

Parental Time and Material Investments in Rural Thailand

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August 7, 2017

This paper...

- studies parental time and material investment in early childhood:
 - ▶ estimates a reduced form model using the RIECE Thailand Data,
 - ▶ estimates a structurally-linked model, derived from a simple economic model, to identify the mechanisms through which family structure and child gender affect the parental investments,
 - ▶ estimates the elasticity of substitution between time and material investments.

Data

- The data are part of the Reducing Inequality through the Early Childhood Education project (the RIECE Thailand).
- There are two generations of samples: with about 1,400 households and 1,600 targeted children from 23 Tambons/subdistricts in rural areas of Mahasarakham and Kalasin provinces.
- The results presented today come from the baseline survey of the first generation only.
- *Children* questionnaire: basic information of the children in the household (e.g., age, gender, birth weight etc.), time & material investment, parenting style, child health, chronic disease & disability, education & current development (1,275 children interviewed in the first round).
- *Household* questionnaire: household composition, jobs of each adult, marital status, income, expenditure, asset, borrowing & lending (1,054 households interviewed in the first round).

Summary Statistics of the Data: Households

Family structure	Having-parents	No-parents	Total	Obs	Whole sample	Obs
Income	20564	8445	14784	606	15453	892
(Baht per month)	(24731)	(12254)	(20680)		(20821)	
Selection-corrected wage	46.16	39.52	43.00	606	43.50	938
(Baht per hour)	(16.41)	(18.81)	(17.89)		(17.02)	
Household size	4.78	3.76	4.29	606	4.71	1023
	(1.31)	(1.09)	(1.31)		(1.53)	
Memory digit span score	3.78	2.76	3.30	606	3.23	1041
	(1.61)	(1.39)	(1.59)		(1.54)	
Highest years of schooling	11.56	7.36	9.56	606	9.95	1023
	(2.83)	(3.39)	(3.75)		(3.81)	
Age of household head	48.83	55.54	52.03	606	52.61	1044
	(13.45)	(8.26)	(11.76)		(12.25)	
Female household head	0.45	0.47	0.46	606	0.46	1052
	(.5)	(.5)	(.5)		(.5)	
Faction of female	0.53	0.54	0.53	606	0.53	1023
	(.17)	(.2)	(.19)		(.18)	

Table 1: Household's characteristics

Summary Statistics of the Data: Children

Family structure	Having-parents	No parents	Total	Obs	Whole sample	Obs
Female child dummy	0.46 (.5)	0.48 (.5)	0.47 (.5)	775	0.49 (.5)	1101
Birth weight (kilogram)	3.03 (.48)	3.07 (.46)	3.05 (.47)	775	3.05 (.47)	1064
Child age	39.16 (7.54)	39.81 (8.01)	39.46 (7.76)	775	39.40 (7.8)	1055
Parental remittance (Baht per month)	1561 (3842)	6135 (6551)	3654 (5728)	775	3365 (5612)	1085
Material Expense (Baht per month)	585 (1018)	267 (463)	439 (827)	775	490 (973)	1102
Activity time (Hours per month)	45.98 (42.69)	36.77 (40.78)	41.77 (42.05)	775	42.32 (43.45)	1102
Caring time (Hours per month)	429 (148)	280 (48)	361 (136)	775	368 (140)	1098
Main caregiver's caring time (Hours per month)	265 (58)	280 (48)	272 (54)	775	271 (54)	1103
Fraction of sample	54.65%	45.35%	100%			

Table 2: Children's characteristics

Summary Statistics of the Data: Parents and Main Caregivers

Family structure	Having-parent	No-parents	Total	Obs	Whole sample	Obs
Father's age	34.03 (7.42)	30.75 (5.34)	33.02 (7.)	503	32.68 (6.96)	826
Mother's age	30.47 (6.46)	27.96 (4.84)	29.69 (6.11)	503	29.33 (6.18)	940
Caregiver's age	36.50 (10.85)	52.28 (8.)	41.39 (12.42)	503	44.56 (13.25)	1010
Caregiver female dummy	0.93 (.26)	0.89 (.31)	0.92 (.28)	503	0.91 (.28)	1045
Father's yrs of schooling	10.21 (3.12)	10.92 (2.85)	10.43 (3.05)	503	10.50 (3.13)	927
Mother's yrs of schooling	10.84 (3.15)	11.43 (2.82)	11.03 (3.06)	503	10.90 (3.07)	1021
Caregiver's yrs of schooling	9.46 (3.66)	5.46 (2.53)	8.22 (3.82)	503	7.45 (3.77)	1044

