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Determinants of Father-Child Time and Family Labor Allocation

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Abstract

Developmentally, the more a father positively and intentionally engages in a child's life the healthier its socialization process will be. Not only quality but also quantity of time invested is important for modeling behavior, communicating skills and values toward a child's development. However a variety of factors impact such investment. This research investigates contributors within a household affecting paternal interactive investments in children and reflects on why these may be important from social and labor market perspectives. Using a U.S. national data set it explores relationships among father-child time allocation, intergenerational paternal effects differentiated by cause of father absence, maternal and paternal labor allocation, and child gender effects. Alternative measures of household economic production (poverty line multiple, income efficiency, and total income) model the fruitfulness of alternative measures specifically beyond the limits of the widely used total income variable. This paper also provides a significant contribution highlighting the dosed impact of child gender on work hours not only paternally but even more strikingly maternally, gender concordant for each, with implications for parental time investment for child development and labor market.

Keywords: Paternal-child time allocation, household income modelling, household labor gender effects, labor market

Determinants of Father-Child Time Allocation

Economic, social and biological contexts shape the lives of fathers and children as well as popular and scholarly conceptions of family life. These contexts include biological sex and social gender, parental roles within social, and material and temporal economies of the household. On the policy front attention to fathers has emerged less from effective fathering than in the breach. American communities are voicing concerns over lived experience and statistics indicating that paternal absence often leads to social-developmental and economic poverty for children, obliquely registered also in the expression 'the feminization of poverty'.

An economic modelling approach has shown itself to be fruitful in analyzing household factors impacting child development. While some children excel despite the challenges of paternal absence, it has become clear that insufficient paternal time investment contributes to negative behavioral outcomes in children, notwithstanding exceptional efforts in parenting by mothers (Goncy and van Dulman, 2010) or by parental proxies. On the other hand there is evidence that children close to their fathers exhibit higher self esteem, better performance at school, less delinquency, fewer depressive symptoms, less violence, and less substance abuse (Booth, Scott and King, 2010).

Increased paternal involvement has expanded in variety beyond economic contributions over the past three decades, mediating reductions in negative adolescent behavior across diverse family structures for children of either sex (Carlson, 2006). Contrary to popular belief, total parental time investments in children actually increased over the latter third of the 20th Century from 1965-1998 (Sayer, Bianchi and Robinson, 2004). Maternal to paternal time proportions decreased from 4.9 : 1 to 1.9 : 1 over the same period while playing and teaching activities remained closest to parity throughout. This indicates an increase in paternal investment as a proportion of total time with children.

While much attention has been paid to the impact of absent fathers on sons, the timing of father absence for daughters also evidences a robust dose-response relationship in the United States concerning early sexual activity, adolescent pregnancy and suicide attempts after controlling for familial and ecological stressors highlighted in life-course adversity models (Ellis et al., 2003). There is also evidence of children self-censoring their desire for more interactive time with their father, subordinating their own felt needs to their perception of parental priorities or perceived external demands (Polatnick, 2002). Although many studies note negative behavioral impacts from insufficient paternal-child time allocation (New York Psychiatric Institute, 2007), much less has been done to investigate specific paternal time allocation determinants ecologically (*οἶκος*, household). We next explore existing literature while the third section presents models, data and empirical results.

Background and Related Literature

Economic researchers frame parental allocations for children as an investment. Marginal propensities to invest in one's children involve at least two types of human capital: monetary and temporal. In maximizing utility subject to a budget constraint parents must trade-off between their own consumption and investment in their children. This includes the cost of time allocated - the marginal utility of children's benefits, multiplied by the return on that investment. The magnitude of investment will be positively related to the rate of return, time allocation and other factors (Becker & Tomes, 1986). As children grow the rewards will depend on that investment (Goldberger, 1989).

Becker and Tomes hypothesize that an exogenous increase in non-parental supports for children will, other things being equal, draw parents to substitute away from investment in children and towards their own consumption (Becker & Tomes, 1986). Factors that could lead to

an exogenous increase in children's potential benefits include intergenerational traits or environmental endowments, government programs involving cash transfers or educational subsidies. The direct partial effects of endowments and government expenditures on parental levels of investment in children are negative (Menchik, 1979).

A major paternal responsibility in the household production function comprises time allocation for children. Not surprisingly, the failure of men to assume more responsibility in the home has long been suggested as a reason that career-minded women delay marriage and childbearing (Willis, 1987).

Household production models conceive the family in part as a productive organization in which nonmarket commodities are produced with purchased goods and time of household members (Willis, 1987). People in every society treat time as a household resource with trade-offs among alternative pursuits such as working, resting, sleeping, praying, playing, fighting, or making love. Western industrial society semantically commodifies time such that it can be "saved", "spent", "wasted", "bought", "sold", "divided", "shared" or "used up". Such expressions are characteristic of a system in which "time is money" (Gross, 1984). When a parent does one activity he or she is restricted as to what can be done simultaneously (opportunity cost): parental time allocation is costly.

However time allocation for children is not solely a cost: Parents may arrange time with their children in a certain way just like they provide clothing of a certain style - because they enjoy seeing their children dressed in that style. Should one consider the cost of clothing - or of time - as a compulsory child-rearing cost or as a part of parental discretionary spending? When part of the cost of raising children is subject to parental choice, the concept of net benefits received from parental time allocation becomes more challenging. How might one deal with

differences in the quality of life that parents voluntarily inject into or derive from their child rearing?

