

Fertility, Financial Literacy, and Household Portfolios: Speed of Adjustment

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Motivation

Financial literacy is an important factor in household portfolios:

- Accumulation of wealth throughout the life-cycle (e.g. Lusardi and Mitchell, 2007; Lusardi, Michaud, and Mitchell, 2017)
- Access to various financial assets, e.g. stocks (Gaudecker, 2015)
- Increasing returns assets (Fagereng et al., 2020)
- Facing shocks (Lusardi, Hasler, and Yakoboski, 2021)

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Speed of adjustment:

- Little is known about its relationship to financial literacy (Bianchi, 2018)
- Relevant role when facing shocks

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Questions:

- Is there any relationship between **financial literacy** and speed of adjustment in household portfolios?
- If so, can financial literacy dampen the negative effect of shocks?

Fertility

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 - Presence of **adjustment costs** can make **financial literacy** more relevant
- I document differences in the adjustment for different **wealth levels**
 - Relative importance of financial literacy
- Differentiate between planned and **“unplanned”** births
 - Use “unplanned” births as a shock
 - Evaluate protection of financial literacy from those shocks
 - Roe v Wade

Contribution

- ① Role of **financial literacy** in **speed** of portfolio adjustment
- ② Protection of financial literacy to shocks (fertility)
- ③ Fertility and portfolios including non-financial assets (Love, 2009; Bogan, 2013)
- ④ Effect of fertility shocks in household portfolios

Data and estimation

Data sources:

- PSID
 - Follow households before and after birth (panel 1998 - 2018)
 - Leverage fertility shocks to distinguish planned vs unplanned births
- SCF
 - Age of children
 - Questions on financial literacy

Household portfolios

- Assets: **Liquid financial assets**, stocks, **housing**, other real estates, private business, and retirement accounts

Estimation

- Tobit (share) and logit (own)
- Path before and after birth

Stylized Facts

- **Family size effect:** Children increase the weight of housing ($\uparrow 8.6\%$) and decrease liquid financial ($\downarrow 3.5\%$)
- **Expected events and planning horizons:** On average, households start adjustment four years before birth
- **Household heterogeneity:** [Financial literacy](#) changes the speed of adjustment toward housing
 - Poor: delay
 - Medium-wealth: accelerate
 - Rich: no effect
- **Fertility shocks:** “unplanned” births decrease share of housing

Results

Model

- Life-cycle model
- Durable (h) and non-durable (c) consumption
- Fertility: increases MU of consumption goods
- Adjustment costs in durable good ($\phi(h_{t-1}, h_t)$)
- Financial asset (b)
- Financial literacy and fertility exogenous
- **Financial literacy:**
 - Benchmark: b is risk-free. Higher return (Lusardi, Michaud, and Mitchell, 2017; Fagereng et al., 2020; Bianchi, 2018)
 - Robustness: return b stochastic. Less volatility

Counterfactuals

- **Mechanism:** Ability to pay for portfolio adjustment costs depends on financial literacy → different portfolio outcomes
- **Financial literacy and welfare:** Financial literacy increases welfare more for households with children (2x)
- **Fertility shocks:**
 - More likely in poor households (Roe v Wade)
 - Increase need for liquidity
 - Different allocation to planned births
 - Financial literacy can compensate welfare losses by 10% - 35%

▶ Details

Conclusions

- ① Fertility comes with an adjustment towards illiquid assets (housing)
- ② Speed of adjustment depends on financial literacy
- ③ Interaction of financial literacy and borrowing constraints
- ④ Financial literacy plays a larger role in welfare for households with children
- ⑤ Financial literacy can diminish negative effect of “unplanned” births

Regressions

Random effects Tobit

$$y_{i,t}^k = \begin{cases} 0 & y_{i,t}^{*k} \leq 0 \\ y_{i,t}^{*k} & 0 \leq y_{i,t}^{*k} \leq 1 \\ 1 & y_{i,t}^{*k} \geq 1 \end{cases} \quad (1)$$

$$y_{i,t}^{*k} = \beta^k X_{i,t} + \sum_{j=-N_0}^{N_1} \gamma_j^k \mathbb{1}\{\text{birth}_{t+j}\} + \epsilon_{i,t}^k \quad (2)$$

