

# Children and Time Allocation

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# Plan for today

- Blundell, Pistaferri and Saporta-Eksten (2018): "Children, Time Allocation and Consumption Insurance"
  - Unitary model - Combines US data.

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- **Reading guide:**
  1. What are the main *research questions*?
  2. What is the (*empirical*) *motivation*?
  3. What are the central *mechanisms in the model*?
  4. What is the *simplest model* in which we could capture these?

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- **Reading guide:**
  1. What are the main *research questions*?
    - How do couples allocate time and consumption when having children?
    - How does children affect couples abilities to smooth consumption?
  2. What is the (*empirical*) *motivation*?
  3. What are the central *mechanisms in the model*?
  4. What is the *simplest model* in which we could capture these?

# Empirical Motivation: Siminski and Yetsenga (2022)

- Australian time-use data on panel of couples!

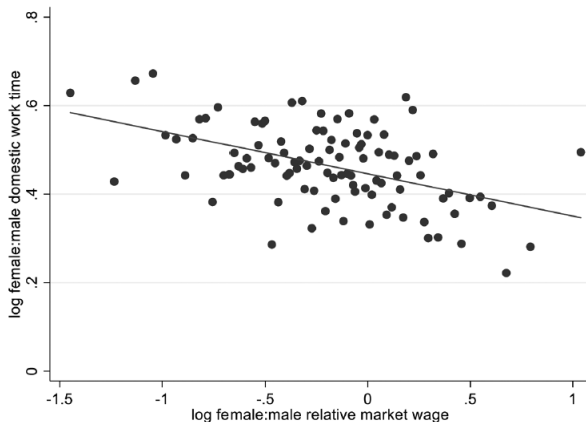


FIG. 1.—Relative domestic work time by relative wage. Each point represents 1 percentile of the female-to-male relative wage distribution among heterosexual couples. A color version of this figure is available online.

# Outline

## 1 Model and Mechanisms

## 2 Estimation

- Data
- First Step: MRS
- Second Step: SMM

## 3 Simulations

# Model Overview

- **Write** out the *recursive formulation* of the model
  - States
  - Choices
  - (transitions)

# Model Overview

- **Choices:**

$H_{j,t}$ : work hours,  $j \in \{1, 2\}$  (2=woman)

$L_{j,t}$ : leisure hours,  $j \in \{1, 2\}$

$T_{j,t}$ : Parenting hours,  $j \in \{1, 2\}$  (child care)

$C_t$ : Household consumption

- **States:**

$A_t$ : wealth

$F_{j,t}$ : permanent income shock,  $j \in \{1, 2\}$

$u_{j,t}$ : transitory income shock,  $j \in \{1, 2\}$

$\varepsilon$ : vector of 5 unobserved time-fixed taste-shifters.

(only allow for  $\varepsilon_{L_2}$ , wife's leisure, using two-point, fnt 27)

$z_t$ : child (50/50 prob. at age 28, young for 10years)



# State Transitions

- **Budget**

$$A_{t+1} = (1 + r)[A_t + \mathcal{T}(z_t, H_{1,t}W_{1,t} + H_{2,t}W_{2,t}) - C_t]$$

where joint taxation gives

$$\mathcal{T}(z_t, H_{1,t}W_{1,t} + H_{2,t}W_{2,t}) = \chi_t(b(z_t) + H_{1,t}W_{1,t} + H_{2,t}W_{2,t})^{1-\mu_t}$$

with  $b(z_t)$  being a consumption floor.

- **Hours worked** are

$$H_{j,t} = \bar{L} - L_{j,t} - T_{j,t}$$

- **Wages** are

$$\log W_{j,t} = x'_{j,t}\beta_W^j + F_{j,t} + u_{j,t}$$

$$F_{j,t} = F_{j,t-1} + v_{j,t}$$

# Preferences

- **Utility** is

$$\begin{aligned} & \exp(\tilde{\phi}_C(z_t, \varepsilon_t)) \frac{[C_t - \gamma(z_t) \mathbf{1}(H_{2,t} > 0)]^{1-1/\eta}}{1 - 1/\eta} \\ & - \frac{1}{1 - \rho_L} \left[ \exp(\tilde{\phi}_{L_1}(z_t, \varepsilon_t)) L_{1,t}^{1-1/\varphi_{L_1}} + \exp(\tilde{\phi}_{L_2}(z_t, \varepsilon_t)) L_{2,t}^{1-1/\varphi_{L_2}} \right]^{1-\rho_L} \\ & - \frac{1}{1 - \rho_T} \left[ \exp(\tilde{\phi}_{T_1}(z_t, \varepsilon_t)) T_{1,t}^{1-1/\varphi_{T_1}} + \exp(\tilde{\phi}_{T_2}(z_t, \varepsilon_t)) T_{2,t}^{1-1/\varphi_{T_2}} \right]^{1-\rho_T} \end{aligned}$$