Dennis De Tray suggests an interesting solution: divide expenditures for children into maintenance and discretionary expenditures. This is much more easily said than done, but it suggests the following line of argument. Maintenance costs, almost by definition, vary much less with income and socioeconomic status than do discretionary expenditures. If this is the case, variations in the net economic value of children derive mainly from variations in discretionary investments and returns and not from variations in the exogenous costs of child maintenance (De Tray, 1983). In this families are seen as maximizing utility across the functional arguments of quantity and quality of children along with other goods, subject to budget and time constraints. Where parents choose allocations of resources including time to maximize total or average achievement by their children (Hanushek, 1992), a trade-off between child quality and number follows from parental resources being spread thinner with more children, although at a certain point older children may assume certain care duties toward younger children and impart other, often mutual, sibling benefits.

Bonke and Esping-Anderson (2007) indicate more advanced parental education as being positively related to a preference for more intensive investment ratios in children (the same or more investment in fewer children) with shifts from non-developmental to developmental parenting time while educational parity between couples leading toward parity in marginal substitution of tasks. Additionally, the social constitution of a child is significantly influenced by the quality of parental behavior in domains such as empathy, reasoning and values communication. (Booth, Scott and King, 2010). The quality of socialization is also informed by

quantity of socialization because even the greatest focus will have little effect where sufficient time allocation is not available to parents and children. Quantity is a dosed dimension of quality.

The present study examines three dimensions in the context of household time allocation. First we examine impacts of the prior paternal relationship on the current father's time allocations as past patterns may impact next generation prioritizations specifically in the context of differentiated paternal absence. As many decisions about parent-child interactions are premised on future intergenerational economic and relational payoffs including for parents who hope they will be well-attended to by children in old age and therefore devote more resources in the development of their children's skills, habits and values, including through increased interaction time (Pörtner, 2001).

Second, the present study examines the relationship between household child gender to parental outside labor allocation given the number of children of each gender. This accounts for both marginal dosing effects and gender mix relative to maternal and paternal time labor market participation.

Third, the present study examines three measures of household economic production functioning as dependent and independent variables: Total family income reported in thousands is a standard variable in modeling but one without information concerning income significance relative to size of household ($40,000 in a family of 3 has different significance than the same for a family of 5). In place of total family income we substitute a multiple of poverty level based on the weighted average poverty threshold for specific family sizes from the U.S. Bureau of Census Current Population Survey (http://www.census.gov/hhes/www/poverty/data/historical/people.html). A third measure examines household income generation as a function of income efficiency or average wage rate

(total household income divided by total household remunerative labor). As this involves temporal linearity relative to other time allocations due to endogeneity it is not utilized predictively in models where the dependent variable involves paternal or maternal time allocation.

Conceptual Framework

In conceptualizing factors which may be related to variation in father-child time allocation, the present study utilizes human capital theory (Becker & Tomes, 1986). Booth, Scott and King (2010) indicate intentional weekly paternal interaction with children promotes well-being that may overcome problems associated with otherwise father absence. 'Quality time' includes quantity and efficiency dimensions in skill communication, a function which also may be performed by proxies. However, the interpersonal benefits and values communicated relative to a unique relationship of parent qua parent may not be delegatable.

Studies emphasizing educational benefits from a father's interaction with children (e.g., Hoover-Dempsey & Sandler, 1997) relate parental education to child-developmental time allocation and educational impacts. One hypothesis concerning parental education and a propensity to invest in children suggests that more educated parents will be more efficient human capital investors. Thus, temporal investments of better educated parents may result per time unit in better-educated children (Booth, Scott and King, 2010; Menchik, 1979; De Tray, 1983). Formal investments in human capital, like education, have higher returns when past informal investments are larger: accumulation of knowledge and skills, mediated through paternal interaction with children, eases acquisition of additional knowledge.

Education frequently also serves as a proxy for the value of a person's time: When formal education increases market time-value over home time-value, higher educational levels will tend to

draw parents into greater market activities at the expense of home activities (De Tray, 1983). In this regard a father's education has been found to be an important control on paternal interaction with children (Booth, Scott and King, 2010). The present research also probes the impact of education on father-child time allocation per se and additionally as differentiated by child gender.

Development and skill acquisition are age-staged with increases in child agency and responsibility around ages 12-13 often culturally marked (for example in Bar and Bat Mitzvahs and similar rites). The present research tests the relationship between parental time allocation and child age specifically by age 12 and younger, 12-18, and over 18.

It takes time to teach children values, skills and traditions. Time with children is a part of the parent's utility function with an opportunity cost opposite working hours. Interaction time may become a casualty of an effort to achieve higher income when maintenance or perceived financial demands are closer to full income. However where discretionary margin is greater within the household, differential priorities concerning children may more readily manifest. This study tests whether total family income, when a child resides at home with parents, impacts paternal-child time allocation compared to household economic status as a normed multiple of a family-size indexed poverty threshold.

An increase in paternal time expenditures on children given sufficient family income might be devoted to an increased expenditure per child rather than to increasing the number of children, just as an increase in income might lead a consumer to shift from an economy car to a luxury car rather than an increase in the number of cars (Willis, 1987). We test for the impact of the number of children on relational time and income.

Full income includes the value of time as well as actual money income. Compare two families with the same money income but where the work status of one of the parents differs. Full

income will be higher for the family where one parent does not work. As parental time allocation investment in children depends on full income rather than money income, the coefficient on measured income could depend on a parent's work status (Menchik, 1979). Yet income may be more or less efficiently obtained within a household and whether there is a significant relationship also between wage rate, income and time allocation at the household level is of interest. Thus the present research tests the relationship between household income efficiency and paternal temporal relational investment. It similarly explores paternal and maternal market labor hours relative to household composition in the context of total family income, household poverty level and income efficiency. Given a discretionary margin, significant composition-conditioned preference differences should manifest vis-a-vis market labor. Income has also been significantly associated with paternal interaction with children and problem behavior (Booth, Scott and King, 2010), a dimension outside the scope of our inquiry.

