BORN THIS WAY?
PARENTAL INVESTMENT, CHILD GENDER AND SKILL GAPS

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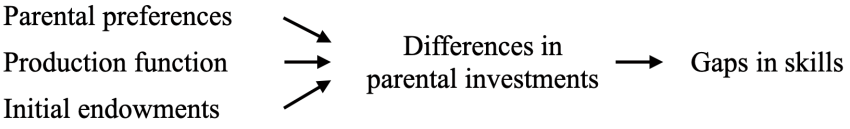
What is driving the expansion of female-favourable gaps in literacy?

- Female-favourable gaps in literacy → gaps in academic achievement (Buchmann and DiPrete, 2006, Entwisle, Alexander, and Olson, 2007)
- Explanations can include differences in
  - initial endowments (Michael and Stevens, 2010, Cobb-Clark and Moschion, 2017)
  - production function of literacy (Lavy and Sand, 2015, Michael and Stevens, 2010)
  - parental time investment (Baker and Milligan, 2016, Bertrand and Pan, 2013)
- Structural literature studies inequality in mother's time investment and child development, but it abstracts from **gender disparities.**



Quantifying the role of preferences, production, and endowments

Approach:

Introduce gender heterogeneity to the model of household choice and child development (Del Boca, Flinn, and Wiswall, 2014).

- Estimate it using data from the Longitudinal Study of Australian Children for school-aged children.

Key findings:

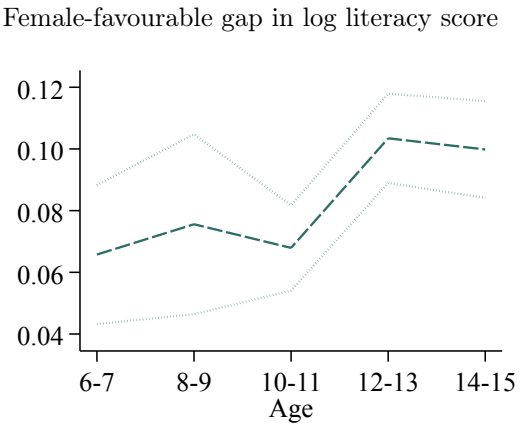
1. Female-favourable gaps in time investment by mothers driven by preferences. (the difference is not statistically significant)
2. Role of time investment in the expansion of gender gaps in literacy is limited.
   - Main drivers: Productivity differences unrelated to time investment.

Data

LSAC K-cohort: 4983 children aged 4-5 in 2004 followed biennially

- I use data for children ages 6-15
- Weekly time investment by mothers
  - Based on time use diaries
  - Includes time spent in educational, social, or general care activities with mothers
- Teacher-reported literacy score
  - Academic Rating Scale based on 9 language and literacy questions
- Demographic information, parental income, employment choices.

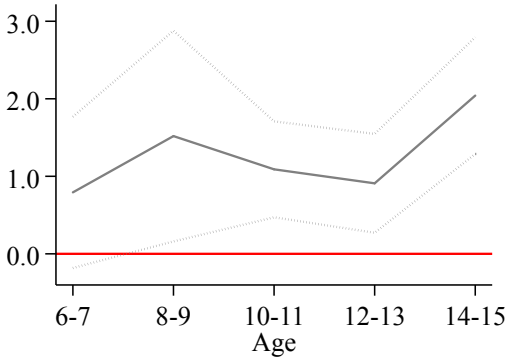
The literacy gap grows from 6.5% at age 6-7 to 10% at age 14-15



by age

Mothers spend 1.2 more hours per week engaged with their daughters

Female-favourable gap in weekly hours of time investment



by age

Model

The model of household choice and child development

(Del Boca, Flinn, and Wiswall, 2014)

closed-form solution for the labour supply and time investment of mothers

- No saving/borrowing
  - father's income = non-labour income of mothers
- Utility function: $U = \underbrace{\alpha^m \ln l_t^m}_{\text{leisure of mother}} + \overbrace{\alpha^c \ln c_t}^{\text{consumption}} + \underbrace{\alpha^s \ln S_t}_{\text{literacy}}$
- Production function:

$$lnS_{t+1} = \underbrace{\ln \rho_t}_{\text{total factor productivity}} + \overbrace{\rho_t^m \ln \tau_t^m}^{\text{mother time investment}} + \underbrace{\rho_t^s \ln S_t}_{\text{lag log literacy}}$$

+ heterogeneity of preferences α and productivities ρ by gender

Model predictions for optimal time investment in children

Optimal time investment in children conditional on labour supply:

$$\tau_t^m = (T - h_t^m)\frac{\phi_t^m}{\alpha^m + \phi_t^m}$$

- where $\phi_t^m = \beta\rho_{\mathbf{t}}^{\mathbf{m}}\left(\alpha^{\mathbf{s}} + \beta\rho_{\mathbf{t+1}}^{\mathbf{s}}\frac{\partial V_{t+1}}{\partial ln(S_{t+1})}\right)$