where, for  $x \in \{C, L_1, L_2, T_1, T_2\}$ ,

$$\tilde{\phi}_x(z_t, \varepsilon_t) = \phi_x^{nk} + \phi_x^k z_t + \varepsilon_{x,t}$$

are taste-shifters.

(only  $\text{var}(\varepsilon_{L_2,t}) > 0$  so irrelevant in all other)

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where

$\eta > 0$  is the consumption Frisch elasticity ( $1/\eta$  is the CRRA)

$\gamma(z_t)$  is cost of work (for women)

$\varphi_x \in (0, 1)$  is the curvature wrt  $x$ .

(Governs how sensitive  $x$  is to e.g. wage changes.)

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where

$\rho_x < 1$  is the complementarity ( $\rho_x > 0$ ) / substitutability ( $\rho_x < 0$ )  
between men and women

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where

interpreting the last part as “home production of children”

→ relative weight on  $j$  is their absolute advantage in child production

→ if  $\tilde{\phi}_{T_2}(z_t, \varepsilon_t) > \tilde{\phi}_{T_1}(z_t, \varepsilon_t)$  mothers has an absolute advantage

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  - Illustrates the amount of hoops one could be willing to jump to reduce the parameter space in the SMD...

# Data Sources

- **Panel Study of Income Dynamics (PSID)**

labor income, and hours worked,  $H_{j,t}$ ,  $\rightarrow w_{j,t}$

Non-durable consumption,  $c_t$ , and assets,  $A_t$ .

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- **American Time Use Survey (ATUS)**

Time used for leisure,  $L_{j,t}$ , and child care,  $T_{j,t}$

Only for one respondent (not both partners)

$\rightarrow$  Use responses of women and *impute* values for their partners:

$$X_{1,t} = f(\text{cohort}_1, \text{educ}_1), \quad X \in \{L, T\}$$

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- **Consumer Expenditure Survey (CEX)**

Non-durable consumption,  $c_t$ .

(better quality than PSID)

# MRS (approximations): 1

- **MRS between wife's and husband's leisure** (e.q. 7,  $x = \log(X)$ )

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can give *three* moments to identify  $K_0$ ,  $\varphi_{L_2}$  and  $\varphi_{L_1}$  (mine...)

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 $\rightarrow L_{j,t} = \underbrace{\bar{L}}_{4,160 \text{ ass.}} - \underbrace{T_{j,t}}_{0 \text{ ass.}} - H_{j,t}$  observed through  $H_{j,t}$ .

# MRS (approximations): 2

- **MRS between wife's leisure and consumption (e.q. 8)**

$$\mathbb{E}\left[l_{2,t} - K_1 + \varphi_{L_2} w_{2,t} - \mu \varphi_{L_2} y - \frac{\varphi_{L_2}}{\eta} c_t - \frac{\varphi_{L_2}}{\varphi_{L_1}} \rho_L (1 - \varphi_{L_1}) l_{1,t} + \varphi_{L_2} \rho_L \frac{\varphi_{L_2} (1 - \varphi_{L_2})}{\varphi_{L_1} (1 - \varphi_{L_1})} \frac{W_{2,t} L_{2,t}}{W_{1,t} L_{1,t}} | l_t\right] = 0$$

where  $\mu$  is “known” tax parameter and  $y$  is household income.  
Can likewise give *three* moments to identify  $K_1$ ,  $\eta$  and  $\rho_L$ .

