

The Household Demand for Leisure, the Price of Time and the Full Cost of Children: A Structural Model and Evidence from the PSID

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I.

Introduction

What this paper's about

- Parenting children takes **money** and **time**.
- **The problem:** Most models ignore the **time cost**, or simply value it at the parent's wage rate.
(Bradbury, 2008; Bargain et al., 2022; Calvi et al., 2023)
- **The limitation:** Pricing childcare at the wage rate assumes:
 - ❖ Time allocation is freely chosen.
 - ❖ Childcare is perfectly substitutable for paid work.

The missing piece: **Process benefits** refer to the direct happiness a person gets from the act of doing an activity, completely separate from the final outcome.

This research addresses two key questions:

- Q1:** *To what extent is childcare experienced as **leisure** rather than **work**?*
- Q2:** *What is the **full cost of children** by pricing the true value of parental time?*

What this paper adds

1. **Monetary costs of children:** Bargain & Donni (2012); Bargain et al. (2022); Brown et al. (2021); Calvi et al. (2023); Dunbar et al. (2013); Lechene et al. (2022); Lewbel & Pendakur (2024); Penglase (2021).
 - ❖ **Main message:** Monetary costs are inferred from declines in adult consumption (Rothbarth approach).
 - ❖ **Contribution:** We estimate monetary costs using a novel adult good "Full Leisure" conditioned on full household expenditure.
2. **Total cost of children:** Apps & Rees (2001); Bradbury (2008); Colombino (2000); Gustafsson & Kjulin (1994).
 - ❖ **Main message:** Time costs are typically evaluated by mechanically valuing parental childcare time at the market wage rate.
 - ❖ **Contribution:** We endogenize the price of time and identify the shadow prices of pure childcare time.
3. **Process benefits:** Cosaert & Hennebel (2023); Graham & Green (1984); Hallberg & Klevmarken (2003); Juster & Stafford (1991); Kerkhofs & Kooreman (2003).
 - ❖ **Main message:** Productive activities generate direct utility, decoupling the opportunity cost of time from the market wage.
 - ❖ **Contribution:** We point-identify process benefits from observed behavior and integrate them into a structural model to estimate the Full Cost of children.

II.

Collective Labor Model with Process Benefits

Individual preferences ► Model

Household Setup

A couple $I = \{W, H\}$ and their young children (n).

Individual Preferences

Each spouse derives utility from private consumption (c_I), leisure (l_I), childcare time (t_I), and the child's welfare (u_K).

$$U_I = \underbrace{u_I(l_I, t_I, c_I; n)}_{\text{Private Utility}} + \underbrace{\delta_I(n) \cdot u_K(c_K)}_{\text{Altruism (Child Welfare)}}$$

Technical Assumptions

$$\lim_{c_I \rightarrow 0} \frac{\partial u_I}{\partial c_I} = \lim_{c_K \rightarrow 0} \frac{\partial u_K}{\partial c_K} = \lim_{l_I \rightarrow 0} \frac{\partial u_I}{\partial l_I} = +\infty$$

Goods and leisure are essential.

$$\frac{\partial u_I}{\partial t_I} < \frac{\partial u_I}{\partial l_I}$$

Leisure preferred to childcare at the margin.

Technology and budget constraints

1. Childcare Technology Constraint

$$m \geq g(t_W, t_H, n) \quad \text{with } m \geq 0$$

- ▶ External childcare (m) must compensate for the gap in required supervision.
- ▶ Technical Assumption: $\lim_{t_l \rightarrow 0} \frac{\partial g}{\partial t_l} = -\infty$ (Parental time is essential).

2. Budget Constraint

$$\underbrace{c_W + c_H + c_K}_{\text{Goods}} + \underbrace{m}_{\text{Daycare}} + \underbrace{\omega_W(l_W + t_W) + \omega_H(l_H + t_H)}_{\text{Value of Time}} \leq \underbrace{Y}_{\text{Full Income}}$$

- ▶ $Y = T \cdot (\omega_W + \omega_H) + y$ (where T is total time, y is non-labor income).

Shadow prices

► **Proposition 2**  $\theta_I = 1 - \varphi'_I(t_I)$

III.

Identification

Identification of the time cost of children

► Proposition 3

Observed



Parental time:
 t_W, t_H



Daycare spending:
 m



Wages:
 ω_W, ω_H

Identification strategy



Parental
time



Paid
daycares

Changes in wages alter
the substitution between parental
time and paid childcare.