↑ productivity of time | ↑ self-productivity of literacy | ↑ preferences for literacy

⇓

↑ returns to time investment in children

Estimation

Step 1. Estimate exogenous processes from the data:

- For all children:
  - Mother's wage process - Heckman selection correction
    (instruments: number of children, child's gender, non-labour income)
  - Non-labour income process: Tobit regression model censored at zero
- By gender:
  - Initial skill distribution
  - Production function - non-linear least squares estimator

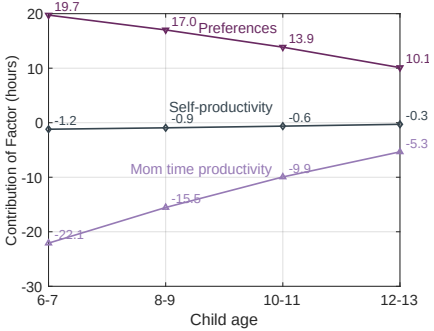
Step 2. Given estimates from Step 1, identify preference parameters from choices; estimate with the Method of Simulated Moments by gender.

Model estimates summary

- The estimated model predicts the expansion of gender gap in literacy. fit
- Production function: estimates
  - Productivity of mother's time and self-productivity of literacy is higher for boys
    - gender differences are not statistically significant
  - Total factor productivity is higher for girls and difference expanding with age
    - higher share of growth in literacy for girls is unexplained by investment or endowments
- Preferences: estimates
  - Mothers have higher preferences for the human capital of daughters
    - gender differences are not statistically significant
- Initial endowments: estimates
  - Girls have higher initial endowments of literacy (at age 6-7)

Deficits in time investment explained by preferences

Decomposition of the gap in active time investment, hours



- Higher returns to time with mothers for boys lead to more maternal investment in sons.
- Higher skill preference for girls leads to more maternal investment in daughters.
- Productivity and preference differences are not significant.

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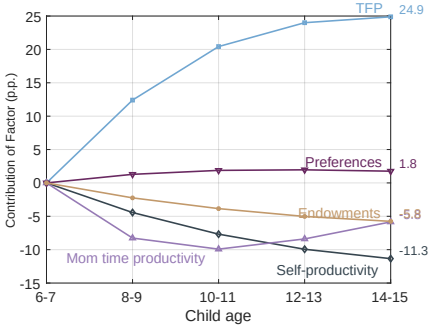
Expansion of literacy gap explained by total factor productivity

Decomposition of the expansion in the female-favourable gap in literacy, p.p.



- Main factor: total factor productivity of the production function
  - Potential explanations:
    - Genetic predisposition to different trajectories of brain maturation (Lim, Han, Uhlhaas, and Kaiser, 2015)
    - Neighbourhoods and schools (Chetty, Hendren, Lin, Majerovitz, and Scuderi, 2016)
    - Differences in behavioural skills (Bertrand and Pan, 2013)

CI

Conclusion

- Mothers spend more time with their school-aged daughters compared to sons.
  - The gaps in time investment are driven by differences in point estimates of preferences for skill or time spent children.
- For school-aged children, gender differences in time investment do not play a big role in explaining the expanding female-favourable gap in literacy.
- Further research can explore the role of other factors:
  - Parenting style
  - Behavioral skills
  - Neighbourhoods and peers

Thank you for your attention!

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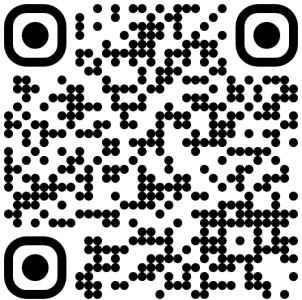
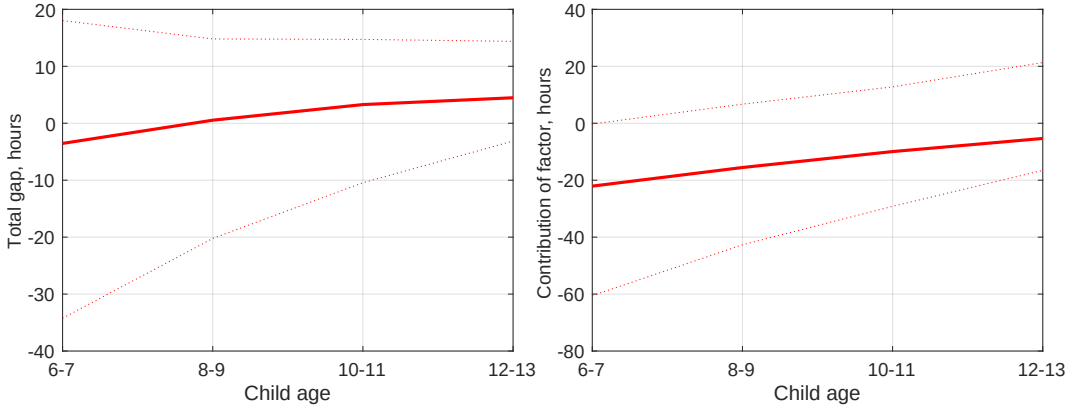