Dual income arrangements require many families to make intrafamilial parental-time trade-offs between market work and interaction with children as fathers and mothers work out opportunities of employment and interaction with children relative to their respective jobs and relative to each other. We model the relationship between a father's working hours and a mother's working hours as substitutable components to sustain family welfare, in particular exploring the impact of dual-earning on child time allocation. Fathers have appeared less likely to engage in regular weekly child care responsibilities under a variety of conditions including when mothers and fathers work nonsimultaneous schedules; when fathers work hours than mothers each week; and when fathers did not have flex-time available (Avery, Haynes, & Haynes, 2000).

If a father is successfully involved in market activities it is reasonable to expect a negative relationship between the father's working hours outside the home and temporal dimensions relative

to the family's welfare (re a mercantile proverb that 'you take care of your job and your job will take care of your family'). If paternal working hours are a substitute for maternal working hours, they will have negative relationship relative to her working hours. However, if they are a complement, they will have a positive relationship. This study not only explores how maternal market hours relate to paternal time allocation for children and the mutual conditioning of parental labor hours, it also measures child gender-conditioning of paternal and maternal market labor allocation to identify possible gender concordant or discordant patterns.

A father's age may be an independent contributing factor in time allocation. Hence the relationship between paternal time allocation and paternal age is also modelled in this study. It has previously been found that paternal involvement with children tends to decline with age (Booth, Scott and King, 2010). However, as men age, market hours may decline and potential household (in contrast to golf course) investment hours increase holding total hours fairly constant over much of the life course: Here paternal-child investment could receive a significant benefit. However as children grow older, overall child-conditioned household labor demand declines reflecting decreasing actual or perceived childcare need (Ciscel, Sharp, & Heath, 2000).

An economic approach to paternal-child time allocation against the background of parental market labor is a useful tool for analyzing intrafamilial household dynamics with labor market implications. This can be utilized both for improving work environment structures to increase employee productivity, and for developing recommendations to enhance positive family relationships for the benefit of employee and the firm.

Data, Methods, and Models

Data

The proprietary data used in this research was collected by Canfield in 1995 using the National Center for Fathering's Personal Fathering Profile instrument of 1990 (National Center for Fathering, 1999). This contains 19 demographic and household items including direct interaction time with children, spousal working hours, a self and other rating of fathering effectiveness as well as 138 five-point Likert-scale items concerning paternal characteristics, practices and satisfaction which resolved into 21 subscale (reliability ranges: .75 to .90). 2000 U.S. respondents were contacted and surveyed via random digit dialing, in person, and by mail from urban, suburban, small town, inner city and military installations. Minority oversampling was conducted in New York City where respondents were also offered a meal and a book on fathering thereafter (Osgood, 1989). Table 1 provides descriptive respondent characteristics.

1651 surveys were returned yielding a raw response rate of 82.6% (Logan, 2000). Respondents ranged in age from 20 to 82. Meeting the inclusion criterion, 1135 respondents still had children present in their home (68.7% of those returned) with ages from 20 to 77 years and a median of 37. The vast majority were married (95.4%). The remainder were single, separated, divorced or widowed. Years married ranged from 0 to 42. Employment outside the home ranged from 0 to 90 hours per week (n=1129) with a mean of 46.9 working hours and median of 45.0. In the overall sample a total of 1553 of 1651 (94.1%) reported total family income with a mean of $61,258, (range $0 to $800,000) and median $50,000. Only 25 respondents did not report income.

We checked for non-response bias in income reporting using correlations for continuous variables, chi-square and Fischer exact test where appropriate for categorical variables and two logistic regressions on an indicator variable (1= income reported). Bivariately income reporting for children averaging less than 12 or 12-18 did not differ significantly, nor did paternal education with some college. Paternal high school education reported somewhat less compared to others(91.9% to

94.7%, p=.045 X^2, p=.056 Fischer) and college degree somewhat more (95.6% compared to 91.6% for all others, p=.001 for X^2 and Fischer). Age was weakly negatively correlated to reporting (-.075, p<.01), number of children at home (0.08, p<.01), but not number of children out of the home. Weekly hours with children were not significantly correlated while hours worked was weakly correlated (.085, p<.01). In the exploratory logistic regressions on reporting with hours worked, paternal education, counts of male and female children at home, children not at home, and child age, education was no longer significantly associated with nonreporting. Child age was of modest account (0.064, p=05). Transforming child age to dummies for children <12, and 12-18 compared to >18 (a proxy for emancipation) returned coefficients of -1.509 (p=.059) for < 12 and -1.451 (p=.049) for 12-18 respectively. In sum, those with oldest children were more likely to report income compared to those with children < 18 (of interest here), while dummy coefficients for children younger than 18 did not differ significantly. Thus there are modest differences among the 6% not reporting income according to child age but not education. These income non-reporting observations are excluded in the remaining analysis as models include an income related variable, whether as total income,as a multiple of poverty level, or as income efficiency.

The sample's maternal working hours outside the home averaged 14.6 hours per week (range 0 to 90) was slightly higher compared to census data as was educational achievement compared to U.S. population: 37% of the sample had as highest a bachelor's degree compared to just under 23% of European American males over age of 25. Greater educational level proxies for wage rate and time at work. The sample breakdown for highest education was high school graduate 16.7%, post high school including technical or associate degree 13.9%, and college bachelor's degree and above 68.5%.

43.2% of respondents reported their own father being "largely absent" as they grew up: 7.8% due to death, abandonment or other; 5.0% due to divorce or separation, 30.4% due to work.

18.8%, of respondents had only one child; 40.1% two; 27.2% three; 9.6% four; and 4.3%. five or more. However the number of children living at home found 28.9% with one child; 39.7% two; 22.6% three; 7.0% four; and only 1.8% had five or more children at home.

Fathers reported a mean of nearly eight weekly hours interacting (playing, talking, …) with their children (mean 7.6, median 5.0 with range 0.25 to 75 hours). Only 53 fathers (4.7%) had no sibling. 21.7% had one; 27.3% two, 21.6% three, 10.6% four, while 14.2% had five or more siblings.