Unobserved



Shadow prices:
 θ_W, θ_H



Childcare technology:
 g



Time cost:
 c_T

Price of parental time

$$\omega_I^* = \theta_I \omega_I \iff \omega_I^* = \underbrace{\frac{\partial U / \partial t_I}{\partial U / \partial m}}_{MRS_{t_I, m}}$$

Time cost of children

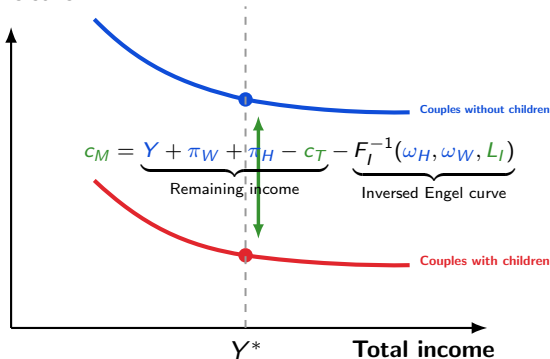
$$c_T = \underbrace{t_W \theta_W \omega_W}_{\text{Cost of mother's time}} + \underbrace{t_H \theta_H \omega_H}_{\text{Cost of father's time}} + \underbrace{m}_{\text{Cost of market childcare}}$$

Identification of the monetary cost of children

► Further

◀ Engel curve

Full leisure



Key assumptions

A.2 Preference stability

Leisure preferences are similar between couples with and without children.

A.3 Invariance of sharing rule

The way income is shared between adults does not depend on the presence of children.



Rothbarth principle : At a given income level, parents enjoy less leisure than childless couples; this gap measures the missing income absorbed by children, i.e. the monetary cost c_M .

IV.

Empirical specification

Wrap up: two-stage estimation process

First Stage: Joint Estimation

► First stage estimation results

► Childcare specification

$$t_H = \beta_H \mathbf{z}_H^T + \gamma_H \frac{1}{\sqrt{\theta_H \omega_H}} + \gamma_{WH} \sqrt{\frac{\theta_W \omega_W}{\theta_H \omega_H}} + v_H$$

$$t_W = \beta_W \mathbf{z}_W^T + \gamma_W \frac{1}{\sqrt{\theta_W \omega_W}} + \gamma_{WH} \sqrt{\frac{\theta_H \omega_H}{\theta_W \omega_W}} + v_W$$

$$m^* = \alpha \mathbf{z}^M + \sum_I \gamma_I \sqrt{\theta_I \omega_I} + u$$

⇓ Yields parameters and prices to evaluate Full Leisure (L_I)

Second Stage: Full Leisure Demand

► Second stage estimation results

► Full leisure specification

Model A: Preference stability

$$L_I = a_I z_I^L + b_I \omega_I + c_I \omega_J + d_I Y_R + e_I Y_R^2 + \varepsilon_I$$

Model B: SAT Type

$$L_I = (a_I + a'_I \delta(n)) z_I^L + (b_I + b'_I \delta(n)) \omega_I + (c_I + c'_I \delta(n)) \omega_J + d_I Y_R + e_I Y_R^2 + \varepsilon_I$$

V. Data

Data: Panel Study of Income Dynamics (PSID 2019)

Main Source: PSID 2019 wave.

- Rich set of variables: *Household expenditures, Labor income, Time use, and Socio-economic characteristics.*

Sample Selection Criteria

➤ Demographics:

- ❖ Adults aged **20–50** years.
- ❖ Couples (Dual-earner households).

➤ Family Structure:

- ❖ At most **2 children**.
- ❖ Youngest child aged ≤ 6 years.

Final Sample Structure

825

Total Households

With Children: **463**

Childless: **362**

► Descriptive statistics

VI.

Empirical Results

First-stage estimation (ML)

◀ Childcare time demand

Parameters	Model A (Adjusted values)	Model B (No extreme val.)	Model C (Orig. measures)
	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)
γ_H	20.67 (6.74)	16.95 (9.71)	27.50 (9.85)
γ_W	27.40 (6.40)	22.53 (16.55)	31.45 (8.59)
$\gamma_{W,H}$	-3.28 (2.49)	-2.66 (3.28)	-4.07 (4.61)
θ_H	0.35 (0.21)	0.42 (0.55)	0.20 (0.12)
θ_W	0.44 (0.26)	0.66 (0.84)	0.32 (0.24)

Interpretation of the structural parameters (Model A)

$H_0 : \theta = 1$ means that childcare time is valued at the market wage.

