in the hopes of motivating future research that would formally model how government policies interact with parental investments in children's human capital.

To gain insights from the descriptive comparisons, it is important to provide information regarding the countries' political context. Social democratic governments generally provide the greatest resource supports to families and children, followed by conservative governments, and lastly by liberal governments (Esping-Andersen 1999). If welfare states are viewed as a predetermined characteristic of the family environment that potentially substitutes for parental human capital investments (i.e., if there is no endogeneity), then we would expect that parents in social democratic countries would spend the least time investing in their children, followed by parents in conservative countries, with parents in liberal countries spending the most time investing in their children. If the structure of welfare states is influenced by parental preferences for children's human capital investment, then we would expect to observe parental investments

to be the highest in countries with social democratic governments, followed by countries with conservative governments and lastly by countries with liberal governments.

With data from only three countries and the complex welfare regime background we cannot rigorously test any hypotheses regarding the influence of welfare regimes. Nevertheless, recognition of the potential roles that welfare regimes play guides our work by suggesting that estimation should be done separately for each country because of the possibility that differences in government support interact with other independent variables to affect parent-child time. It also provides us with a lens to interpret any cross-national differences that we observe. Thus, our estimation will be country specific and our discussion will compare and contrast the country-specific results and suggest how future research might rigorously test the welfare regime hypothesis.

Parental investments in their children likely vary by age. At very young ages, parents typically spend considerable time caring for children. As children grow up, the need for parental supervision and interaction wanes. Given the importance of parental involvement at early ages, we choose to focus on parental time spent with children under the age of 10.

3 Modeling human capital investment – A treatment effects approach

Ideally, our analyses would make use of longitudinal data where parental time spent with a child during the early years is linked to human capital-related child outcomes at a later point in time (e.g. linking parental time spent with a child during the early years to a child's ultimate educational attainment using a panel econometric approach), or alternatively make use of a natural experiment. Unfortunately, there are no such data sets currently available.[2] Thus, we must fall back on the use of cross-sectional time diary data. The use of cross-sectional data to investigate questions of time use and human capital investment raises issues about the possibility of endogeneity of parental choices about how they spend their time and whether or not their time should be shared with a child.[3]

Concern about the potential dependence between time allocation and the decision to share certain types of time with children would disappear if eligible respondents were randomly assigned to have a child present during specific activities. But, they are not. Rather, respondents self-select as to how much time they spend in certain activities and that self-selection may be related to whether or not a child is present. One approach to this self-selection issue would be to

[2] While some longitudinal data sets (e.g., the Panel Study of Income Dynamics) contain time diary information on parent-child time along with child outcome data, the window of observation for parent-child time is typically short. This, in turn, limits the researcher's ability to draw conclusions regarding causality from the empirical modelling.

[3] By restricting our analyses to those couples who have one or more children under age 10 in the home, we control for the possible endogeneity of fertility.

estimate a simultaneous system. This strategy is limited by the functional form that is chosen and by the reality that such methods may hide the fact that many in the "treated" sample have no counterfactual in the non-treated sample (i.e., there is a lack of common support) (Black and Smith 2004; Gibson-Davis and Foster 2006).

Rosenbaum and Rubin (1983; 1984) propose the use of the propensity score method which approaches the simultaneity problem by balancing a treatment group (i.e., parents participating in an activity with one or more children under age 10 present during the activity; the treatment thus is the presence of those children) with a control group (i.e., parents participating in the same activity with no children under age 10 present) with regard to their covariates. Essentially, the propensity score adjusts for the bias that may be caused by certain types of parents self-selecting into doing certain activities when children are present by creating matches between members of the treatment and control groups rather than through the random assignment that is used in true experiments (Angrist and Pischke 2009).

The propensity score approach relies on first estimating a logit type equation where the dependent variable is the presence or absence of a child under age 10 during an activity spell $D = (1, 0)$. The independent variables in the logit model, X, include factors that might affect whether or not the child is present as well as factors that might affect how much time is spent in the activity. The specification of the functional form and the independent variables can vary as the goal is simply to maximize the predictive capabilities of the model. However, we include content driven explanatory variables which in addition should minimize possible unobserved heterogeneity. From the logit estimates, the predicted probabilities of having a child present while participating in an activity are generated for all respondents. These predicted probabilities become the features on which treated parent-child spells are matched to control spells of parental time.