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- **MRS between wife's and husband's parental time** (e.q. 9)

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- **Solution:** Impute consumption from the CEX “into” the ATUS.
  1. **Estimate** avg. consumption in CEX:  $\hat{C}(\text{cohort}, \text{educ})$
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- Similarly for the time-use of men (as discussed above)

# Parameter Estimates

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PARAMETER ESTIMATES

A. MRS ESTIMATES			
	Leisure and Consumption (1)		Parental Time (2)
$\varphi_{L_1}$	.211 (.037)	$\varphi_{T_1}$	.115 (.081)
$\varphi_{L_2}$	.162 (.025)	$\varphi_{T_2}$	.503 (.201)
$\rho_L$	.535 (.099)	$\rho_T$	-.197 (.123)
$\eta$	.903 (.049)		
Observations	11,195		2,901
B. PREFERENCE SHIFTERS			
	With Children		Without Children
$\phi_{L_1}$	-8.925 (1.108)		-7.680 (1.013)
$\phi_{L_2}$	-9.397 (1.036)		-8.816 (1.024)
$\phi_{T_1}$	-23.993 (10.245)		N/A
$\phi_{T_2}$	-3.957 (1.201)		N/A
$\sigma_{\varepsilon_{\alpha}}^2$	1.476 (.174)		.700 (.087)
$\gamma$	(see table 2)		4,794 (438)
$\phi_C$	.132 (.024)		Normalized to 0



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alot to wage-changes

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leisure time is complements  
(enjoy time together)

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$\phi_{T_1}$	-23.993 (10.245)	N/A
$\phi_{T_2}$	-3.957 (1.201)	N/A
$\sigma_{\varepsilon_{\alpha}}^2$	1.476 (.174)	.700 (.087)
$\gamma$	(see table 2)	4.794 (.438)
$\phi_C$	.132 (.024)	Normalized to 0

# Parameter Estimates

TABLE 3  
PARAMETER ESTIMATES

A. MRS ESTIMATES			
	Leisure and Consumption (1)		Parental Time (2)
$\varphi_{L_1}$	.211 (.037)	$\varphi_{T_1}$	.115 (.081)
$\varphi_{L_2}$	.162 (.025)	$\varphi_{T_2}$	.503 (.201)
$\rho_L$ child-care time is sublements	.535 (.099)	$\rho_T$	-.197 (.123)
$\eta$	.903 (.049)		
Observations	11,195		2,901
B. PREFERENCE SHIFTERS			
	With Children		Without Children
$\phi_{L_1}$	-8.925 (1.108)		-7.680 (1.013)
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children decrease the  
value of leisure

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women have a large abs.  
advantage in child-care

# Parameter Estimates

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random pref. shocks have  
more variance when children  
are present



# Parameter Estimates

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$\sigma_{\varepsilon_{L_1}}$	1.476 (.174)		.700 (.087)
$\gamma$	fixed cost (in cons.) of work (see table 2) 2,900		4,794 (438)
$\phi_C$	.132 (.024)		Normalized to 0

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$\gamma$	(see table 2)		4,794 (438)
$\phi_C$	.132 (.024)		Normalized to 0

marg. util. of cons. is 13%  
higher when children present

# Outline

## 1 Model and Mechanisms

## 2 Estimation

- Data
- First Step: MRS
- Second Step: SMM

## 3 Simulations

# Simulations

- Simulate **transitory and permanent** wage changes.  
Men and women separately
- **Transitory:** Approximate Frisch (since little income effect)
- **Permanent:** Approximate Marshall

# Consumption and Labor Supply Responses

- Age 30 response from 10% increase in wage in two models  
With child from age 28 + Without child from age 28 (elasticities)

TABLE 5  
CONSUMPTION AND LABOR SUPPLY RESPONSES TO TRANSITORY AND PERMANENT SHOCKS

	TOTAL RESPONSE						EXTENSIVE VS. INTENSIVE MARGIN			
	<i>C</i>		<i>H<sub>1</sub></i>		<i>H<sub>2</sub></i>		<i>E<sub>2</sub></i>		<i>H<sub>2</sub></i>  Employed	
	With Kids (1)	Without Kids (2)	With Kids (3)	Without Kids (4)	With Kids (5)	Without Kids (6)	With Kids (7)	Without Kids (8)	With Kids (9)	Without Kids (10)
Transitory:										
Husband	.119	.123	.180	.222	-.076	.001	-.051	.005	-.041	.006
Wife	.130	.135	.000	-.006	.703	.394	.574	.280	.329	.167
Permanent:										
Husband	.393	.410	.105	.116	-.296	-.140	-.193	-.065	-.170	-.088
Wife	.353	.375	-.070	-.106	.531	.304	.491	.266	.208	.086

NOTE.—Model-simulated responses for transitory and permanent shocks.