Mothers ($\theta_W = 0.44$):

- ($|t| = 2.15 > 1.96$) $\Rightarrow \theta_W < \omega_W$
- **44%** of childcare time = labor, **56%** = leisure

Marginal wage effects on mother's time (t_W):

- $\hookrightarrow w_W \uparrow \$1 \Rightarrow -0.18 \text{ h } (\approx 11 \text{ min})$
- $\hookrightarrow w_H \uparrow \$1 \Rightarrow -0.14 \text{ h } (\approx 8 \text{ min})$

Fathers ($\theta_H = 0.35$):

- ($|t| = 3.10 > 1.96$) $\Rightarrow \theta_H < \omega_H$
- **35%** of childcare time = labor, **65%** = leisure

Marginal wage effects on father's time (t_H):

- $\hookrightarrow w_H \uparrow \$1 \Rightarrow -0.12 \text{ h } (\approx 7 \text{ min})$
- $\hookrightarrow w_W \uparrow \$1 \Rightarrow -0.14 \text{ h } (\approx 8 \text{ min})$

Estimated weekly costs of children

► Cost function

	Model A	Model B	Model C
1. Time Cost (\$1k)	(Benchmark)	(No extreme val.)	(Orig. measures)
1 Child	0.43	0.52	0.81
2 Children	0.40	0.41	0.76
2. Monetary Cost (\$1k)	(Quadratic)	(Quad. + Demo)	
1 Child	0.74	0.72	—
2 Children	1.08	1.01	—

Interpretation the costs of children

Time Cost

- Flat/decreasing with size ($0.43 \approx 0.40$).
- Sizable: 23–35% of labor income.
- Model C overstates costs (passive care).

Monetary Cost

- Increases significantly with family size ($0.74 \rightarrow 1.08$).
- Robust across specifications.

VII.

Conclusion

What this paper's takeaways

1. Identification

The **full cost of children** can be identified from observed behavior.

2. Price of time

The opportunity cost of childcare is significantly **lower than the market wage** ($\theta < 1$).

3. 44% against 35%

Mothers perceive a higher share of childcare time as "labor" (**44%**) compared to fathers (**35%**).

4. Up to 1 000 \$ / week

Total cost exceeds **\$1,000/week**, including monetary and time costs of children.

Key takeaway: Children entail a substantial time cost that cannot be mechanically priced using wages, due to the presence of process benefits.

Where this paper leads

1. Exploring Alternative Identification Goods

- **Current:** Full leisure yields relatively flat Engel curves.
- ⇒ **Future:** Exploit goods with steeper curves (e.g., clothing) by endogenizing market hours.

2. Refining Instrumental Variables

- **Current:** The instrument for full expenditure (fitted time cost) is model-dependent.
- ⇒ **Future:** Identify external, exogenous shocks to instrument household expenditure more credibly.

Appendix

Private consumption and time use

The main theoretical results of this paper still hold if the childcare constraint that follows is replaced by the assumption that the child's utility function is separable in t_W , t_H and m , taking the form $u_K(c_K, f_K(t_W, t_H, m, n))$ for some well-behaved function $f_K(\cdot)$.



The collective household problem

Pareto-Efficient Allocation

The household maximizes a weighted sum of the spouses' utilities. The Pareto weights (ϕ_W, ϕ_H) capture the bargaining power of the wife and husband.

$$\max_{\substack{l_W, l_H, t_W, t_H, \\ c_W, c_H, c_K, m}} \phi_W U_W + \phi_H U_H + (\phi_W \delta_W + \phi_H \delta_H) U_K$$

which expands to:

$$\phi_W u_W(l_W, t_W, c_W, n) + \phi_H u_H(l_H, t_H, c_H, n) + (\phi_W \delta_W + \phi_H \delta_H) u_K(c_K)$$

Subject to:

- The Budget constraint (Y).
- The Childcare technology constraint (g).
- Time constraints: $l_l + t_l \leq T$.