Next, a common support region is important and only those observations that fall within this region are further analyzed. The common support region is defined by the area of overlap in propensity scores for the treated and untreated groups. Within the common support area, members of the treatment group can be matched to members of the control group. A number of matching methods are used in the literature and these methods reflect the tradeoffs one must make between bias and variance when matching with small sample sizes (Gibson-Davis and Foster 2006; Caliendo and Kopeinig 2008). However, when sample sizes are large, the various matching approaches should produce similar results. Once the matching is complete, t-tests are conducted to ascertain if statistically significant differences exist between the treatment and the control groups with respect to spell length.[4]

[4] We also used a second method to compare the outcome of the treated and control groups, namely a linear regression specification with all of the observations in the common support area (Gibson-Davis and Foster, 2006). The dependent variable is the duration of the spell of the activity (Y). Independent variables in the regression are the respondent's propensity score (prob(X)) and a dummy variable indicating whether or not a child under the age of 10 was present during the activity: (D)

$$Y_i = \beta_0 + \beta_1 prob(X_i) + \beta_2 D_i + \varepsilon_i$$

In our application, if the length of the spell of each activity is dependent on the presence (absence) of a child after adjusting for the propensity score, this becomes a weak test of human capital investment. That is, such a result would be consistent with the hypothesis that parents will spend more time in an activity when a child is present because they are using some of that time to invest in the child's human capital (e.g., talking with the child while eating dinner, teaching a child how to cook while making dinner). It is a weak test because differences in spell length could also reflect differences in the current consumption value of engaging in an activity with or without a child. For example, meals may simply be more enjoyable for a parent when they are eaten with a child present and this leads the parent to devote more time to eating.

In using the propensity score approach, we are estimating the population average treatment effect on the treated (ATT). This is the causal effect of treatment only on that group and not the overall treatment effect. As mentioned, treatment (control) in this case is the presence (absence) of a child under age 10 during an activity spell, (D=(1,0), where 1=child present and 0=child not present). The outcome is the length of the spell in minutes $Y=(Y^1,Y^0)$. The causal effect of treatment is defined as $\Delta_{ATT}=Y^1-Y^0$. The mean of Δ_{ATT} is defined according to:

$$(1) \qquad \Delta_{ATT}=E(\Delta_{ATT}\mid D=1)=E(Y^1-Y^0\mid D=1)=E(Y^1\mid D=1)-E(Y^0\mid D=1).$$

However, as equation (1) is formulated, it cannot be estimated because we do not have both the treated and non-treated spell length for one person at the same time on the individual level. Hence the last term can be analyzed only based on averages.

To make the estimation tractable, and to meet the causal effects of a treatment by the propensity score method, three conditions must hold. First, once we control for observable covariates, X the potential outcome is independent of the treatment selection. This is known as the conditional independence assumption (CIA). This assumption allows the means of Δ_{ATT} to be estimated by using the observable untreated $E(Y^0\mid D=0,X=x)$ instead of the not observable untreated $E(Y^0\mid D=1,X=x)$ in equation (1). The conditional independence assumption (CIA) can be formalized according to:

$$(2) \qquad Y^0 \perp D\mid X\ .$$

In our case, this means that the presence of a child should be random after we control for X. We meet the CIA assumption by doing two things. First, we include in X both parental and child characteristics that have been found to be associated with time spent with children (Buchel and Duncan 1998; Zick et al. 2001; Dubas and Gerris 2002; Sayer et al. 2004; Craig 2005; Crosnoe and Trinitapoli 2008). We follow the specification of past research as closely as possible across all three analyses given the limits on the information available in each of the

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If the coefficient associated with the dummy variable (β_2) is statistically significant, then this is an indication that there are treatment effect differences. These results are close to the matching results, and to save space not shown here. However, the results are available upon request.

three time diary data sets we utilize.[5] Second, we focus on parental time-use activities that are done whether or not a child is present (i.e., eating, housework, leisure, watching television). It is arguable that often a child may be off playing with friends, at day care, at school or engaged in other activities away from the parent. This allows for the possibility that the child's presence during a specific activity may be somewhat random. To the extent that spells with children may be a function of structural factors, we include among our covariates measures of structural aspects of the spell characteristics including time of day, day of week, and season of the year. We assess whether or not these actions help us meet the CIA requirement by conducting t-tests to assess if the distributions of the X's are the same between the treated and untreated groups (Caliendo and Kopeinig 2008).

The second condition that must be met is the common support assumption. That is, the estimated probabilities of participation for the treatment group must overlap with the estimated probabilities of participation for the control group and the probabilities have to be positive, irrespective of the value of X (Imbens 2004; Smith and Todd 2005; Caliendo and Kopeinig 2008). To meet this condition, we drop treatment observations whose propensity score is higher than the maximum or less than the minimum of the controls. Once the common support region criterion has been satisfied, we use nearest neighbor matching with replacement to pair spells in the treated group (i.e., child present for the specified activity) with spells in the non-treated group (i.e., child not present for the specified activity). Our sample sizes are relatively large and thus nearest neighbor matching with replacement should produce unbiased results that are quite similar to other matching methods although the variance may be increased (Caliendo and Kopeinig 2008).[6] As such, this matching technique provides a conservative test.

The final condition that must be met in order to estimate the ATT is the stable unit treatment value assumption (SUTVA). SUTVA requires that the outcome of a unit depends on the own participation only and not on the treatment of the other units. Satisfying SUTVA would be a problem if we pooled mothers and fathers from the same family in our analyses. To avoid violating this assumption, we estimate propensity scores separately for mothers and fathers. This approach also insures perfect matching on gender (Heckman, Ichimura, Smith, and Todd 1998).