Table 3: Parents and main caregiver's characteristics

An Empirical Specification without an Explicit Economic Model

- Linear regression specification:

$$y_i = \beta_w w_i + \beta_f d_i^f + \beta_g d_i^g + \beta_0 \mathbf{X}_i + \epsilon_i, \quad (1)$$

where

- ▶ y_i is the dependent variable including monthly time investment, monthly material investment,
- ▶ d_i^f is a dummy variable for child i living in a household without parents,
- ▶ d_i^g is a dummy variable indicating if child i is a girl,
- ▶ w_i is the average wage per hour of the household,
- ▶ \mathbf{X}_i is a set of exogenous demographic variables including income, remittances, number of adults, number of children, memory digit span score of the questionnaire's respondent, child's birth weight, child's age, female head dummy, household head age.

Imputation of the Hourly Household-Average Wage

- We imputed the hourly wage for each individual using the two-step Heckman estimation based on the following specification:

$$\ln w_i = \beta_0 + \beta_1 s_i + \beta_2 Expr_i + \beta_3 ExprSq_i + \beta_4 d_i^g + \beta_5 d_i^m + \epsilon_i \quad (2)$$

where s_i denotes the years of education of individual i ; $Expr$ and $ExprSq$ denote potential experience and its square, respectively; d_i^g and d_i^m denote female dummy and marital status.

- Occupational choices: we divided the LFS sample into two groups, wage workers and the rest.
- To capture the occupation selection, we use the ratio of years of schooling of each individual to the highest years of schooling of all household members and male adult ratio as the exclusion restrictions.
- The hourly household-average wage was then calculated by averaging the hourly wage of all adults in the household.

Estimation Results with Whole Sample

	Activity Time	Activity Time	Material Expense	Material Expense	Caring Time	Caring Time	Caring TimeCG	Caring TimeCG
No parents at home	-5.933* (3.390)	-0.704 (3.873)	-254.3*** (59.97)	-143.1** (72.60)	-101.5*** (9.021)	-137.1*** (11.03)	15.34*** (4.952)	13.07** (5.282)
Child female dummy	10.41*** (3.044)	10.52*** (3.126)	-148.1*** (55.01)	-134.7** (57.74)	-8.542 (7.850)	-11.80 (7.785)	-6.751* (3.755)	-6.608* (3.713)
Heckman wage rate	0.205* (0.106)	0.320** (0.157)	8.328*** (2.502)	7.497** (3.459)	0.655** (0.276)	0.978*** (0.354)	-0.123 (0.146)	-0.00339 (0.189)
Caregiver's age		-0.542*** (0.204)		-6.124* (3.175)		2.127*** (0.604)		0.190 (0.281)
Caregiver's yrs of schooling		-0.594 (0.812)		9.523 (17.61)		-3.421 (2.273)		-0.0827 (1.099)
Adjusted R-squared	0.035	0.043	0.079	0.082	0.369	0.407	0.038	0.039
Observations	775	745	775	745	771	742	776	746

Table 4: Impact of fundamental variables on parental investments

Estimation Results with Households with One Child Only

	Activity Time	Activity Time	Material Expense	Material Expense	Caring Time	Caring Time	Caring TimeCG	Caring TimeCG
No parents at home	-4.293	2.129	-254.6***	-163.0*	-105.4***	-136.6***	13.55**	12.51**
Child female dummy	10.18***	10.15***	-160.5***	-151.7**	-5.844	-7.162	-8.634**	-8.538**
Heckman wage rate	0.267**	0.316*	8.458***	8.602**	0.663**	1.057***	-0.00607	0.0254
Caregiver's age		-0.553**		-6.888*		1.678**		0.0463
Caregiver's yrs of schooling		-0.188		2.663		-4.863*		-0.337
Adjusted R-squared	0.033	0.042	0.095	0.098	0.367	0.395	0.050	0.044
Observations	607	589	608	590	605	587	608	590

Table 5: Impact of fundamental variables on parental investments

The Economic Model of Parental Investment

- Consider a household with two agents, called an adult and a child.
- The household's decision problem is to choose consumption c , leisure ℓ , time investment I_t , and material investment I_m to maximize household utility:

$$\max_{c, \ell, I_t, I_m} U(c, \ell, \theta) \quad (3)$$

subject to the full-income budget constraint, and the skill formation technology, respectively,

$$c + w\ell + wI_t + I_m \leq wT + b, \quad (4)$$

$$Af(I_t, I_m) = \theta, \quad (5)$$

where w is the wage rate, b is a non-labor income (e.g., remittances from relatives and friends), A is the productivity of skill formation, and T is the total time endowment.