- Consumption response consistent with buffer-stock theory:  
transitory shocks have little effect
- Women have larger responses than men
- Children increases response for women
- Extensive margin important (for women)

# Leisure and Parental Time Responses

TABLE 6  
LEISURE AND PARENTAL TIME RESPONSES TO TRANSITORY AND PERMANENT SHOCKS

	$L_1$		$L_2$		$T_1$	$T_2$
	With Kids (1)	Without Kids (2)	With Kids (3)	Without Kids (4)	With Kids (5)	With Kids (6)
Transitory:						
Husband	-.230	-.231	-.003	-.001	-.095	.131
Wife	-.007	.006	-.217	-.309	.033	-.538
Permanent:						
Husband	-.131	-.120	.078	.110	-.067	.261
Wife	.085	.110	-.151	-.238	.058	-.443

NOTE.—Model-simulated responses for transitory and permanent shocks.

1. Leisure elasticities similar between men/women w/w.o. kids and compliments (same-sign cross trans ela)
2. Permanent → reduction in both own leisure and child care time and opposite sign cross elasticity → specialization.
3. Women have large responses on child-care time from own and male wages.

# Consumption Insurance

TABLE 7  
INSURANCE EFFECTS

Consumption	-3.9%	
After-tax and transfers household earnings	-5.0%	
Before-tax (after-transfers) household earnings	-5.6%	
	Husband	Wife
Earner's average share of before-tax earnings	.66	.34
Earner's before-tax and transfers earnings response:	-10.7%	+2.0%
Hours	-1.0%	+3.0%
Leisure	+1.3%	-.8%
Parental time	+.7%	-2.6%

NOTE.—Insurance decomposition calculations based on model-simulated responses to a 10 percent permanent decline in the husband's wage.

1. Some consumption insurance (3.9% drop from 10% drop in wages)
2. Substitution effect dominates (-1% in hours worked)
3. Sizable cross-effect (+3% in work hours of women)
4. Leisure margin most active for men, parent time most for women.

# Counterfactual Simulations

Two counterfactuals with same budget effects:

1. unconditional child-subsidy,  $b(z) \uparrow$
2. employment subsidy,  $\gamma(z) \downarrow$

TABLE 10  
POLICY EXPERIMENTS

	$C$ (1)	$H_1$ (2)	$H_2$ (3)	$E_2$ (4)	$L_1$ (5)	$L_2$ (6)	$T_1$ (7)	$T_2$ (8)
A. Experiment 1: Unconditional Subsidy for Families with Young Children								
Total	.6%	-.4%	-.7%	-.4%	.4%	.3%		
Before young children	.9%	-.4%	-.5%	-.2%	.4%	.4%		
With young children	1.3%	-.6%	-1.8%	-1.0%	.8%	.7%	.2%	1.0%
After young children	.1%	-.1%	-.1%	-.1%	.1%	.1%		
Consumption equivalent utility value	.95%							
B. Experiment 2: Employment Subsidy for Wives with Young Children								
Total	.1%	-.2%	1.9%	4.6%	.2%	-.5%		
Before young children	.9%	-.4%	-.5%	-.1%	.4%	.4%		
With young children	-.3%	-.3%	6.5%	13.1%	.3%	-1.7%	.3%	-5.6%
After young children	.1%	-.1%	-.1%	~0%	.1%	.1%		
Consumption equivalent utility value	.17%							



# Exam: Upload

**You should hand in a single zip-file with all assignments and the exam.** The zip-file should be named after your KU username (e.g. abs123) and have the following folder and file structure:

**Assignment\_1\**

Assignment\_1.pdf - with text and all results

*\*files for reproducing the results\**

**Assignment\_2\**

Assignment\_2.pdf - with text and all results

*\*files for reproducing the results\**

**Assignment\_3\**

Assignment\_3.pdf - with text and all results

*\*files for reproducing the results\**

**Exam\**

Exam.pdf - with text and all results

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- **Individual exam!**

# Exam: Tips

- **Try to answer all questions**

48 hours, but thought of as  $2 \times 9$  work days

Make sure that your computer+Python works!

Similar flavor as assignments

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Write clearly how you move forward

Often you can “easily” go back and change stuff if time

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- **Thanks for now - Good luck!**

# References I

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