Decomposition of gaps in time investment - CI

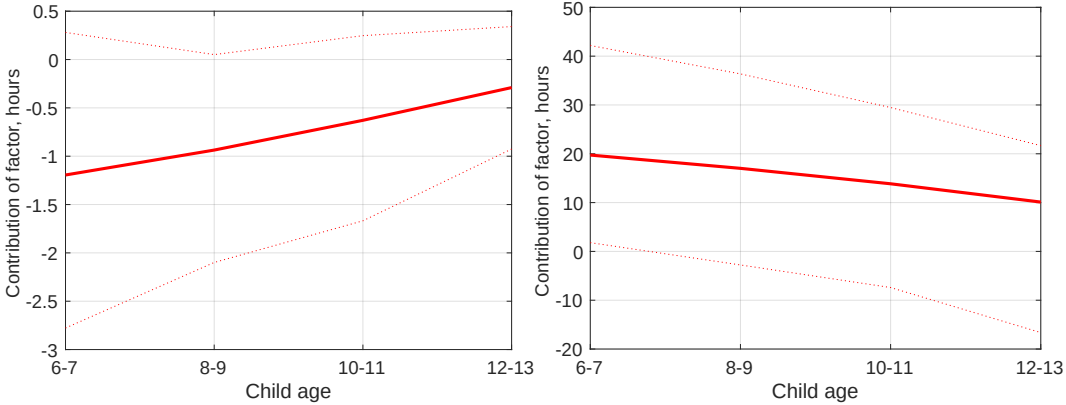


(a) Total

(b) Active time

main

Decomposition of gaps in time investment - CI



(a) Self-productivity

(b) Preferences

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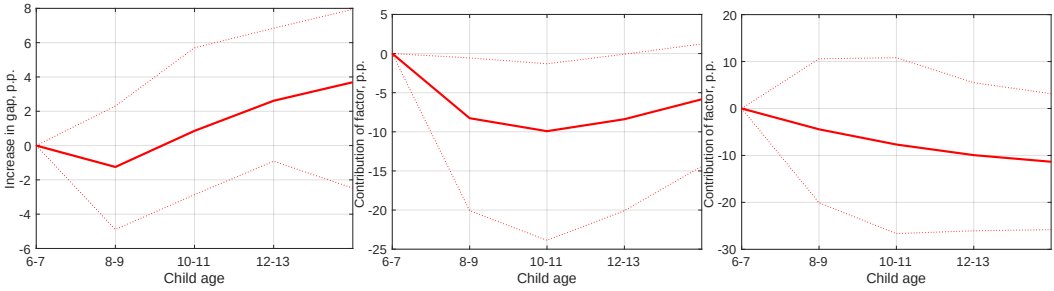
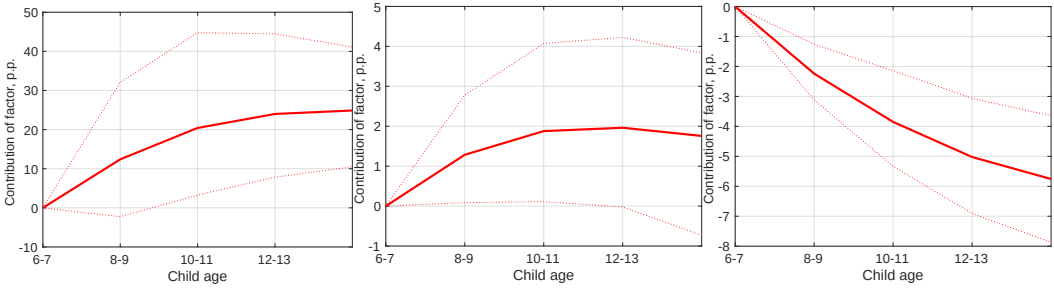
Decomposition of expansion in log literacy gap - CI