4 Data sets

We construct compatible time diary data sets for Finland, Germany, and the United States given the limitations that are inherent in each data set's design. Specifically, we restrict our samples to respondents with complete time diaries, who are between the ages of 20 to 60, who are married or cohabiting, and who have one or more minor children under the age 10 present in the home. We choose these three countries because they represent three different types of family

5 Some descriptive measures for the covariates included in X for the three countries are shown in Appendix.
6 Matching is done using the STATA psmatch2 procedure (Leuven and Sianesi, 2003).

policies that vary by welfare regimes. Again, Finland's family policies are consistent with the social democratic welfare approach, while Germany's policies reflect the conservative welfare approach and policies in the United States reflect a liberal welfare approach.

The *Finnish Time Use Survey* (FTUS) was conducted in 1999-2000 by Statistics Finland. The FTUS design follows EUROSTAT's Guidelines on Harmonised European Time Use Surveys (HETUS). The survey is a representative sample covering persons aged 10 and above. The data included 5,300 individuals from 2,600 households. Participants were asked a series of questions regarding their personal characteristics and one household member was asked about the household characteristics. Some information regarding their income was added to the survey from tax registers. All respondents were asked to fill in a time use diary based on 10-minute intervals for two days, one weekday and one weekend. For each 10-minute spell, respondents filled in their primary activity and what else they were doing at the same time. They were also asked to fill in with whom they spent their time, the location and mode of transportation. For this data set, the information on with whom respondents spent their time was not available for those respondents interviewed in January and February. Hence, observations from those two months are missing (Niemi and Pääkkönen 2001). Our present sample consists of 329 fathers and 363 mothers, observed for two days.

The *German Time Use Survey* (GTUS) of 2001/02 provided by the German Federal Statistical Office consists of about 5,400 households and approximately 37,700 diary days. The GTUS design also follows EUROSTAT's Guidelines on Harmonised European Time Use Surveys (HETUS). All household members aged 10 years and older were asked to fill out diaries based on 10-minute intervals on three days – two days during the week from Monday to Friday, one day on the weekend. Data were collected on primary and secondary activities, persons involved or present (children below 10 years old, partner, other household member, known other persons) for each single activity. Household and individual data (i.e., socio-demographic/economic variables and other background variables) were collected in additional questionnaires. A comprehensive *GTUS-Compass* about the broad range of GTUS 2001/02 information and its usage is provided by the German Federal Statistical Office (Ehling, Holz and Kahle 2001; Statistisches Bundesamt 2006). There are 890 fathers and 890 mothers, observed for three days, in the sample used for the current analysis.

The third time diary data set is the 2003 *American Time Use Survey* (ATUS). The 2003 ATUS is the first annual American time-diary survey conducted by the U.S. Bureau of Labor Statistics and thus the closest ATUS survey to the Finnish and German data. Each year a sample is drawn from those households that have completed the final interview for the Current Population Survey. The ATUS respondent is randomly selected from among each household's members who are age 15 or older. Respondents are asked a series of questions that focus on household composition, employment status, etc. They are also asked to complete one 24-hour time diary using retrospective recording methods. Half of the respondents complete a diary for a weekday and half of the respondents complete a diary for a weekend day. For each activity the respondent

reports doing over the 24 hours, s/he is also asked who else was present when doing the activity. For the current analyses our sample consists of 2,416 mothers and 2,136 fathers, who had no missing data on the "who with" question.

Both the FTUS and GTUS are part of the Harmonized European Time Use Survey, where activities are comparable by design. We use the ATUS survey coding lexicons to create comparable activity categories with the FTUS and GTUS. Although the FTUS and GTUS data sets contain information on both parents' time use, we have data on only one parent in the ATUS. Thus, we elect to analyze mothers and fathers separately so as to be consistent. However, we recognize we lose information on the Finnish and German parents by doing this. It should also be noted that although the three surveys were conducted in different years, their close proximity in time makes the possibility of observing period-specific differences small.

In all the time use surveys, one diary day consists of information on activities during a 24 hour period. We do not use all information on the performed activities; the activities of interest in our analyses are spells of eating, housework (where child care is not included), leisure (where television and video viewing is not included), and television and video viewing. These activities may be considered child care in the broadest sense (Klevmarken 1999) but they are not seen as traditional child care when coding the parent's time. Thus, for each type of activity we examine whether or not a child was present during a spell and how long the spell lasted.

Individuals in the surveys can have multiple spells of each activity during the 24-hour diary period and in two of the three surveys, each individual has more than one 24-hour diary. Thus, all analyses correct for the correlation of error terms caused by having multiple spells from the same individual included in the analyses. In addition, all descriptive information is weighted using the weights provided in each data set. The multivariate analyses are not weighted as these analyses control for those factors used to construct the sampling weights (DuMouchel and Duncan 1983).

5 Results – Human capital investments in children

We focus on primary time in eating, housework leisure, and TV time because we believe they are the most common non-care related activities that offer the potential for parents to engage in child-related human capital investment. As mentioned, life skills may be taught by a parent while doing housework with a child or engaging in active leisure (e.g., playing a sport) with a child. Likewise, parents may talk to a child about his/her day or about current events, etc. over a meal, or even while engaging in leisure activities. Admittedly, it is less likely that human capital investment occurs when a parent watches television or a video with a child. But, even television/video viewing may provide a parent with some "teachable moments".