- $y_{i,t}^k$: share of total assets invested in asset k
- $X_{i,t}$: age, years of education, gender, marital status, state, number of adults in household, income group, wealth group, year fixed effects

Stylized facts - I: adjustment

- 1 Fertility: share of housing \uparrow 8.5%, deposits \downarrow 3.5%
- 2 Anticipation in the adjustment (all wealth levels)

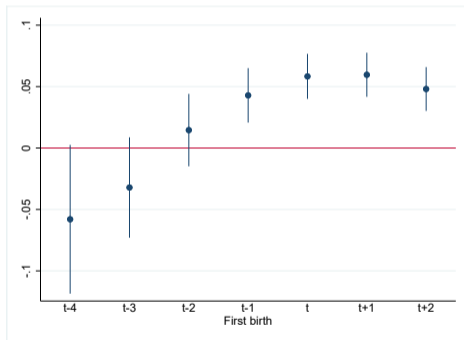
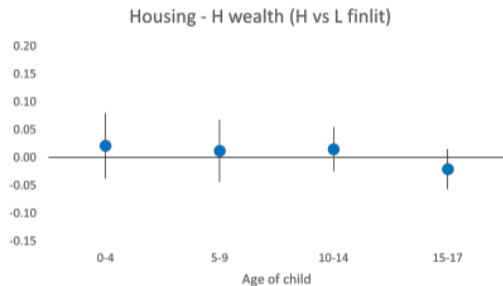


Figure: Share of housing. Control group: no children

Stylized facts - II: speed of adjustment

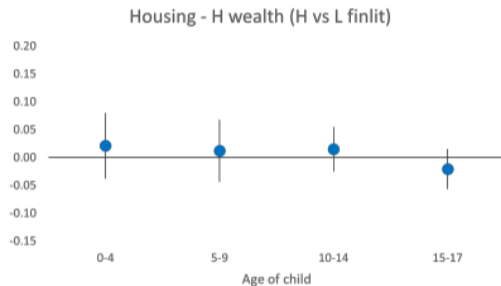
③ Financial literacy affects speed of adjustment