Note: *Weights are normalized such that $\phi_W + \phi_H = 1$.*

Shadow prices

► **Proposition 1** ► $\theta_l^* = 1 - \frac{\partial u_l / \partial t_l}{\partial u_l / \partial l_l}$

Decentralization of the household optimization problem

Proposition 1

Assume that time feasibility conditions are not binding. Then the optimal allocation of time and consumption in Problem $\bar{P}$ can be seen as the solution of a decentralized decision process. More precisely,

(a) there exists a pair of positive functions (θ_W, θ_H) of $(\omega_W, \omega_H, Y, n)$ such that the time cost is minimized:

$$e_T(\omega_W, \omega_H, Y, n) = \min_{t_W, t_H} (t_W \theta_W \omega_W + t_H \theta_H \omega_H + g(t_W, t_H, n)); \quad (P_0)$$

(b) there exists a triplet of functions $(\kappa_W, \kappa_H, \kappa_K)$ of $(\omega_W, \omega_H, Y, n)$, with $\kappa_W + \kappa_H + \kappa_K = Y - e_T$, such that each spouse maximizes her or his own utility function subject to a budget constraint:

$$\max_{l_W, t_W, c_W} u_W(l_W, t_W, c_W, n) \text{ subject to } \kappa_W - c_W - l_W \omega_W - t_W(1 - \theta_W) \omega_W \geq 0, \quad (P_H)$$

$$\max_{l_H, t_H, c_H} u_H(l_H, t_H, c_H, n) \text{ subject to } \kappa_H - c_H - l_H \omega_H - t_H(1 - \theta_H) \omega_H \geq 0. \quad (P_W)$$

[◀ Back to Shadow prices](#)

The full leisure demand functions

Assumption 1

Each spouse I has a utility function of the form:

$$u_I(l_I, t_I, c_I, n) = u_I(l_I + \varphi_I(t_I), c_I, n)$$

with $I = W$ or H , where $L_I = l_I + \varphi_I(t_I)$ can be viewed as the “full leisure” of spouse I for some differentiable and concave functions $\varphi_I(\cdot)$, satisfying $\varphi_I(0) = 0$.

Proposition 2

Assume that time feasibility conditions are not binding and that utility functions are of the form A.1. Then the optimal allocation of time and consumption in Problem $\bar{P}$ is sequential. Firstly, the time cost is minimized in Problem P_0 with $\theta_W = 1 - \varphi'_W(t_W)$ and $\theta_H = 1 - \varphi'_H(t_H)$, giving $t_H^* = t_H(\omega_W, \omega_H, n)$ and $t_W^* = t_W(\omega_W, \omega_H, n)$ as optimal levels of childcare time. Secondly, each spouse maximizes her or his own utility function subject to a budget constraint in Problems P_W and P_H with $\theta_W = 1 - \varphi'_W(t_W^*)$ and $\theta_H = 1 - \varphi'_H(t_H^*)$, giving $L_W^* = L_W(\omega_W, \kappa_W + \pi_W)$ and $L_H^* = L_H(\omega_H, \kappa_H + \pi_H)$ as optimal levels of full leisure, with $\pi_W = \varphi_W(t_W^*)\omega_W - t_W^*(1 - \theta_W)\omega_W$ and $\pi_H = \varphi_H(t_H^*)\omega_H - t_H^*(1 - \theta_H)\omega_H$.

[◀ Back to Shadow prices](#)

Identification

Proposition 3

Assume that time feasibility conditions are not binding. The childcare cost can be recovered from the observation of m^* , t_W^* , and t_H^* as functions of (w_W, w_H, Y, n) . The technology g and the prices θ_W and θ_H can be recovered as well.

Intuition

When wages change, parents adjust the amount of daycare they purchase. By observing this substitution between (t_I) and (m) , we can use this variation to identify the (θ_I) .

Example

Imagine a mother's wage increases by \$10. Standard theory assumes she will immediately buy exactly \$10 of daycare to go work an extra hour. But suppose she only increases paid childcare spending by \$4. This gap is exactly what identifies our prices (θ_I) . If parents don't substitute their time one-for-one, it proves childcare is not purely a cost. Parents derive direct utility from spending time with their children. We use this substitution behavior to quantify how they value their time.



Identification

Assumption A.2

The full leisure demand functions are independent of the presence of children: $L_I(w_I, \kappa_I) = L_I(w_I, \kappa_I, n)$, where $L_I = l_I$ for a couple without children.

Assumption A.3

The sharing functions are independent of the presence of children: $\kappa_I(w_H, w_W, Y_R) = \kappa_I(w_H, w_W, Y_R, n)$, where $Y_R = Y$ for a couple without children and $Y_R = Y + \pi_W + \pi_H - c_M - c_T$ for a couple with children.