Methods and Models

The results of the study are divided into three major areas to evaluate work-home allocation on father-child time using ordinary least squares (OLS) regression predicting paternal interaction with children, paternal and maternal market labor, and household economic production under three horizons: family poverty level, total income, and income efficiency.

Theoretically, OLS regression yields the best linear unbiased parameter estimate when the model is linear in parameters under a random sample (yielding conditional expected means of zero) whose independent variables (predictors) lack any exact linear relationship among themselves when measured (relatively) precisely (together yielding an unbiased estimate); independent normally distributed errors (optimal for t and F tests) and (relatively) constant variance in the residuals off the mean (homoscedasticity) ensure minimum variance in the estimate.

Models 1 and 2 explore the impact of various factors on Father/Child time allocation with income respectively as multiple of poverty level and total family income while avoiding the endogeneity of the father's working hours relative to the same.

Models 3, 4 and 5 respectively analyze income production in terms of a multiple of poverty level, total family income, and household income efficiency.

Models 6 to 9 examine paternal and maternal market labor time allocation relative to a multiple of poverty level and total family income, respectively.

Variables in the structural equations are denoted by:

Y*1t* = father-child time allocation

Y*2t* = father's working hours

Y*3t* = mother's working hours

Z*1t* = college education

Z*2t* = post high school education

Z*3t* = age of father

Z*4t* = number of father's siblings

X*1t* = poverty multiple; total family income; or income efficiency

X*2t* = # male children at home

X*3t* = # female children at home

X*4t* = dummy children < 12

X*5t* = dummy children 12 – 18

X*6t* = father's father absent due to work

X*7t* = father's father absent due to divorce or separation

X*8t* = father's father absent due to death, abandonment, or other

The father-child time allocation function for weekly hours comprises

$$\mathbf{Y}_{1t} = \beta_{10} + \beta_{12}\mathbf{Y}_{3t} + \delta_{11}\mathbf{Z}_{1t} + \delta_{12}\mathbf{Z}_{2t} + \delta_{13}\mathbf{Z}_{3t} + \delta_{14}\mathbf{Z}_{4t} + \gamma_{12}\mathbf{X}_{2t}$$
$$+ \gamma_{13}\mathbf{X}_{3t} + \gamma_{14}\mathbf{X}_{4t} + \gamma_{15}\mathbf{X}_{5t} + \gamma_{16}\mathbf{X}_{6t} + \gamma_{17}\mathbf{X}_{7t} + \gamma_{18}\mathbf{X}_{8t} + \varepsilon_{1t}$$

with predictive variables maternal market labor, paternal post-high school education, paternal college degree (high school or less omitted), paternal age, # of paternal siblings, poverty multiple or total family income, # male children home, # female children home, children < 12 indicator, children 12-18 indicator (>18 omitted), indicators for father's father respectively absent due work; due to divorce/separation; and due to death, abandonment, or other.

The household economic production functions (poverty level multiplier; total family income; income efficiency) comprise:

$$\begin{aligned} X_{1t} &= \beta_{20} + \beta_{22}Y_{2t} + \beta_{23}Y_{3t} + \delta_{11}Z_{1t} + \delta_{12}Z_{2t} + \delta_{13}Z_{3t} + \delta_{14}Z_{4t} \\ &+ \gamma_{12}X_{2t} + \gamma_{13}X_{3t} + \gamma_{14}X_{4t} + \gamma_{15}X_{5t} + \gamma_{16}X_{6t} + \gamma_{17}X_{7t} + \gamma_{18}X_{8t} + \varepsilon_{1t} \end{aligned}$$

Predictors: paternal market labor hours*, maternal market labor hours*, paternal post-high school education, paternal college degree (high school or less omitted), paternal age, # of paternal siblings, # male children home, # female children home, children < 12 indicator, children 12-18 indicator (>18 omitted), indicators for father's father respectively absent due work; due to divorce/separation; and due to death, abandonment, or other. (* *Omitted in income efficiency model.*)

Finally, the paternal and maternal weekly market labor hours functions comprise (with respective substitution):

$$\begin{aligned} Y_{2t/3t} &= \beta_{20} + \beta_{22}Y_{3t/2t} + \delta_{11}Z_{1t} + \delta_{12}Z_{2t} + \delta_{13}Z_{3t} + \delta_{14}Z_{4t} + \gamma_{11}X_{1t} \\ &+ \gamma_{12}X_{2t} + \gamma_{13}X_{3t} + \gamma_{14}X_{4t} + \gamma_{15}X_{5t} + \gamma_{16}X_{6t} + \gamma_{17}X_{7t} + \gamma_{18}X_{8t} + \varepsilon_{1t} \end{aligned}$$

Predictors are paternal post-high school education, paternal college degree (high school or less omitted), paternal age, # of paternal siblings, poverty multiple or total family income, # male children home, # female children home, children < 12 indicator, children 12-18 indicator (>18

omitted), indicators for father's father respectively absent due work; due to divorce/separation; or due to death, abandonment, or other.

For parameter estimates we report raw betas with standard errors and standardized betas (normalized to reflect the change in the dependent variable per 1 standard deviation increase in the predictor providing impact comparison between dissimilar variables). In Tables 1 & 2 result significance is indicated as † $p \leq .10$, * $p \leq .05$, ** $p \leq .01$, and *** $p \leq .001$.

Results

Paternal-Child Time Allocation (Models 1 & 2; see Table 1)

With few exceptions significant variables in models with poverty level multiple (Model 1) and total family income (Model 2) are consistent. In the models analyzing paternal-child time allocation negative significant variables were father's age, # of female children, college degree; positive were paternal age and children $<$ 12.