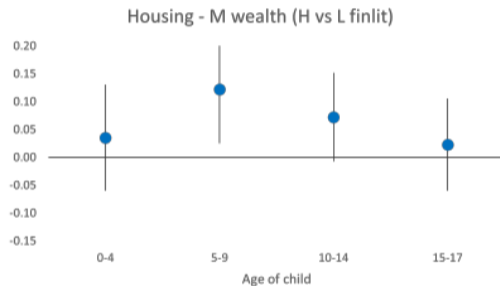
(a) Tercile 3

Stylized facts - II: speed of adjustment

③ Financial literacy affects speed of adjustment



(a) Tercile 3



(b) Tercile 2

Figure: Share of housing. Double difference by fertility and financial literacy

Stylized facts - II: speed of adjustment

③ Financial literacy affects speed of adjustment

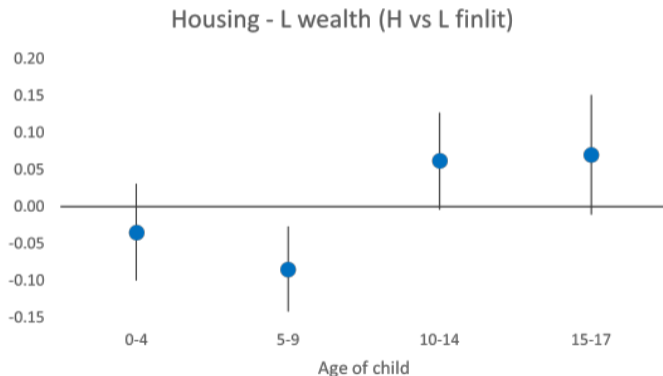
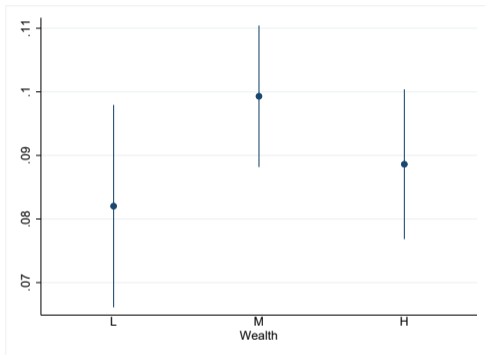
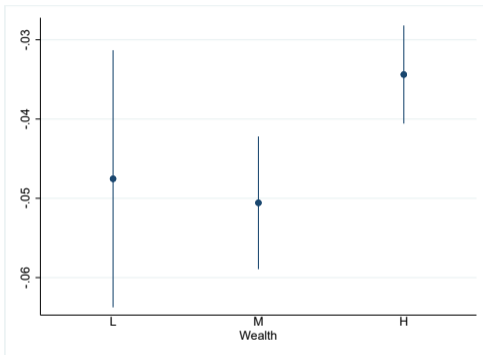


Figure: Share of housing. Tercile 1 wealth. Double difference fertility and finlit

Fertility - Wealth



(a) Housing



(b) Deposits

Figure: Share in portfolio. Control group: no children

Fertility - Path deposits

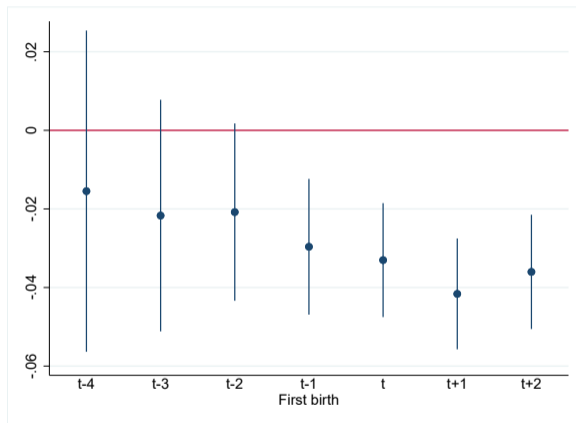
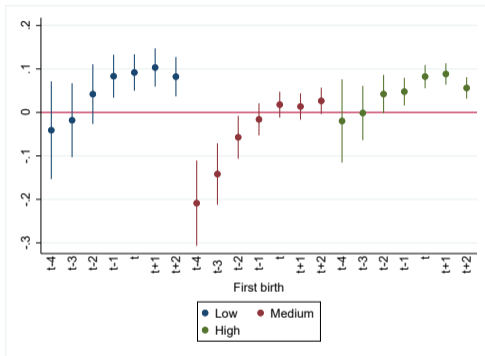
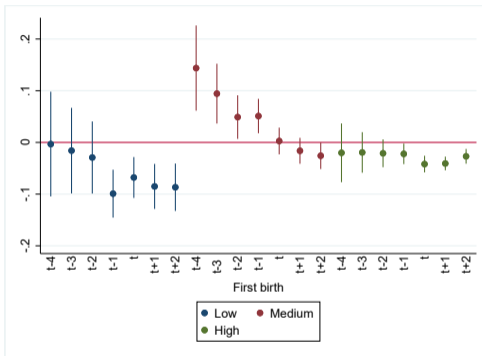