Roles of Family Structure and Child Gender

- **Family structure** can potentially enter the problem as follows:
 - ▶ Factor Share: the share for time μ should be higher for no-parents households: $\mu(\text{no-parent}) > \mu(\text{parent})$.
 - ▶ Productivity parameter A : grand parents may be less effective in producing the skill than the biological parents.
 - ▶ Altruism U_θ : grand parents may be less altruistic toward the child than the biological parents. For example, we may write $U(c, \ell, \theta) = u(c, \ell) + \lambda v(\theta)$, where λ here is the altruistic parameter.
 - ▶ Remittance b : a household whose parents went working somewhere else may receive more money from outside the household more than the others.
- **Child gender** can potentially enter the problem as follows:
 - ▶ Factor share: the share for time μ should be higher for girls, $\mu(\text{girl}) > \mu(\text{boy})$.
 - ▶ Altruism U_θ : the adult may be more altruistic toward girls than boys.

Key Implications of the Model

- An optimal condition with respect to time and material investments is

$$\frac{f_t(l_t, l_m)}{f_m(l_t, l_m)} = w, \quad (6)$$

- The first key implication of the model is that the preference and productivity parameters do not enter this optimal condition.
- More formally, the homotheticity assumption of the production technology implies that

$$\frac{f_t(l_t, l_m)}{f_m(l_t, l_m)} = g\left(\frac{l_t}{l_m}\right) = w \Rightarrow \frac{l_t}{l_m} = h(w), \quad (7)$$

where $h(\cdot)$ is the inverse function of $g(\cdot)$.

Empirical Specification with CES Production Function

- Assume that the skill formation is a CES:

$$f(l_t, l_m) = (\mu l_t^\rho + (1 - \mu) l_m^\rho)^{1/\rho}, \quad (8)$$

where $0 \leq \mu \leq 1$ is the factor share, and $\frac{1}{1-\rho} \leq 0$ is the elasticity of substitution.

- The optimal condition with respect to time and material investments becomes

$$\ln \left(\frac{l_t}{l_m} \right) = -\frac{1}{1-\rho} \ln w - \frac{1}{1-\rho} \ln \left(\frac{1-\mu}{\mu} \right) \quad (9)$$

An Empirical Specification from the Economic Model

- Based on the optimal condition (9), we employ the following linear specification

$$\ln \left(\frac{l_t}{l_m} \right)_i = -\frac{1}{1-\rho} \ln w_i + \eta_f d_i^f + \eta_g d_i^g + \eta_0 \mathbf{X}_i + \epsilon_i, \quad (10)$$

where l_t and l_m are time and material investment, respectively; and \mathbf{X}_i are the set of control variables similar with specification (1).

- Empirical interpretation:
 - ▶ The coefficient of the log wage, $-\frac{1}{1-\rho}$, should be negative.
 - ▶ The impacts of other variables, especially child gender and family structure, should be interpreted through the factor share μ .
 - ★ If the girl dummy is positive and significant, we would interpret that $\mu(\text{girl}) > \mu(\text{boy})$.
 - ★ If the no-parent dummy is positive and significant, we would interpret that $\mu(\text{no-parent}) > \mu(\text{parent})$.
 - ★ If these are true, we then should expect a positive significant result for the interaction term between girl and no-parent dummies.

Estimation Results of the Structurally-Linked Estimation

	ln(Time/Material)	ln(Time/Material)	ln(Time/Material)	ln(Time/Material)
No parents at home	0.487*** (0.174)	0.301 (0.196)	0.0133 (0.248)	0.319 (0.196)
Child female dummy	0.932*** (0.132)	0.905*** (0.136)	0.672*** (0.166)	3.945*** (1.465)
Log Heckman wage	-0.584*** (0.211)	-0.731** (0.307)	-0.749** (0.304)	-0.346 (0.341)
Log caregiver's age		0.647* (0.361)	0.644* (0.359)	0.638* (0.356)
Log caregiver's yrs of schooling		0.124 (0.273)	0.0952 (0.273)	0.125 (0.271)
Girl & No parents at home			0.585** (0.289)	
Girl & Log Heckman wage				-0.815** (0.385)
Adjusted R-squared	0.105	0.109	0.114	0.112
Observations	636	615	615	615

Discussion

- Only material investment is influenced by family structure. No-parent children received less material investment.
- Girls received less material but more time investments.
- An older main caregiver led to a lower investment of both types.
- The structurally-linked estimation suggested that households might believe that the factor share of time investment μ is higher for girls (no-parent) than for boys (at least one parent).
- We also identified the elasticity of substitution and found that inputs for female child seems to be more substitute.