In Table 1, mean daily times spent in the selected activities are presented for the samples in order to give some background to our analyses.

On average, German parents spend the most time in eating while the parents in the United States spend the least time in eating. Mothers clearly spend more time in housework than fathers in all three countries, and German parents are the most diligent in devoting time to housework. Parents in the United States spend the least time in housework, and Finnish parents are in between. Parents in the United States spend less than two hours per day on average in leisure activities, while parents in Finland and Germany spend around two and a half hours per day. At the same time, parents in the United States generally spend somewhat more time watching TV than their counterparts in Finland and Germany. Though the overall picture across the three countries is heterogeneous, differences with regard to the amount of activity time can be recorded.[7]

Table 1
Weighted mean daily duration (in minutes) in selected activities in Finland, Germany and the United States

	Finland		Germany		United States	
Activity	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
Eating	78	78	96	106	58	59
Eating with children < 10	36	50	61	78	39	46
Housework	114	218	161	283	93	179
Housework with children < 10	40	112	36	96	28	76
Leisure	152	145	165	166	99	95
Leisure with children < 10	55	71	54	68	48	54
TV	110	92	104	82	123	104
TV with children < 10	38	45	15	15	54	55
N diary days	623	695	2666	2668	2256	2583
N observations	329	363	890	890	2256	2583

Source: FTUS 1999-2000. GTUS 2001/02, ATUS 2003, own calculation.

When it comes to shared time, German parents also spend the most time eating with children under 10 years old on average, while they share relatively smaller amounts of TV viewing time. Parents in the United States, share more TV watching and generally share less eating and less housework time than their counterparts in Finland and German. Finnish parents on the other

[7] All mentioned differences are statistically significant, except that the fathers in the United States watch more TV than the fathers in Finland but the difference is not statistically significant. The t-tests are available upon request.

hand, share housework for longer periods with children under 10 years old on average than other parents but their shared time spent eating with children is shorter.[8]

Times spent in the four selected activities are not spent consecutively; rather they are spent in several spells over the course of the day. Table 2 shows the mean times for spells in the four different activities by whether or not a child less than age 10 was present.

Table 2 also provides an opportunity to compare and contrast the estimates across the three countries. Focus on the rows that report spells spent with one or more children under age 10. These rows reveal that shared parent-child spells for eating, housework, leisure, and TV viewing are all longest for mothers and fathers in the United States, and the differences are statistically significant. German parents' average spell length for eating and leisure time is in the middle and Finnish parents' average spell lengths are the shortest. Spell length for housework and TV watching are not statistically different between Finnish and German parents.[9] However, if parental time spent in these four activities involves some human capital investment on the part of their children, then these differences hint that government policies may be associated with cross-national differences in parental human capital investment.

Comparing the spells with children present to the spells without children present reported in Table 2, we observe that spell length for the four activities in question is generally shorter for Finnish mothers and fathers when one or more children under age 10 is present compared to when no children are present, the only non significant difference is eating time. In contrast, in Germany, the eating and leisure spells for mothers and fathers are longer when children are present relative to when they are not present, and the opposite holds for housework and TV watching. Finally, in the United States, the spells are relatively longer when one or more children under age 10 are present, with the exception of housework for fathers where the difference is not significantly different.[10] This pattern across countries is again consistent with the argument that government supports may substitute for some parental human capital investments in social democrat countries like Finland.

To more confidently assess whether or not shared parent-child time in non-care activities involves human capital investment, we must move beyond the bivariate comparisons in Table 2 for two reasons. First, the observed bivariate relationships could be spurious if family socio-demographic characteristics also play a role in parent-child shared time. Second, parents may self-select into shared versus non-shared time use spells. To address these two potential shortcomings, we contrast the above findings with the results obtained using a treatment effects approach by propensity score methods where similar parents are matched and their time use is compared.

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8 All mentioned differences are statistically significant, except the difference between fathers' housework time in Finland and Germany are not statistically significant. Furthermore, fathers in Finland and the United States spend equally long amount of time eating with their children. The t-tests are available upon request.

9 The t-tests are available upon request.

10 The t-tests are available upon request.

Table 2
Weighted mean times for spells spent in various activities by presence/absence of one or more children under age 10