Figure: Share of deposits. Control group: no children

Fertility - Paths by wealth



(a) Housing



(b) Deposits

Figure: Share in portfolio. Control group: no children

Model overview

- Life-cycle model. 1 period = two years
- Exogenous income
- Durable (h) and non-durable (c^a, c^d) consumption: MUC increases with children
- Adjustment costs in durable good ($\phi(h_{t-1}, h_t)$)
- Financial asset (b)
- Financial literacy:
 - Benchmark: b is risk-free. Fin. lit. higher return (Lusardi, Michaud, and Mitchell, 2017; Fagereng et al., 2020)
 - Robustness: return b stochastic. Fin. lit. less volatility
- Exogenous fertility. Known from moment 0 ($d = \{0, 0.25\}$)
- Financial literacy and fertility drawn from copula

Household problem

$$\begin{aligned} V_t(b_t, h_{t-1}, d_t, y_t) = \\ \max_{c_t^a, c_t^d, b_{t+1}, h_t} & \left\{ \frac{(\alpha_1 (c_t^a)^\rho + \psi d_t (c_t^d)^\rho + (\alpha_2 + g(d_t, A_d)) (h_t)^\rho)^{(1-\sigma)/\rho}}{1 - \sigma} \right. \\ & \left. + \beta \mathbb{E}_t[V_{t+1}(b_{t+1}, h_t, d_{t+1}, y_{t+1})] \right\} \\ \text{s.t.} \\ b_{t+1} + h_t + c_t^a + d_t c_t^d + \phi(h_{t-1}, h_t) &= R_b^i b_t + R_h h_{t-1} + y_t \\ b_{t+1} &\geq 0 \\ h_t &\geq 0 \end{aligned}$$

► Total household consumption

Household problem - Functional forms

$$\phi(h_t, h_{t-1}) = \begin{cases} 0 & h_t = h_{t-1} \\ \max(\phi_1 h_t + \phi_2 (h_t - h_{t-1})^2, \phi_0) & h_t \neq h_{t-1} \end{cases} \quad (3)$$

$$g(d, A) = \begin{cases} 0 & d = 0 \\ \eta_{0-4}^d - 1 & d > 0, A \leq 4 \\ \eta_{5-9}^d - 1 & d > 0, 5 \leq A \leq 9 \\ \eta_{10-14}^d - 1 & d > 0, 10 \leq A \leq 14 \\ \eta_{15-17}^d - 1 & d > 0, 15 \leq A \leq 17 \end{cases} \quad (4)$$

$$\ln(y_t) = y_t^f + z_t + \epsilon_t \quad (5)$$

$$z_t = \rho_y z_{t-1} + \nu_t \quad (6)$$

Parameter values

Table: Moments are excess of share in housing children vs no children

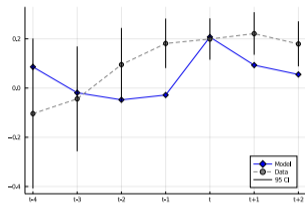
Parameter	Value	Moment	Model	Data
η_{0-4}	4.97	Child at home tercile 1	0.105	0.125
η_{5-9}	3.88	Child at home tercile 2	0.093	0.083
η_{10-14}	4.78	Child at home tercile 3	0.123	0.072
η_{15-17}	4.07	R	1.069	1.05
ϕ_0	0.50	Low wealth, H v L fin. lit. 0-4	-0.032	-0.035
ϕ_2	0.13	Low wealth, H v L fin. lit. 5-9	-0.060	-0.082
$R_{\text{lowfinlit}}$	1.064	Low wealth, H v L fin. lit. 10-14	0.025	0.063
$R_{\text{highfinlit}}$	1.078	Low wealth, H v L fin. lit. 15-17	0.010	0.070