Father's age was modestly negative and highly significant (per year, -.148***, -.129; -149***, -.130). Mother's working hours were modestly complementary to paternal time with children (.096*** for both, .166; .165) with the relation of the same to paternal working hours analyzed in subsequent models.

Interestingly the coefficient on number of male children at home was not significant and modest (-.091, -.170), while the coefficient on number of female children at home was over five-times greater in magnitude (-.779*, -.068; -.858**, -.075). This is a gender discordant result indicating per female child a father spent about 47 minutes less per girl when considering household economic production under the horizon of a multiple of the household-adjusted poverty level and about 51 minutes less per female child under the horizon of household economic production as simple total income. The strongest positive predictor of paternal time

with children is having children under 12 (4.688***; 4.672***, both .205), while older children have no significant effect. The predictor of largest magnitude for less time with children was having a bachelor's or higher college degree (-1.242†; -1.249†, both -0.59) compared to high school less. Neither poverty level multiple nor total income were independently significant, nor were the various modes of intergenerational father absence on paternal temporal investment in children.

Household Income Production (Models 3, 4 & 5; Table 1)

The three economic production models explore family income in terms of a multiple of family-size adjusted poverty level (Model 3), total family income (Model 4) and income efficiency (Model 5). The model yielding the fewest significant predictors was income efficiency. In this and each of the other models fathers age, children under 12 and 12-18, and college degree were each positively significant (differential detail below). Both Total Family Income and Income Efficiency models had an additionally significant variable. Income Efficiency and Poverty Multiple find intergenerational paternal absence predicting increased income level. The number of paternal siblings modestly predict a lower poverty multiple and lower income (about 8% of a poverty level or about $1100 less income). The model holding the largest number of significant variables is the Poverty Multiple with 7 compared to 5 for each of the other two. Uniquely the poverty multiple framing of household economic production captured the child gender count effects at a very high level of significance (p<.000) with slightly greater decrease per marginal girl child compared to the decrease per marginal boy child. Details for models follow.

The poverty multiple model reports a multiple of the 1995 federal poverty level normed for household size (for example the 1.350 coefficient for children 12-18 indicates an increase of

an additional 135% above poverty level adjusted for household size). The coefficients of total family income report effects in thousands of dollars (12.251 indicates a $12,251 increase per predictive unit increase such as for college degree) whereas income efficiency coefficients (Model 5) provide a measure of household average wage convertible to dollars via a norming multiplier (i.e. income in thousands divided by 52 weeks: 1000/52=19.23; e.g. for father's age: .017 * 19.23 = .327, or a 32.7 cent increase in household income efficiency per age year holding other variables constant). Table 1 reports the converted result for the efficiency model alongside the original betas for convenience.

In the three models, paternal age is significant in each carrying roughly the same standardized magnitude (raw betas: .051***, .702**, .017*; standardized: .115, .119, .118) or a circa 5% poverty level multiple increase per paternal year adjusted for family size, circa a $700 increase in total family income, and an income efficiency (household average wage) increase of about 33 cents per year.

The marginal male or female child at home is associated with a lower poverty multiple (-.709***, -.734***; -.160, -.161) - an added child-condition increase in family-size adjusted poverty baseline is not caught up with by any associated increased income. There is a slightly lower multiple associated with the marginal female child compared to marginal male child - an aspect that will be further illuminated below in the maternal market labor model.

Poverty multiple and total family income are negatively associated with an increase in the number of paternal siblings (-.084†, -.047; -1.102†, -.046). Fathers with a larger number of siblings behave differently than those with fewer (Becker, 1993), possibly due to extended social capital as well as obligations.

Presence of children < 12 is increasingly prominent and significant for standardized betas across models from poverty multiple (.885†, .098) to total income (13.347*, .111) to income efficiency (.443**, .151). Children between 12 and 18 predict even higher household economic production in poverty multiple (1.350**, .116) and total income (18.347**, .119) but relatively somewhat less in income efficiency (.345**, .094) compared to younger children. The association with relatively higher income efficiency and lower total income for younger children and lower income efficiency and relatively higher total income for older children is consistent with the subsequent maternal market labor model and a gender wage differential.

Paternal college degree is positively significant for income production across the board adding on average over a full multiple, some $15,000 in total income, and increased household income efficiency (1.128***, 135; 15.069***, .137; .198**, .075).

Radical father absence due to death, abandonment or other (not divorce, separation or work) affecting 7.8% of homes in our sample is, perhaps somewhat surprisingly, positively associated with an increased multiple and income efficiency (.781*, .055; .378**, .083) but does not reach significance for total income. This result indicates the utility of considering household economic production under alternative constructions including in reference to household size adjusted poverty level and income efficiency.

Paternal and Maternal Market Labor Allocation by Poverty Level and Total Family Income (Models 6-9; Table 2)

The final four models compare paternal and maternal market labor allocation including in the predictors poverty multiple or total family income but not income efficiency as efficiency temporal elements are endogenous. Results across poverty level multiple and total income are

largely consistent while significant contrasts between maternal and paternal models emerge. Highlighting, significant for all models were number of male and female children, number of paternal siblings, and college degree. In the maternal labor models paternal age ceased to be significant for the first time. In the paternal model the labor-reducing effect of younger children only reached p=.13. Neither paternal nor maternal working hours were independently significant for the other's labor models.. Prior paternal absence due to death, abandonment and other (not divorce/separation) predicted a 2 hour decrease in weekly labor - a strong intergenerational effect.

Paternal age was very highly negatively associated with paternal work hours for both poverty multiple and total income (-.212***, -.178; -.211***, -.177) but - for the first time - not reaching significance for maternal market labor hours.