	Finland						Germany						United States					
	Fathers			Mothers			Fathers			Mothers			Fathers			Mothers		
	Mean	N Spells	N Resp.[a]	Mean	N Spells	N Resp.[a]	Mean	N Spells	N Resp.	Mean	N Spells	N Resp.[a]	Mean	N Spells	N Resp.[a]	Mean	N Spells	N Resp.[a]
All Spells																		
Eating	22.85	2173	326	21.13	2574	363	31.32	8203	890	30.53	9333	890	32.98	3787	2000	33.41	4557	2355
Housework	31.63	2364	310	29.58	5105	363	31.15	13721	888	31.94	23791	890	49.50	3898	1521	38.00	10950	2374
Leisure	45.26	2200	320	37.00	2819	361	50.95	8665	887	44.81	10010	888	69.11	3071	1519	61.65	4010	1833
TV	53.32	1393	302	43.44	1474	334	73.93	3748	823	64.04	3335	807	98.88	2914	1702	77.86	3365	1885
Spells with Children < 10																		
Eating	23.70	1037	280	21.33	1677	340	33.77	4838	870	31.71	6611	882	35.89	2497	1613	34.39	3581	2100
Housework	28.69	923	233	28.02	2777	341	29.06	3211	737	29.12	8322	867	50.31	1237	752	40.09	4493	1780
Leisure	42.10	911	253	34.55	1501	323	56.16	2595	760	47.64	3603	816	84.93	1418	905	73.05	2099	1259
TV	44.12	602	217	39.22	793	272	42.98	910	467	42.54	903	450	104.24	1303	955	82.26	1728	1176
Spells without Children < 10																		
Eating	22.15	1136	304	20.77	897	297	27.86	3365	835	27.71	2722	767	28.68	1290	963	30.41	976	771
Housework	33.49	1441	290	31.44	2328	338	31.82	10510	886	33.62	15469	890	49.17	2661	1264	36.55	6457	1985
Leisure	47.30	1289	298	39.74	1318	316	49.14	6070	879	43.02	6407	872	58.18	1653	1006	50.62	1911	1167
TV	59.84	791	274	48.43	681	273	83.91	2838	807	72.29	2432	783	94.88	1611	1164	73.21	1637	1215

[a] Respondents

Source: FTUS 1999-2000. GTUS 2001/02, ATUS 2003, own calculation.

In Table 3, the results for a nearest neighbor matching propensity scores are presented.[11] With regard to the matching quality, the common support assumption is met as there is a broad overlapping score region for all activities in each country.[12] There are generally more treated relative to the untreated respondents when the probability of time shared with a child is higher which is in some favor of our maintained hypothesis. We also test the resemblance of the covariates in the treated and control groups in all activities. After matching, the respective means of the covariates for each country are very close which empirically supports the CIA. The significant bias reduction of the matched covariates and the valid null hypotheses of no differences of the matched covariate means of the treated and the control group supports the argument of a successful matching procedure with important and central explanatory variables by the selection on observables in the logit estimates behind.[13]

Turning to the propensity score results presented in Table 3, focus first on **eating** time. As our results in Table 3 suggest, fathers in all three countries spend significantly more time in eating spells if a child less than 10 years old is present. The largest increases in shared eating time are for fathers in the U.S. followed by German fathers and then by fathers in Finland. The results for mothers are more mixed with only German mothers spending significantly more time. The rank ordering for the fathers are consistent with the notion that government policies may also play a role.

Considering **housework**, Table 3 reveals that Finnish and German mothers and fathers, along with American fathers, all spend less time in housework if one or more children under age 10 are present (although the estimates for Finnish mothers, German fathers, and American fathers do not reach conventional levels of statistical significance). Only American mothers spend more time in housework spells when a young child is present, suggesting that they may view such time to be human capital enriching.

It is important to note that we cannot tell from these data whether or not the children are helping with the chores. We only know that they are present. Thus, a number of stories are consistent with our findings. It may be that children in Finland and Germany are more helpful in doing the chores (allowing their parents to finish more quickly), while the presence of children in the United States dampen their mothers' housework productivity. Alternatively, it may be that mothers in the United States are simultaneously teaching their children how to do the tasks which may decrease their productivity in the short run but enhance their children's human capital in the long run. In any case, the marginal differences in spell length are small. More confident conclusions regarding these cross-country differences can only be ascertained with data

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11 The means for the covariates are presented in the Appendix Tables 5-6. Marginal effects for the logistic regressions are available upon request.

12 The common support graphs are available upon request.

13 The results of the t-tests for the differences in the covariates before and after matching are presented in the Appendix Tables 5-6 showing that there are no differences of the matched logit covariate means of the treated and the control group.

(either qualitative or quantitative) that examines not only the time inputs but also the household production outputs.

The coefficients for **leisure** time are negative for Finnish parents, however only statistically significant for mothers (-7 minutes). On the other hand, both German and American mothers and fathers spend significantly more time in leisure activities if one or more children under age 10 are present. The sizes of the estimated time differences are larger for the American parents. Again, the differences we observe across the three countries suggest that government policies may play a role in the decisions parents make about children's human capital investment as reflected by shared parent-child time.