▶▶ Other parameters

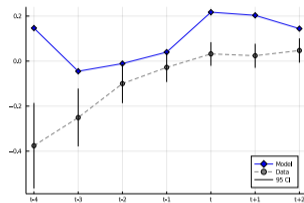
▶▶ Plots

▶▶ Stochastic R

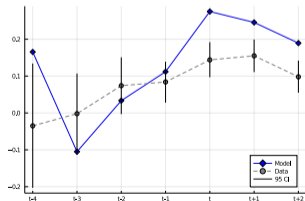
Non-targeted moments



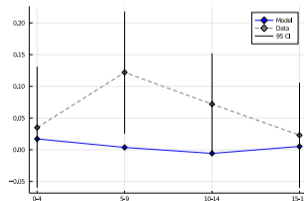
(a) Low wealth



(b) Medium wealth



(c) High wealth



(d) High vs Low fin. lit. Wealth 2

Household problem - Total household consumption

$$V_t(b_t, h_{t-1}, y_t, d_t) = \max_{c_t, b_{t+1}, h_t} \left\{ \frac{(\alpha_1(1 + d_t(\psi/\alpha_1)^{1/(1-\rho)})^{1-\rho} c_t^\rho + (\alpha_2 + g(d_t))(h_t)^\rho)^{(1-\sigma)/\rho}}{1 - \sigma} + \beta \mathbb{E}_t[V_{t+1}(b_{t+1}, h_t, y_{t+1}, d_{t+1})] \right\}$$

s.t.

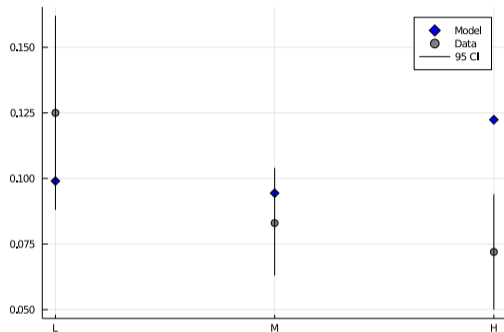
$$b_{t+1} + h_t + c_t + \phi(h_{t-1}, h_t) = R_b b_t + R_h h_{t-1} + y_t$$
$$b_{t+1} \geq 0$$
$$h_t \geq 0$$

Other parameter values

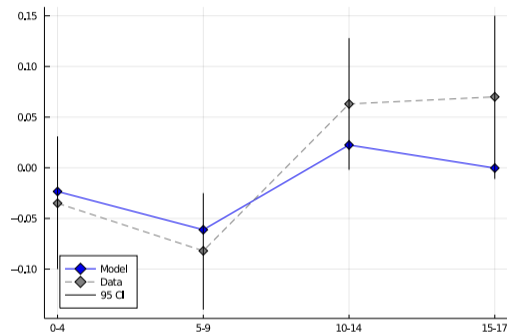
Table: Parameter values [▶ Back](#)

Parameter	Value	Source
ρ	0	Fernández-Villaverde and Krueger (2011)
α_1	0.85	Kaplan and Violante (2014)
α_2	0.15	Kaplan and Violante (2014)
σ	2.0	Fernández-Villaverde and Krueger (2011)
ψ	0.92	Attanasio et al. (2016)
y_t^f		Hansen (1993)
ρ_y	0.935	Fernández-Villaverde and Krueger (2011)
σ_ν	0.247	Fernández-Villaverde and Krueger (2011)
σ_ϵ	0.130	Fernández-Villaverde and Krueger (2011)
κ	0.031	Cooper and Zhu (2016)
ϕ_{beq}	1.834	Cooper and Zhu (2016)
β	0.88	Kaplan and Violante (2014)
R_h	1.03	Shiller (2011) and average 2000-2020
ϕ_1	0.06	Bajari et al. (2013)