A notable contrast emerges in the effect of child gender on market working hours both in relative magnitude and in sign (paternal +, maternal -). In paternal labor models coefficients on count of resident male and female children is sharper with poverty multiple over total family income (male: .683*, .057; .613†, .051) while the coefficient magnitude is less for male than female children (female: .788*, .064; male: .707*, .058) - a gender concordant difference with fathers labor increasing relative less per marginal boy than girl. This is generally consistent with findings by Lundberg and Rose (2002) involving more time for sons than daughters, with larger responses for men born after 1950 however with little difference for mothers in contrast to our findings.

Here in the maternal labor supply models, coefficients on the marginal son or daughter are both negative (fewer labor hours) but coefficient magnitude for a marginal female child is over twice that as for a male child whether using poverty multiple or total income (male child: -

.980†, -.050; -1.004†, -.052; female child -2.372**, -.118; -2.395***, -.120). Maternal weekly market labor reduction runs 58-60 minutes less per male child compared to circa 2 ½ hours less per female child. Here gender concordance is at a higher level of differentiation and statistical significance: 142-144 minutes relatively less market labor per marginal female child.

While much has been made of paternal concordance conditoned on child gender (effects found also for paternal time with children in Models 1 & 2) with regard to outside labor we find a much stronger maternal gender concordance: 2.4x greater reduction in weekly market labor per marginal female child compared to male. Compared to the of the paternal labor models, the disparity is 18-20x greater in the maternal market labor gradient.

The effect of the number of paternal siblings on paternal and maternal labor supply is oppositely valanced indicating a social network resource (or distraction) paternally and complimentarity maternally; the third higher coefficient magnitude maternally may also indicate a gender wage gradient ceteris paribus (paternal working hours: -.236†; -.238†, both -.049; maternal working hours .327†, .041; .330†, .040).

In contrast to time with children and household economic production models (Models 1-6), a stark contrast emerges concerning paternal and maternal working hours with regard to children < 12: while the negative coefficents on the paternal labor side are nonsignificant on the mater,nal side they are of greatest magnitude in the model and highly significant (-6.242**; -6.275**, both -.159) while children 12-18 are not significant indicating a concentration of difference in market labor supply toward younger children.

Concerning labor supply, partial post-secondary paternal education in comparison to high school degree or less does not significantly predict decreasing paternal work hours while very strongly and significantly predicting an over 3 ½ hour increase in maternal market labor hours

(3.588*; 3.587*, both .073) possibly due to lower paternal wages compared to college degree. By contrast paternal college degree is associated with an increase in paternal working hours (1.807*, .081; 1.837*, .082) and with fewer maternal work hours, again complimentary with a difference of about 20 percent in the coefficients, consistent also with a gender wage gradient (-2.207†, -.060; -2.243†, -.061).

Finally intergenerationally, paternal father absence due to death, abandonment or other (not divorce, separation or work) is once again significant, strongly predicting fewer paternal working hours (-2.129*, -.056; -2.098**, -.055) although not significantly predicting a change in maternal market labor consistent with the indicated increase in income efficiency associated with the same (possibly implying radical paternal absence pressures greater initiative).

Discussion

In contemporary society, conditioned by maternal market labor participation, fathers have an opportunity to play a more significant role in the lives of children through time investment, both qualitatively and quantitatively, positively impacting socialization from a family-welfare maximizing perspective. Whether this is fulfilled or disappointed will depend upon how discretionary employment and non-employment time is allocated. In this context an economic approach to paternal-child time allocation against the background of parental market labor is a useful tool for analyzing intrafamilial household dynamics with labor market implications.This can be utilized both for improving work environment structures to increase employee productivity for the benefit of the firm, and for supporting policies to improve familial child investments, and enhance positive family relationships for the benefit of the family and communities.

Of relevance to understanding parental external labor and time allocation patterns (Models 6-9), we discover a gender concordant pattern and influence on both the maternal and paternal sides. On the paternal side, children of either gender positively predict a dosed increase in working hours yet less per male child by a gradient of about 5 ½ minutes. This holds whether economic production is given in terms of poverty level multiple (male child .683*, .057, or 41.2 minutes; female child .778*, .064, or 46.7 minutes; gradient -5.5 minutes) or as total income (male child 613†, .057, 36.8 minutes; female child .707,* .058, 42.2 minutes; gradient -5.4 minutes).

On the maternal side, however, one finds a sharp child-gender-conditioned contrast in two dimensions: direction of the change and magnitude. Here there are also much sharper levels of significance for girls than boys. Per boy market labor decreases circa 1 hour; per girl circa 2.4 hours, again consistent using poverty level multiple or total income (for boys -.980† and -1.004†; for girls -2.372** and -2.395***). The highly significant negative coefficient for children < 12 on the maternal side of ca. -6.2 hours and nonsignificance for older children indicates a concentration of this significant gender differential among younger children. This implies a substitutional relationship between maternal labor and child investments. Developmentally, children are most formable at younger ages with key milestones particularly throughout the primary school ages with implications for gender-related child development via close modeling and in school-related tasks and greater firm impacts.

Recognition of this divergent gender dosing effect thus impacts social and corporate analysis including labor planning as conditioned by parental gender (direction of the change) and child gender (relative magnitude of gender-concordant parental involvement and labor supply).

In the paternal child-time allocation model there is a strongly positive coefficient for children < 12 (an additional 4.7 hours on average when younger children are present) while simultaneously in

the paternal labor model the negative coefficient on younger children is about a third of the magnitude of the maternal labor model but fails to reach significance (-1.967 p=.129 with poverty multiple; -1.951, p=.132 using total family income): Paternally the time-with-children effect is stronger than the labor reduction dimension for children < 12 while the latter is much more acute in both magnitude and significance with regard to maternal labor. Our data indicate that younger children garner more parental involvement at the cost of labor hours. Child age < 12 in the paternal labor model is negative but does not reach signifcance yet it is the single greatest (and highly significant) predictor of reduced maternal working hours (-6.242**, -6.275**).