Table 3
Average treatment effect on the treated (ATT) – Difference in time use (in minutes) by presence/absence of a child under age 10 using nearest neighbor matching (standard error in parentheses)[a]

		Finland		Germany		United States	
		Difference	N[b]	Difference	N[b]	Difference	N[b]
Fathers	Eating	2.70	2158	4.17	8202	5.18	3781
		(1.07) **		(0.91) ***		(1.65) ***	
	Housework	-8.85	2362	-1.82	13721	-4.93	3896
		(-3.45) ***		(1.22)		(4.05)	
	Leisure (no TV)	-1.56	2198	5.34	8662	20.56	3071
		(3.84)		(2.38) **		(4.09) ***	
	Television	-10.54	1389	-38.82	3694	11.29	2903
		(3.15) ***		(3.34) ***		(5.05) **	
Mothers	Eating	0.82	2558	2.10	9332	0.40	4534
		(1.14)		(0.94) **		(1.82)	
	Housework	-0.69	5105	-3.37	23791	2.54	10949
		(1.86)		(0.99) ***		(1.45) *	
	Leisure (no TV)	-6.79	2817	7.30	10008	18.18	4006
		(2.82) **		(1.73) ***		(3.63) ***	
	Television	-7.40	1473	-25.41	3317	4.62	3362
		(2.58) ***		(2.64) ***		(4.62)	

***p<.01 **p<.05 *p<.10

[a]Standard errors are obtained using bootstrapping methods, where the estimates are replicated 100 times and correct for the clustering of multiple observations from the same individual.

[b]The reported sample size for each analysis is based on the number of person-spells within the common support region. The actual degrees of freedom in each analysis are much smaller as the t-tests correct for the clustering of multiple observations from the same individual.

Source: FTUS 1999-2000. GTUS 2001/02, ATUS 2003, unweighted, own calculation.

The results for **TV-watching**, show that both Finnish and German parents spend significantly less time watching TV if a child less than 10 years old is present, and the magnitude of these differences is fairly large (Finns 7-11 minutes and Germans 25-39 minutes less time). In con-

trast, parents in the United States watch 5-11 minutes more TV if a child is present (although the estimate for mothers not significant). The negative estimates associated with shared television viewing time in Finland and Germany are consistent with the general view that television/video viewing does not promote positive developmental outcomes. In the case of the American parents, the positive difference might be interpreted as a human capital investment if the program they watch with their children is educational or generates parent-child discussion. But, more likely, the change in signs simply reflects American adults' greater relative preference for television viewing over other leisure activities.

6 Summary and conclusions

In this study we assess if non-care related parent-child time has an element of human capital investment associated with it by utilizing data from three different countries. We analyse non-care related human capital investment time by focusing on the time parents share with their children in four potentially enriching time use categories: eating, housework, leisure (excluding TV), and television/video viewing. In the multivariate analyses we control for other possible confounding socio-demographic factors and we adjust for possible endogeneity using propensity score treatment effect techniques. We compare the impacts on time spent in selected activities for treatment (child present) and non-treatment groups (child not present) by nearest neighbor matching. In both the descriptive and the multivariate analyses, we find evidence of human capital investment as it relates to parent-child shared time.

Our results provide mixed support for the hypothesis that non-care related parent-child time is human capital enriching. The strongest support is found in the case of leisure time (both parents in Germany and the U.S.) and eating time (fathers only in all three countries). For these two categories we see that the presence of children is typically associated with longer spells and this result is consistent with the human capital investment hypothesis. Our results for housework and television/video viewing time provide no support for the human capital enrichment argument. In the case of television/video viewing time, the result is not surprising. The absence of support for shared housework as human capital enriching may reflect the more general trend away from investing in domestic skills. In recent years, advances in household technology and the growing availability of paid housekeepers have increasingly substituted for family members' housework time in many countries thus reducing the need for individual family members to possess high levels of household production related human capital. Furthermore, the children in this study are under 10 years old, and their young ages may sometimes lead them to be excluded from housework responsibilities.

Do parents and governments serve as substitutes with respect to children's human capital investment? The current analyses cannot provide a definitive answer. We find some differences, but also similarities across the three countries. Similarities across countries indicate that family core functions are common irrespective of different welfare regimes. But, future research needs

to disentangle the direction of causality with respect to welfare regime effects. Finally, we interpret the positive differences in shared eating and leisure activities to be an indication of parental investment in children's human capital. Another interpretation of these findings would be that parents simply place a higher value on the consumption aspects of shared time spent eating and engaging in leisure. Clearly, a more definitive test of parental investment in children's human capital would involve linking such time to specific child outcome measures. As with assessing the impact of various family policies, more definitive tests await new data sets that contain detailed information on parental inputs, societal inputs, *and* child outcomes.