Assumption A.2'

The full leisure demand functions can be written as: $L_I = \alpha_I(w_I; n) + \beta_I(w_I, \kappa_I)$, where $L_I = l_I$ for a couple without children.

Intuition

Imagine we observe two couples (with and without children) who have exactly the same household income. The parents might consume less full leisure and fewer adult goods than the childless couple as the child acts like a tax. By measuring how much the parent's adult consumption falls relative to similar childless couple, we can identify the size of that "tax" (c_M).



Childcare time reporting: the problem and the fix

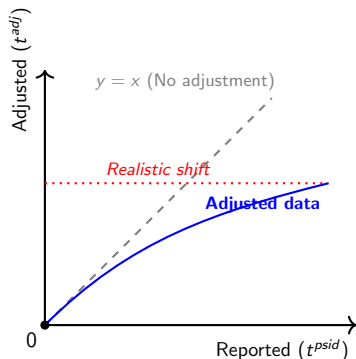
The Fix: Non-linear Transformation

We map the inflated PSID data to realistic ATUS levels using a hyperbolic tangent function:

$$t_I^{adj} = t_I^{psid} - k_I \times \tanh\left(\frac{t_I^{psid}}{k_I}\right)$$

Why this functional form?

- Preserves true zeros (if $t^{psid} = 0 \Rightarrow t^{adj} = 0$).
- Aggressively shrinks absurd extremes (constant downward shift for high values).



[◀ Back to Data](#)

Childcare specification: parental time

The Dual Approach (Generalized Leontief)

By the Duality Principle, we bypass the unknown physical technology $g(t_W, t_H, n)$. We directly specify a flexible cost function e_T capturing baseline costs and substitution patterns.

Cost Function (e_T)

$$e_T = \alpha^* + \underbrace{\sum_I \beta_I^* \omega_I^*}_{\text{Rigid baseline}} + \underbrace{2 \sum_I \gamma_I \sqrt{\omega_I^*}}_{\text{Non-linear flexibility}} + \underbrace{2 \gamma_{WH} \sqrt{\omega_W^* \omega_H^*}}_{\text{Substitutes vs Complements}}$$

Shephard's Lemma

$$\left(\frac{\partial e_T}{\partial \omega_I^*} = t_I \right) \Rightarrow t_I = \beta_I^* + \gamma_I \frac{1}{\sqrt{\omega_I^*}} + \gamma_{WH} \sqrt{\frac{\omega_J^*}{\omega_I^*}}$$

Adding covariates ($\beta_I^* = \beta_I z_I^T + v_I$) and shadow prices ($\omega_I^* = \theta_I \omega_I$)

Empirical Specification of Parental Time

$$t_I = \beta_I z_I^T + \gamma_I \frac{1}{\sqrt{\theta_I \omega_I}} + \gamma_{WH} \sqrt{\frac{\theta_J \omega_J}{\theta_I \omega_I}} + v_I$$

Childcare specification: daycares

Budget Identity

$$(m = e_T - \sum_I \omega_I t_I)$$



Latent Expenditure (m^*)

$$m^* = \alpha \mathbf{z}^M + \sum_I \gamma_I \sqrt{\theta_I \omega_I} + u$$

Baseline cost: $\alpha^* = \alpha \mathbf{z}^M + u$ ($\mathbf{z}^M$: control variables, u : unobserved error)

Observed expenditure is censored (Tobit regime): $m = \begin{cases} m^* & \text{if } m^* \geq 0, \\ 0 & \text{otherwise} \end{cases}$

Corner Solution Regime ($m = 0$)

Parents' time equations switch regime. Prices of pure childcare time ($\omega_I^* = \nu \theta_I \omega_I$) satisfy:

$$\alpha \mathbf{z}^M + \sum_I \gamma_I \sqrt{\omega_I^*} + u = 0 \quad (\text{Inverted to recover } \nu)$$

1. The time cost function

$$c_T = \underbrace{t_W \theta_W \omega_W + t_H \theta_H \omega_H}_{\text{Cost of parental childcare}} + \underbrace{m}_{\text{Cost of market childcare}}$$

2. The monetary cost function

$$c_M = \log \left(1 + \exp \left(\kappa_0 + \sum_I \kappa_I \sqrt{\omega_I^*} + \kappa_Y \omega_Y \right) \right) \times \sqrt{n} \quad (1)$$

where κ_0 , κ_I and κ_Y are parameters to be estimated.