(a) Total (b) Active time (c) Self-productivity

main

Decomposition of expansion in log literacy gap - CI



(a) TFP (b) Preferences (c) Endowments

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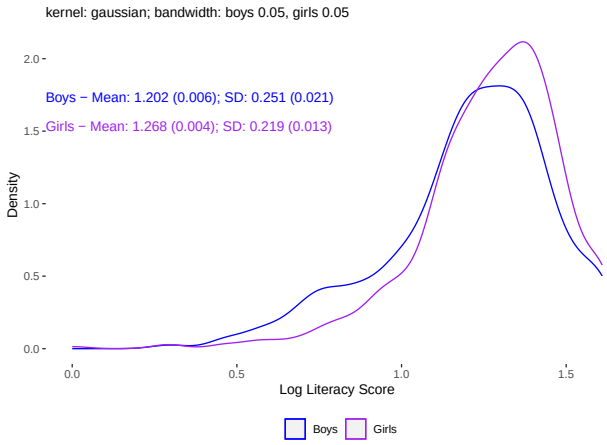
Initial distribution of Log Literacy at ages 6-7



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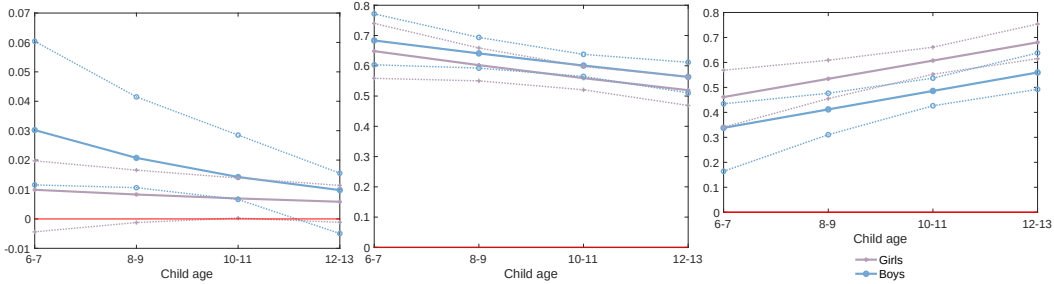
Productivity estimates by child's age



(a) Active Time Productivity, $\rho_t^{j,m}$

(b) Lag Literacy Productivity, $\rho_t^{j,s}$

(c) Total Factor Productivity, $\ln R_t^j$

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Estimates of preference parameters

	Girls	Boys
Preference for consumption $\alpha^{j,c}$	0.033	0.079
	(0.063)	(0.068)
Preference for literacy $\alpha^{j,s}$	0.938	0.847
	(0.141)	(0.167)
Share of NI income b^{j}_{NI}	0.915	0.944
	(0.089)	(0.112)
Time penalty for a sibling Θ^{j}_{sib}	12.443	12.444
	(0.622)	(0.583)

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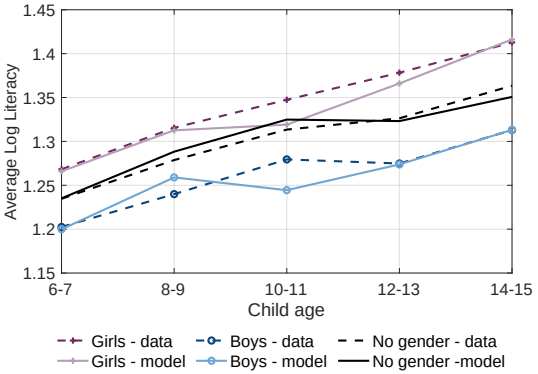
Model fit - predicting the expansion of gap in literacy



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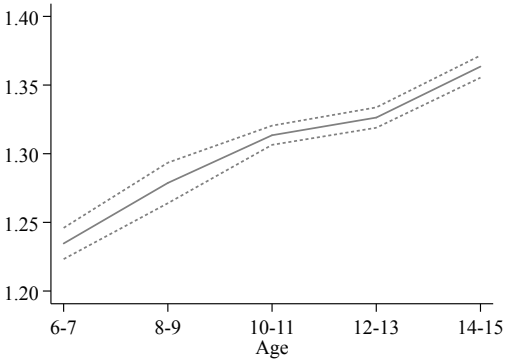
The mean log literacy score increases with child age



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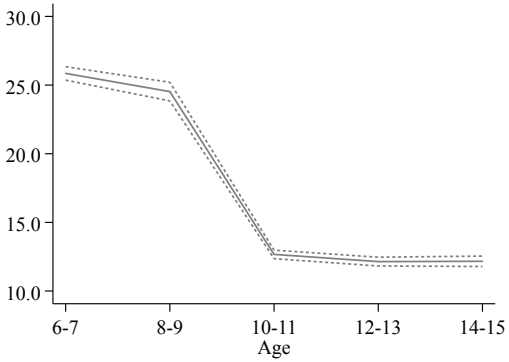
The mean time investment decreases with child age



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