Appendix

Table 4
Means for covariates

	Finland		Germany		United States	
Variables	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
Age	36.76	34.6	39.14	36.43	38.07	35.94
Proportion female children in the home	n.a.	n.a.	n.a.	n.a.	0.49	0.5
Number of children ≤ age 5 (US) ≤ 6 (FI)	1.09	1.08	n.a.	n.a.	0.91	0.89
Number of children age 6-17 (US) 7-17 (FI)	0.98	1.03	n.a.	n.a.	1.23	1.24
Number of children in household age 0-17	---	---	2.11	2.11	---	---
Employed (1=yes)	0.9	0.64	0.94	0.64	0.91	0.60
Weekend diary (1=yes)	0.5	0.5	0.35	0.35	0.53	0.49
Fall diary (1=yes)	0.31	0.32	0.25	0.25	0.24	0.24
Spring diary (1=yes)	0.33	0.32	0.29	0.29	0.25	0.25
Winter diary (1=yes)	0.07	0.08	0.23	0.23	0.25	0.25
Years of schooling	---	---	---	---	14.56	14.45
Elementary schooling (9 years) (1=yes)	---	---	0.25	0.13	---	---
Intermediate schooling (10 years (DE) 12 (FI)) (1=yes)	0.46	0.46	0.3	0.44	---	---
Supper schooling (13 years) (1=yes)	---	---	0.44	0.42	---	---
University diploma (DE) University degree (FI) (1=yes)	0.34	0.39	0.19	0.11	---	---
Hispanic (1=yes)	---	---	---	---	0.13	0.14
Asian (1=yes)	---	---	---	---	0.04	0.03
Black (1=yes)	---	---	---	---	0.06	0.04
Other race/Ethnicity (1=yes)	---	---	---	---	0.01	0.01
German (1=yes)	---	---	0.98	0.98	---	---
East Germany (1=yes)	---	---	0.12	0.12	---	---
Cohabiting (1=yes)	---	---	---	---	0.05	0.05
Married (1=yes)	0.78	0.78	0.95	0.95	---	---
Spell occurred 12am-6am (1=yes)	0.03	0.02	0.04	0.01	0.04	0.02
Spell occurred 6am-12pm (1=yes)	0.25	0.27	0.28	0.31	0.28	0.29
Spell occurred 12pm-6pm (1=yes)	0.37	0.38	0.32	0.37	0.37	0.4
Number of respondents	329	363	890	890	2256	2583
Total number of spells	10070	14045	42869	56396	22805	34998

NOTE: Omitted category for schooling in Finland is Compulsory Schooling, in Germany No Schooling. Omitted category for race/ethnicity is White/Non-Hispanic in the United States. Omitted category for spell time is 6pm-12am, and omitted category for season is diary was in spring in all countries.

Source: FTUS 1999-2000. GTUS 2001/02, ATUS 2003, not weighted data, own calculation.

Table 5
Matching results: P-values of T-tests for the differences in the covariates after matching; mothers in Finland, Germany, USA

Independent variables	Eating			Housework			Leisure			Television		
	Finland	Germany	USA	Finland	Germany	USA	Finland	Germany	USA	Finland	Germany	USA
Age	0.499	0.663	0.979	0.945	0.789	0.330	0.581	0.500	0.838	0.315	0.653	0.774
Age squared	0.405	0.795	-	0.892	0.809	-	0.505	0.467	-	0.350	0.608	-
Number of children age 0-17	-	0.937	-	-	0.540	-	-	0.904	-	-	0.269	-
Proportion female children in the home	-	-	0.392	-	-	0.369	-	-	0.056	-	-	0.902
Number of children age 0-6	0.149	-	-	0.958	-	-	0.663	-	-	0.097	-	-
Number of children age 7-17	0.476	-	-	0.708	-	-	0.798	-	-	0.043	-	-
Number of children < age 6	-	-	0.033	-	-	0.484	-	-	0.438	-	-	0.550
Number of children age 7-17	-	-	0.339	-	-	0.118	-	-	0.523	-	-	0.489
Employed	0.101	0.022	0.414	0.466	0.119	0.421	0.020	0.774	0.950	0.920	0.086	0.946
Weekend diary	0.702	0.306	0.374	0.707	0.753	0.321	0.883	0.062	0.949	0.616	0.634	0.411
Fall diary	0.010	0.305	0.889	0.040	0.757	0.013	0.008	0.589	0.021	0.625	0.419	0.248
Spring diary	0.547	0.089	0.805	0.749	0.391	0.349	0.085	0.756	0.465	0.027	0.414	0.385
Winter diary	0.394	0.279	0.451	0.768	0.185	0.016	0.487	0.140	0.347	0.001	0.755	0.173
Years of schooling	-	-	0.215	-	-	0.993	-	-	0.068	-	-	0.708
Elementary schooling (9 years)	-	0.479	-	-	0.479	-	-	0.883	-	-	0.646	-
Intermediate schooling (10 years (DE) 12 (FI))	0.444	0.958	-	0.830	0.742	-	0.535	0.635	-	0.840	0.571	-
Supper schooling (13 years)	0.181	0.370	-	0.532	0.827	-	0.941	0.585	-	0.324	0.467	-
University diploma (DE) / degree (FI)	-	0.146	-	-	0.828	-	-	0.473	-	-	0.636	-

Table 5 Cont.
Matching results: P-values of T-tests for the differences in the covariates after matching; mothers in Finland, Germany, USA