Full leisure specification

Full Leisure (L_I)

$$L_I = I_I + (1 - \theta_I)t_I$$

'Remaining' Expenditure (Y_R)

$$Y_R = Y - C_M - C_T$$

Reduced-Form Demand Equations

Model A: Preference stability – Adds non-linear income effects

$$L_I = a_I z_I^L + b_I \omega_I + c_I \omega_J + d_I Y_R + e_I Y_R^2 + \varepsilon_I$$

Model B: SAT Type – Shifts preference parameters for parents

$$L_I = (a_I + a'_I \delta(n)) z_I^L + (b_I + b'_I \delta(n)) \omega_I + (c_I + c'_I \delta(n)) \omega_J + d_I Y_R + e_I Y_R^2 + \varepsilon_I$$

[◀ Back to two-stage estimation process](#)

Descriptive Statistics

[◀ Data](#)

	Without Child		With Children	
	Mean	StDev	Mean	StDev
Father's Adjusted Childcare Time	0.00	0.00	9.94	21.05
Mother's Adjusted Childcare Time	0.00	0.00	19.18	28.65
Childcare Expenditure	0.00	0.00	99.91	127.46
Number of Children	0.00	0.00	1.56	0.50
Dummy for Child under 3	0.00	0.00	0.74	0.44
Husband's Leisure Time	77.03	12.28	66.19	22.65
Wife's Leisure Time	82.49	12.30	66.98	28.80
Husband's Hourly Wage	30.71	44.51	31.97	25.89
Wife's Hourly Wage	24.36	16.36	29.48	26.25
Full Expenditure (in thousand dollars)	5.52	4.15	6.31	4.25
Husband's Education in Years	14.24	2.26	14.38	2.39
Wife's Education in Years	14.84	2.10	15.15	1.87
Husband's Age in Years	36.71	7.82	34.21	5.33
Wife's Age in Years	35.58	7.84	32.88	5.04

Preliminary regressions (OLS)

Variables	Expenditure		Father's Time		Mother's Time	
	Est.	StErr.	Est.	StErr.	Est.	StErr.
Constant	31.52	(16.72)	13.18	(3.00)	26.57	(3.80)
Father's Wage	0.74	(0.76)	-0.04	(0.09)	-0.05	(0.13)
Father's Wage ² / 100	-0.15	(0.70)	0.01	(0.04)	0.03	(0.05)
Mother's Wage	1.92	(0.55)	-0.10	(0.07)	-0.27	(0.11)
Mother's Wage ² / 100	-0.61	(0.33)	0.05	(0.03)	0.11	(0.04)
Father's Age	3.31	(8.41)	0.27	(1.83)	-0.66	(2.28)
Mother's Age	11.83	(9.63)	-1.60	(1.96)	-1.51	(2.48)
Father's Education	11.08	(5.70)	-0.78	(1.20)	-2.64	(1.51)
Mother's Education	10.18	(5.67)	-0.15	(1.07)	0.50	(1.74)
Number of Children	19.47	(5.52)	-0.56	(1.01)	-1.20	(1.32)
Child < 3 (dummy)	6.96	(5.11)	0.24	(1.06)	0.33	(1.40)

Recovering the shadow price parameters (θ_W, θ_H)

Mother's implied parameter:

- $w_W \uparrow \$1 \Rightarrow m \uparrow \$1.92$
- $w_W \uparrow \$1 \Rightarrow t_W \downarrow 0.27 \text{ h}$
- $MRS_W = 1.92/0.27 \approx 7.11$
 $\Rightarrow \theta_W \approx 0.71$ (assuming $w_W \approx 10$)

Father's implied parameter:

- $w_H \uparrow \$1 \Rightarrow m \uparrow \$0.74$
- $w_H \uparrow \$1 \Rightarrow t_H \downarrow 0.04 \text{ h}$
- $MRS_H = 0.74/0.04 \approx 18.5$
 $\Rightarrow \theta_H \approx 1.85$ (assuming $w_H \approx 10$)

First-stage estimation method (ML)