This strongly reflects gender roles within the family and at the labor market place. This has implications for parental investments in capacity development of children directly through themselves or through proxies and, simultaneously, it impacts parental labor hours supplied to the market place. It should be noted that this may not hold for first and second generation immigrants from specific cultures in t. For example Pabilonia, S. W & Ward-Batts, J. (2011) found in an extraction from the Current Population Survey and Census data that Asian first generation mothers worked between 2.5 and 4 hours less per week with a son as compared to a daughter in different model specifications (reflecting strong cultural son preference), whereas for immigrants regardless of race mothers worked “a few hours” more with a son (conversely less with a daughter), consistent with our finding.

For resident children 12-18 this is less acute. In the paternal model the associated coefficient shows almost no significance. On the maternal side there is a valence shift (direction of the change flips to positive) with large magnitudes from circa -2 to +3 (release to increased working hours) tending toward but not reaching signficance (p=.13), becoming more willing to work outside of the home with relative higher child independence (‘latchkey kids’ absent other presence) which is

generally consistent with ongoing patterns of increased maternal labor force participation as children increase in age (Cohany & Sok, 2007).

This pattern shift for 12-18 year old children indicates that the above identified gender-concordant time investment differential is predominantly concentrated among children < 12, specifically with mothers investing differentially more intensively with conditioned on younger daughters being present in primary development years but less so with sons - one not offset by the much smaller differential benefitting younger sons by fathers. It should be noted that neither maternal nor paternal working hours had a significant complementary or substitutional effect for the other in the labor models,in contrast to the a substitution effect of maternal labor of about 6 minutes per marginal hour (.096*** both; .166, 165) for paternal time with children (Model 1).

The presence of an additional boy had no significant effect while the additional girl significantly predicted reduced weekly time spent with children (-.779*, -.068, 46.7 min, adjusted by poverty level and -.858**, -.075, 51.5 min, by total income). While in the paternal labor model the coefficient on young children is negative and short of significant, in the time with child model presence young children significantly predict higher weekly interactive time - the most significant variable other factors held constant (4.688***;.4.672***, both .205). This is somewhat predictively offset however with a college degree (-1.242†, -.059) compared to high school or less (the latter also less able to afford paying proxies). Children under 12 have a positive effect on paternal-child time allocation (interaction) and negative to paternal working hours. As noted in Harry and Sandra Chapin's *The Cat's in the Cradle* (1974), most children, particularly boys, pine more for missing hours with dad than for an hour's marginal material return on labor if basic material maintenance needs are met.

On the side of intergenerational paternal impacts this data indicates an economically though not relationally quasi paradoxical effect of the radical absence of the paternal father due to death or abandonment or other in contrast to divorce/separation or work: the 8% of employees whose father was absent due to death or abandonment (a radical absence) on average allocated less time to remunerative labor, yet on average their households had a more efficient income generating structure due either to higher maternal or a higher paternal average wage.

In the three models investigating household economic production (Models 3-5) - by poverty level, total income, and income efficiency (average household wage) - the poverty level model had 7 significant variables while the other models had 4 each. A number of common and several isolated factors emerge. Father's age predicts an increase per year in each at $p<.01$ be it a 5% advance relative to weighted household size adjusted poverty level, a mean $700 per year increase in total family income, and a circa 33 cent per hour increase in average household wage rate (the beta normalized to hourly income as discussed above), not forgetting that paternal age proxies for maternal age only with some discount.

Three other variables in the economic production models are positively significant across all three models, each in much greater magnitude than paternal age: children < 12, children 12-18, and college degree, explicated below.

Children < 12 have a more attenuated level of significance in the poverty multiple model (.885†, .098), in magnitude predictive of about a 90% gain relative to family size-adjusted poverty level, holding other factors constant; a circa $13K annual increase in total family income (13.249*, .111); and predictor of of the highest increase in average household wage of any variable by about $8.51 (.433**, .151, norming multiplier 19.23), also the strongest significance across the models, keeping in mind that that maternal labor participation decreases with younger children, albeit more

so for daughters than sons (above), in conjunction with the *decreased* impact of the durative negative gradient between male and female wage rates also within job classifications, here relative to percentage of household labor hours worked under each in addition to any increased wage productivity paternally.

Children 12-18 in each model reaches a significance of p<.01. Relative to poverty level the positive coefficient is half again greater than with children < 12 (1.350**, .116) recalling also the strongly increased maternal labor participation in terms of hours aside from any increase in wage rate, but about 22% higher in increased total family income (18.347**, .119), but a somewhat *lower* increase in household income efficiency (.345**, .094, or $6.63 per hour) again consistent with the gender based wage gradient.

Paternal college degree falls between the two child age range variables predicting increased economic production for poverty level and total income (1.128***, 135; 15.069***, .137, respectively), but lowest relative to income efficiency (.198**, .075, normed $3.81), holding other factors equal.

Number of fathers siblings were modestly negatively associated with poverty level and total income and nonsignificant with regard to income efficiency (-.084†, -.047; -1.102†, -.046), perhaps due to stronger social networks and potential background resources (or stronger social distraction), consistent with the the same's predicted decrease in paternal working hours but increased maternal working hours (attenuating income efficiency). In market labor models paternal siblings were modestly significant positively predicting greater maternal labor and less paternal labor, however the maternal to paternal labor substitution ratio was about 1.35x and 1.39x.

The intergenerational effect found in decreased paternal work hours given a paternal father largely being absent due to death, abandonment or other in contrast to divorce, separation or work, is

not significant for total income but is felt paradoxically in terms of poverty level and household income efficiency as noted above (.781*, .055 and .378**, .083, $7.26 normed). This is counter to our expectation. Temporally a rational would be not to be radically absent from one's child, but such experience may require greater independence and taking on responsibility within a household which translates into greater marginal productivity.