Independent variables	Eating			Housework			Leisure			Television		
	Finland	Germany	USA	Finland	Germany	USA	Finland	Germany	USA	Finland	Germany	USA
Hispanic	-	-	0.429	-	-	0.663	-	-	0.351	-	-	0.138
Asian	-	-	0.668	-	-	0.687	-	-	0.007	-	-	0.569
Black	-	-	1.000	-	-	0.005	-	-	0.528	-	-	0.324
Other Race/Ethnicity	-	-	0.734	-	-	0.026	-	-	0.036	-	-	0.653
Cohabitating	-	-	0.578	-	-	0.497	-	-	0.400	-	-	0.418
Spell Occurred 12am-6am	1.000	1.000	0.818	0.796	1.000	1.000	0.722	1.000	0.827	1.000	-	0.808
Spell Occurred 6am-12pm	0.136	0.175	0.000	0.931	0.415	0.006	0.036	0.011	0.029	0.023	0.928	0.572
Spell Occurred 12pm-6pm	0.832	0.229	0.016	0.311	0.394	0.225	0.606	0.321	0.599	0.750	0.911	0.510
Married	0.105	0.004	-	0.188	0.051	-	0.031	0.957	-	0.674	0.918	-
German	-	0.014	-	-	0.956	-	-	0.009	-	-	0.070	-
East Germany	-	0.097	-	-	0.287	-	-	0.044	-	-	0.565	-

Ho: no differences of the matched logit covariate means of the treated and the control group.
Source: FTUS 1999-2000. GTUS 2001/02, ATUS 2003, not weighted data, own calculation.

Table 6
Matching results: P-values of T-tests for the differences in the covariates after matching; fathers in Finland, Germany, USA

Independent Variables	Eating			Housework			Leisure			Television		
	Finland	Germany	USA	Finland	Germany	USA	Finland	Germany	USA	Finland	Germany	USA
Age	0.798	0.192	0.969	0.086	0.969	0.896	0.494	0.566	0.992	0.513	0.555	0.582
Age squared	0.827	0.274	-	0.138	0.982	-	0.461	0.485	-	0.614	0.572	-
Number of children age 0-17	-	0.716	-	-	0.920	-	-	0.611	-	-	0.892	-
Proportion female children in the home	-	-	0.918	-	-	0.049	-	-	0.659	-	-	0.824
Number of children age 0-6	0.817	-	-	0.206	-	-	0.522	-	-	0.490	-	-
Number of children age 7-17	0.717	-	-	0.833	-	-	0.580	-	-	0.662	-	-
Number of Children < age 6	-	-	0.005	-	-	0.643	-	-	0.894	-	-	0.825
Number of children age 7-17	-	-	0.151	-	-	0.986	-	-	0.505	-	-	0.577
Employed	0.533	0.030	0.767	0.093	0.526	0.838	0.222	0.878	0.207	0.621	1.000	0.427
Weekend diary	0.195	0.555	0.053	0.962	0.500	0.386	0.467	0.636	0.290	0.766	0.925	0.105
Fall diary	0.962	0.109	0.645	0.758	0.433	1.000	0.518	0.602	0.301	0.853	0.403	0.403
Spring diary	0.117	0.789	0.766	0.439	0.829	0.240	0.378	0.645	0.050	0.802	0.324	0.344
Winter diary	0.683	0.275	0.081	0.424	0.294	0.708	0.933	0.332	0.186	0.357	0.520	0.005
Years of schooling	-	-	0.345	-	-	0.727	-	-	0.004	-	-	0.974
Elementary schooling (9 years)	-	0.320	-	-	0.906	-	-	0.741	-	-	0.686	-
Intermediate schooling (10 years (DE) 12 (FI))	0.505	0.806	-	0.632	0.658	-	0.739	0.759	-	0.907	0.917	-
Supper schooling (13 years)	0.715	0.415	-	0.575	0.881	-	0.236	0.676	-	0.542	0.495	-
University diploma (DE) / degree (FI)	-	0.225	-	-	0.502	-	-	0.678	-	-	0.567	-

Table 6 Cont.
Matching results: P-values of T-tests for the differences in the covariates after matching; fathers in Finland, Germany, USA

Independent Variables	Eating			Housework			Leisure			Television		
	Finland	Germany	USA	Finland	Germany	USA	Finland	Germany	USA	Finland	Germany	USA
Hispanic	-	-	0.215	-	-	0.947	-	-	0.377	-	-	0.765
Asian	-	-	0.240	-	-	0.496	-	-	0.668	-	-	1.000
Black	-	-	0.017	-	-	0.717	-	-	0.854	-	-	0.699
Other race/ethnicity	-	-	0.886	-	-	0.547	-	-	0.237	-	-	0.694
Cohabitating	-	-	0.763	-	-	0.918	-	-	0.389	-	-	0.654
Spell occurred 12am-6am	1.000	1.000	0.834	0.705	1.000	0.713	0.561	1.000	1.000	1.000	-	1.000
Spell occurred 6am-12pm	0.091	0.209	0.532	0.753	0.938	0.801	0.305	0.085	0.719	0.145	0.179	0.959
Spell occurred 12pm-6pm	0.349	0.736	0.593	0.260	0.876	0.186	0.886	0.359	0.139	0.049	0.457	0.661
Married	1.000	0.928	-	0.910	0.951	-	0.148	0.743	-	0.744	0.844	-
German	-	0.305	-	-	0.553	-	-	0.619	-	-	0.189	-
East Germany	-	0.231	-	-	0.736	-	-	0.089	-	-	0.733	-

Ho: no differences of the matched logit covariate means of the treated and the co control group.
Source: FTUS 1999-2000. GTUS 2001/02, ATUS 2003, not weighted data, own calculation.

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