Parameters	Model A	Model B	Model C
	(Benchmark)	(No extreme val.)	(Orig. measures)
	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)
α [Intercept]	-99.28 (28.71)	-83.67 (39.24)	-98.38 (28.71)
α [Husband Edu]	15.81 (8.99)	10.36 (7.82)	15.59 (9.01)
α [Wife Edu]	15.16 (9.41)	5.63 (8.19)	15.34 (9.41)
α [Husband Age]	6.99 (13.19)	13.67 (11.23)	6.99 (13.19)
α [Wife Age]	19.56 (13.77)	8.52 (11.72)	19.31 (13.76)
α [Child < 3]	9.40 (8.08)	-7.14 (7.07)	9.42 (8.07)
α [Num. Kids]	30.08 (7.87)	17.25 (6.92)	30.05 (7.86)
β_H [Intercept]	6.28 (2.40)	7.13 (3.57)	27.40 (4.62)
β_H [Husband Edu]	-0.54 (1.15)	0.11 (1.21)	-0.70 (2.18)
β_H [Wife Edu]	0.01 (1.20)	-0.52 (1.28)	0.11 (2.26)
β_H [Husband Age]	0.25 (1.67)	-0.15 (1.74)	0.07 (3.15)
β_H [Wife Age]	-1.35 (1.74)	-0.94 (1.81)	-2.79 (3.29)
β_H [Child < 3]	0.32 (1.02)	0.27 (1.11)	1.63 (1.93)
β_H [Num. Kids]	-0.56 (0.99)	-1.00 (1.06)	-0.13 (1.87)
β_W [Intercept]	13.12 (2.54)	13.87 (6.17)	44.72 (4.10)
β_W [Husband Edu]	-2.55 (1.55)	-2.02 (1.65)	-3.96 (2.51)
β_W [Wife Edu]	-0.04 (1.57)	-0.64 (1.75)	0.72 (2.56)
β_W [Husband Age]	-0.34 (2.26)	1.74 (2.38)	-0.88 (3.67)
β_W [Wife Age]	-1.74 (2.33)	-3.33 (2.47)	-2.92 (3.80)
β_W [Child < 3]	0.40 (1.39)	0.20 (1.51)	0.67 (2.26)
β_W [Num. Kids]	-1.17 (1.34)	-1.23 (1.45)	-1.90 (2.17)

Second-stage estimation (3SLS) ◀ Full leisure demand

Parameters	Model A	Model B	Model C
	(Childless)	(Quadratic)	(Quad. + Demo)
	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)
α_H [Full Exp.]	1.03 (8.09)	3.41 (1.46)	2.68 (1.63)
α_H [Full Exp. ²]	-0.00 (0.13)	0.00 (0.03)	-0.02 (0.03)
α_W [Full Exp.]	4.20 (8.68)	4.57 (1.92)	3.96 (2.25)
α_W [Full Exp. ²]	0.03 (0.14)	0.02 (0.04)	0.01 (0.04)
Monetary Cost Parameters			
κ_0 (Intercept)	.	3.17 (2.18)	3.31 (3.32)
κ_H (Husband Wage)	.	-0.17 (0.13)	-0.20 (0.21)
κ_W (Wife Wage)	.	-0.09 (0.13)	-0.04 (0.20)
κ_Y (Full Income)	.	0.47 (1.26)	0.33 (1.96)

Interpretation of Engel Curves & Monetary Costs

Engel Curves (Leisure Demand):

