# Sibling Rivalry: Child Endowment and Intrahousehold Allocation

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## 1 Research Question

- Do parents reinforce or compensate for early ability differences between children?
- Does household-based production and residential rivalry influence human capital investment?

## 2 The Related Literature

### Theoretical Prediction

The pattern of parental investment can be **compensating** or **reinforcing** child ability depending on:

- Efficiency concern: investing more in their better-endowed children (Becker & Tames, 1976)
- Equity: investing more in the weaker child to reduce inequality (Behrman et al., 1982)

### Empirical Evidence

A review of the literature by Almond and Mazumder (2013) documented four main findings: *neutral investment, compensating response, reinforcing response* and *a combination of the later two*

## 3 Conceptual Framework

- Parents derive utility from consumption $c$ and the quality of their $n$ children $q$: $u(c, q)$.
- $q$ is a CES aggregator over a child's quality $q_i$: $q = \left(\alpha_1 q_1^r + \ldots + \alpha_n q_n^r\right)^{\frac{1}{r}}$.
- Parents allocate resources (income $y$ and home production $hp$) on consumption $c$ and investment in children $I$: $c + I = y + hp$
- Investment $I_i$ determined by: $I_i = p_i \times I$ where the share $p_i$ is chosen by children via rivalry
- Parents allocate children's time between labour $l_i$ and studying $s_i$.
- Children's labour serves as an input for a home produced good $hp$, given by $hp = f(l_1, \ldots, l_n)$
- A child's individual quality production function: $q_i = q_i(I_i, s_i; q_i^0)$

## 4 Empirical Strategy

$$I_i = \beta_0 + \beta_1 e_i + \beta_2 e_{-i} + \alpha_0 X_i + \gamma_f + \phi_i + \varepsilon_i$$

where $I_i$ is parental investments; $e_i$ is child's own ability, and $e_{-i}$ is the sibling's ability

- A positive (negative) sign on $\beta_1$ would indicate that parental investments are reinforcing (compensating)
- A positive sign on $\beta_2$ would indicate that parents invest more in children who have siblings with higher endowments

### Unobserved heterogeneity

- To reduce the bias due to unobserved family-specific heterogeneity, a within-family differences model is estimated:

$$\Delta I_{if} = \Delta e_{if}\beta_1 + \Delta X_{if}\alpha_0 + \Delta \phi_i + \Delta \varepsilon_{if}$$

### Endogenous measures of endowment

- Potential feedback effects between observed investment and measures of ability
- To deal with this problem, we use the "residual method", where the unexplained part of estimated health (cognitive) production function is taken as the child's genetic ability endowment.

$$Y_{if}^k = \beta_0^k + \beta_1^k Z_{if} + \beta_2^k W_{if} + e_i + \epsilon_{if}$$

### Data

Data is from the *Young Lives* longitudinal study (Ethiopia, Younger cohort only)

## 5 Results

### Sibling Composition and Investment

**Table 1:** Sibling Composition & Child Activities

| | Total Hours | Domestic Work | Market Work |
|---|---|---|---|
| Female | 0.230 | 13.02*** | -12.77*** |
| | (3.244) | (2.352) | (2.922) |
| Relative birth order | 10.88*** | 7.143*** | 3.736** |
| | (1.408) | (1.002) | (1.309) |
| Female×birth order | 0.739 | 5.723*** | -4.999** |
| | (1.786) | (1.419) | (1.576) |
| Number of siblings | 2.187*** | 0.118 | 2.071*** |
| | (0.377) | (0.326) | (0.317) |
| Female×No.of sib | -0.704* | 1.497*** | -2.199*** |
| | (0.335) | (0.311) | (0.317) |
| No. of younger sib | 2.475*** | -0.292 | 2.768*** |
| | (0.494) | (0.399) | (0.468) |
| Female×No.of young sib. | -0.959 | 2.326*** | -3.284*** |
| | (0.519) | (0.476) | (0.498) |
| Observations | 5246 | 5247 | 5246 |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

- Consistent with predictions of a household production model, older children work more because they are better at household production
- A strong correlation between the number of younger siblings and hours per week children spend on different work activities with a clear gender divide

### Endowments & Education Investment

Parents **reinforce** educational inequality

**Table 2:** Child Endowment & Educ. Investment

| | Preschool | Sch.Enr. | Educ.Exp |
|---|---|---|---|
| *Health Endowment* | | | |
| Parental Perception: Better than peers | 0.095** | -0.007 | 0.178* |
| | (0.031) | (0.025) | (0.063) |
| Height-for-age z-score | 0.008 | 0.013* | 0.015 |
| | (0.009) | (0.007) | (0.027) |
| Residual health endowment | 0.086** | -0.017 | 0.167* |
| | (0.030) | (0.027) | (0.064) |
| Sibling health | 0.000 | 0.009 | 0.024 |
| | (0.002) | (0.007) | (0.016) |
| *Cognitive Endowment* | | | |
| PPVT Score | 0.005** | 0.001 | 0.017*** |
| | (0.002) | (0.002) | (0.004) |
| CDA Score | 0.024*** | 0.008 | 0.066*** |
| | (0.006) | (0.004) | (0.015) |
| Residual PPVT Score | 0.000 | 0.000 | 0.013** |
| | (0.001) | (0.002) | (0.004) |
| Sibling PPVT score | 0.000 | 0.001 | 0.002* |
| | (0.000) | (0.000) | (0.001) |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

### Endowments & Health Investment

Parents **compensate** the inherently weak child with health inputs

**Table 3:** Child Endowment & Health Investment

| | Completed Vaccination | Balanced Meal | Medical Expenses |
|---|---|---|---|
| *Health Endowment* | | | |
| Parental Perception: Worse than peers | 0.057* | 0.003 | 0.277* |
| | (0.027) | (0.036) | (0.131) |
| Early health shock | 0.083* | -0.038 | 0.316 |
| | (0.035) | (0.028) | (0.157) |
| Residual health endowment | -0.020 | 0.022 | -0.053 |
| | (0.025) | (0.032) | (0.086) |
| Sibling health | 0.002 | 0.005 | 0.006 |
| | (0.003) | (0.005) | (0.017) |
| *Cognitive Endowment* | | | |
| PPVT score | 0.000 | 0.006** | 0.004 |
| | (0.001) | (0.002) | (0.005) |
| Residual PPVT score | -0.001 | 0.006** | 0.003 |
| | (0.001) | (0.002) | (0.006) |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

### Heterogeneity

- The response of educational investment to a higher ability child is modestly increasing in income;
- Together with the main effect, these estimates imply that educational investments in children are slightly reinforcing in high-income families
- Investment differences across families by maternal education are statistically insignificant

## 6 Conclusions

- The role of the family must be considered when designing public policies to remedy the effects of early inequality. The evidence has been proved for Ethiopia, and an expected conclusion stated.
- The paper could be a real value added to the literature by orientating the lecture on the plausible policy in the case of Ethiopia