Uniquely in the poverty level model one finds a (highly) significant result ($p<.001$) for child gender, both male and female children at home being negatively associated with poverty level (income not catching up with the marginal child, so to speak), but the coefficient magnitude for sons is slightly higher than for daughters (-.709***, .160, -.724***, .161). This is consistent with the gender-concordant result of the maternal labor function indicating a significantly lower labor participation reduction for the marginal male child compared to the marginal female child (i.e. maternal time allocation significantly greater to daughters).

Applications

The results can be useful for firms to develop policies to enhance employee productivity and promote healthier and more efficient work environments. Furthermore this research may be useful for understanding family dynamics generally and particularly, policy makers and civil society voices in developing public policies and programs supporting particularly paternal time investment in children. "Fathering" requires intentional time with children. It would be useful to study how significant family leave provisions or adequate vacation or release time together can encourage effective and meaningful father/child relationships. Supports for two-parent working options need to be enhanced.

Finally, it is generally recognized that the failure of fathers to spend adequate and qualitative time with children can have larger negative economic and social consequences in the larger society.

For example, to reduce at-risk youth behaviors, policy makers should encourage fathers to spend more time with their children (Goncy and Dulman, 2010). Our study suggests that the societal returns of 'only' a high school education may be larger than previously thought: whatever the earnings effect for male high school graduates, getting a diploma rather than a degree was associated with increased paternal time investments in the children of those individuals.

Developmentally, the more a father positively and intentionally engages in a child's life the healthier its socialization process will be. Not only quality but also quantity of time invested is important for modeling, communicating values and skills toward a child's development. This research explores relationships between father-child time allocation, intergenerational paternal factors, paternal and maternal market labor, and multiple measures of household economic production. We further identify a strong child-gender concordance concerning maternal market labor time allocation.

This study has been helpful in identifying variables affecting paternal time allocation for children and parental market activities. The choices a father makes at the start of family life can have long-standing impacts on the long-term development of the children, but the possibilities are economically informed. More intentional shaping of time allocation should ultimately more positively impact long-term family interactions and development. It is important that relationship-strengthening choices be encouraged in a society and economy which understands as one of its values the cultivation of a family-nurturing environment. As fathers are crucial in the area of child socialization, often recognized more strongly in the breach than in the performance it is essential that public policy and firms' policies options include this horizon in structuring of economic parameters and emphases in policy development to develop healthier and more efficient work environment.

From an economic utility point of view, our study also demonstrates the usefulness of measuring household economic production from several vantage points. In particular not relying simply on total household income but norming this to a poverty level multiple yielded important unique results while identifying the greatest number of significant variables. Income efficiency ties together exogenous social wage structures and household endogenous (albeit not model endogenous) labor allocation decisions although income efficiency is endogenous relative to labor allocation. For the marginal labor involved we encourage researchers to include multiple economic production models, particularly normed to poverty levels.

In sum this study identifies important variables related to household time investments, highlighting specific dynamics concerning paternal time allocation with children; paternal and maternal work patterns relative to child gender and age; highlights maternal and paternal gender concordance patterns relative to children and identifies the much greater gradient for the marginal female child, specifically younger than age 12 which in itself predicts a labor decrease of about 6 ¼ hours weekly. This has implications for child development in the formative interactive early period of a child's life as well as for labor force management and work structure. It also identifies a strong integenerational effects of radical father absence due to death or abandonment; and advances understanding of household economic production in relation to alternative measures (weighted average poverty threshold multiple, household income generating efficiency, and total income). These results can be utilized to identify intrafamilial time allocation patterns to the benefit of the family and communities, and in understanding family structure impacts on the work environment, labor planning including accommodating structures to increase employee productivity benefiting the firm.

Limitations

The National Fathering Survey data, while the most comprehensive data of its kind, does not provide identical maternal data (e.g. age, education) while maternal external work is a spousal estimate as is the case with the American Time Use Survey. For interpretation the highest income range's sparseness requires results in this band be treated with commensurate caution. In modeling deviations from OLS assumptions can effect efficiency of the estimation (e.g. when residuals are not homoscedastic) and OLS, like other functional forms, is subject to omitted variable bias from limitations inherent in data or incomplete theory driving variable selection while the estimate will be inefficient when an irrelevant variable is included. As is the case in all Federal poverty level measures, household economic welfare may be greater than reflected given non-income supports not included (e.g. rent or food subsidies, the former of which can vary by county as well as by state).

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Table 1

Sample Characteristics of the Respondents

Characteristic	N	Mean	SD	Median	Range
Age	1135	37.81	7.03	37.00	20 to 77
Annual family income Income increase as father ages	1095 1095	$61,258 $1,005	$53,575	$50,000	$0 to $800,000
Father's weekly interaction hours	1135	7.56	7.81	5	0.25 to 75
Weekly work hours, father	1129	46.85	9.89	45	0 to 90
Weekly work hours, mother	1113	14.60	16.95	7	0 to 90
Years married to current spouse	1099	12.55	6.91	11	0 to 42

Based on 1135 fathers with resident children from the original 1651 respondents completing questionnaires.

Table 2

Descriptive Statistics of Respondents by Category

Category		%
Education	High school degree	16.65
	Post high school degree (e.g. assoc., trade)	13.92
	College degree (includes graduate degrees)	68.46
Marital status	Married	92.42
	Single	4.58
Father absence	Death	7.11
	Divorce or separation	11.79
	Abandonment	2.24
	Work	70.93
	Other	7.93
Children	One child	18.77
	Two children	40.09
	Three children	27.22
	Four children	9.60
	Five or more children	4.32
With father	One child	28.90
	Two children	39.65
	Three children	22.56
	Four children	7.05
	Five or more children	1.85

Paternal siblings Only child	4.67
One sibling	21.67
Two siblings	27.31
Three siblings	21.59
Four siblings	10.57
Five or more siblings	14.18