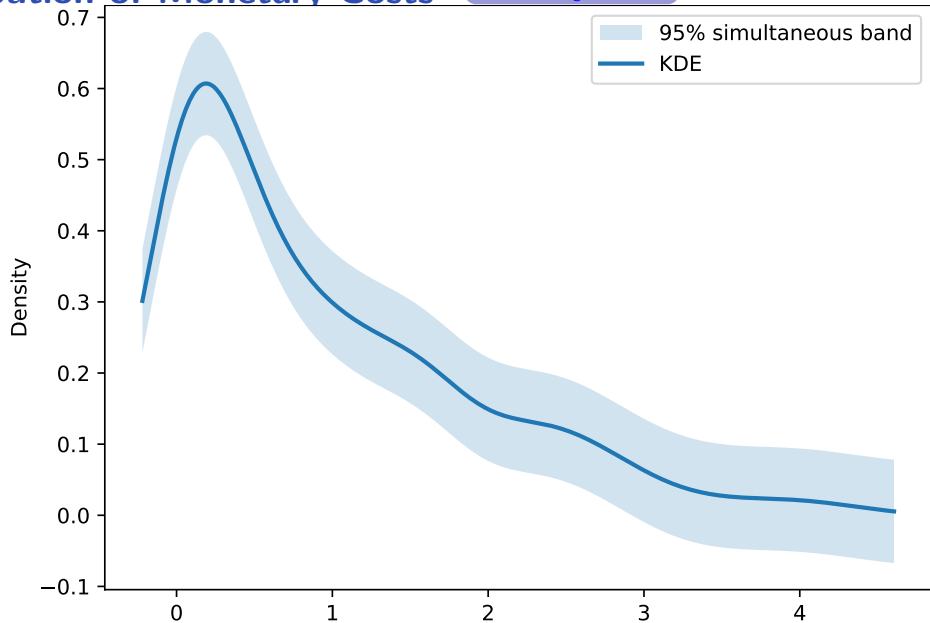
- **Positive Income Effect:** \$1k $\uparrow$ Full Exp $\Rightarrow$ Leisure $\uparrow$ 3.4h (Men) / 4.6h (Women).
- **Linearity:** Quadratic terms are not statistically different from zero.

Monetary Cost Function:

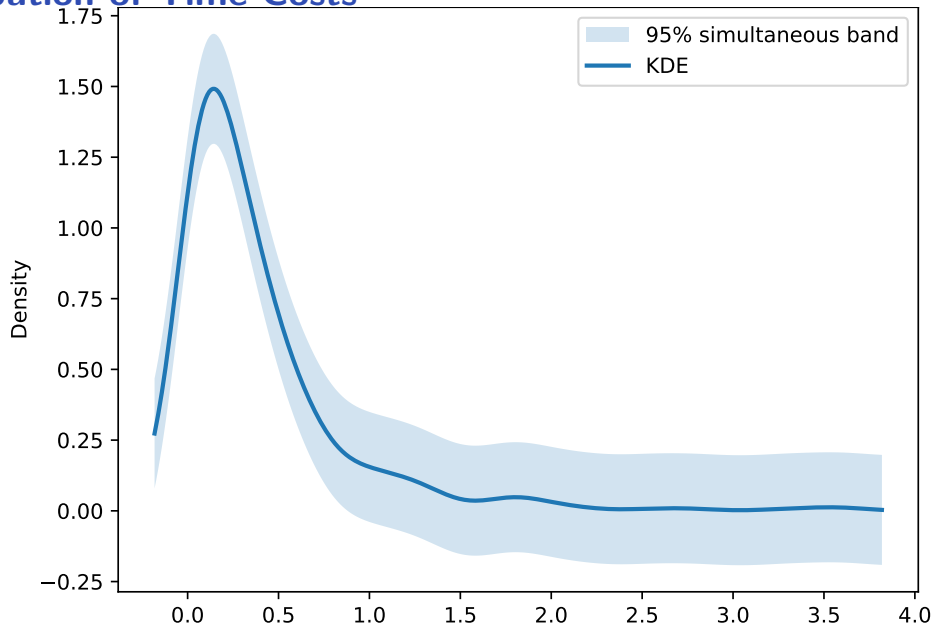
- **Weak Identification:** Parameters (κ) are imprecisely estimated (large S.E.). ► Figure 1
- **Additional covariates:** Adding covariates do not significantly improve fit.

Distribution of Monetary Costs

◀ Second-stage estimation



Distribution of Time Costs



Estimated weekly costs of children ◀ Cost function

	Model A		Model B		Model C	
	Mean	Median	Mean	Median	Mean	Median
1. Time Cost (\$1k)	(Benchmark)		(No extreme val.)		(Orig. measures)	
1 Child	0.43	0.23	0.52	0.27	0.81	0.57
2 Children	0.40	0.25	0.41	0.27	0.76	0.56
2. Monetary Cost (\$1k)	(Quadratic)		(Quad. + Demo)			
1 Child	0.74	0.46	0.72	0.38	—	—
2 Children	1.08	0.75	1.01	0.62	—	—

Interpretation the costs of children

Time Cost

- Flat/decreasing with size ($0.43 \approx 0.40$).
- Sizable: 23–35% of labor income.
- Model C overstates costs (passive care).

Monetary Cost

- Increases significantly with family size ($0.74 \rightarrow 1.08$).
- Robust across specifications.

Thank You!

Questions or feedback?

Scan to launch my website