Targeted moments



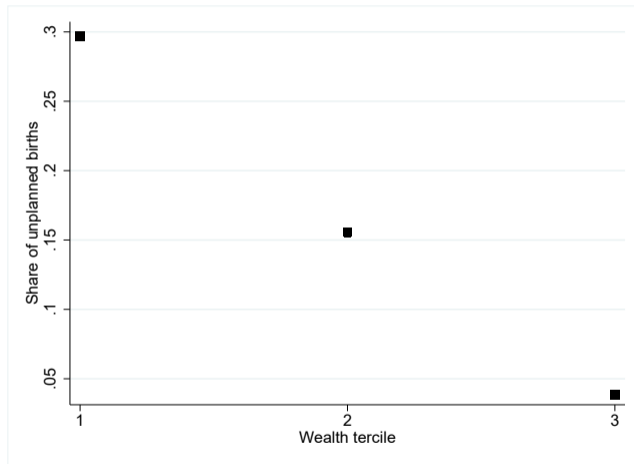
(a) Child at home by wealth tercile



(b) High vs Low fin. lit. Tercile 1 wealth

Figure: Share of housing. Control group: no children

“Unplanned” births: incidence by wealth tercile



“Unplanned” births: effect on portfolio

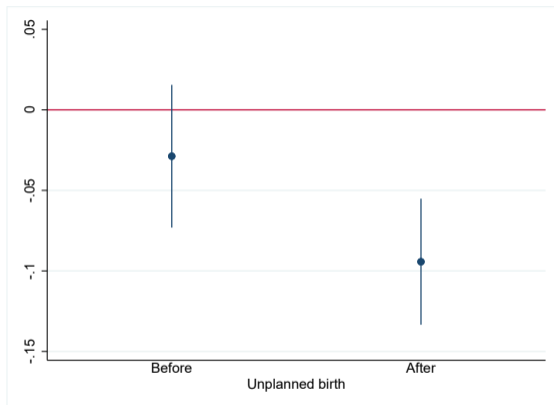


Figure: Share of housing. Control group: “planned” births

“Unplanned” births: effect on portfolio

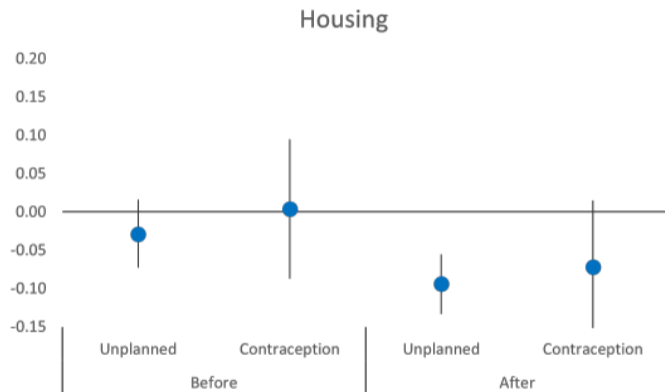


Figure: Share of housing. Control group: “planned” births

“Unplanned” births

Definition

- Benchmark: mother \rightarrow Birth “unwanted”
- Robustness: contraceptive at time of pregnancy

Importance

- “Unexpected shock” to households
- More likely in poor households (Su and Addo, 2018)
- Roe v Wade

Liquidity needs different from “planned” births: \downarrow housing

Use the model to analyze differences between low and high financial literacy

▶▶ Incidence by wealth

▶▶ Effect on portfolio

▶▶ Effect on portfolio. Comparison

▶▶ Model: effect on portfolio by fin. lit

▶▶ Back

Welfare comparison

Compare households

- Same number of children
- Same income shocks
- Different financial literacy
- Different “planning” of birth

$$\mathbb{E} \sum_{t=0}^T \beta^t u(c_t^1, h_t^1, d_t) = \mathbb{E} \sum_{t=0}^T \beta^t u(m \times c_t^2, h_t^2, d_t) \quad (7)$$

Welfare comparison - Financial literacy

Table: Comparison in non-durable consumption units

Group	Median	Mean
No child. High vs Low finlit	0.15%	0.13%
Planned child. High vs Low finlit	0.31%	1.08%
Unplanned. High vs Low finlit	0.34%	1.20%

200 simulations. Initial persistent component of income set at lowest value.

▶▶ Stochastic R

Welfare comparison - Planned births

Table: Comparison in non-durable consumption units

Group	Median	Mean
Low finlit. Planned vs “Unplanned” children	0.19%	0.27%
High finlit. Planned vs “Unplanned” children	0.12%	0.25%

200 simulations. Initial persistent component of income set at lowest value.

“Unplanned” births: effect on portfolio

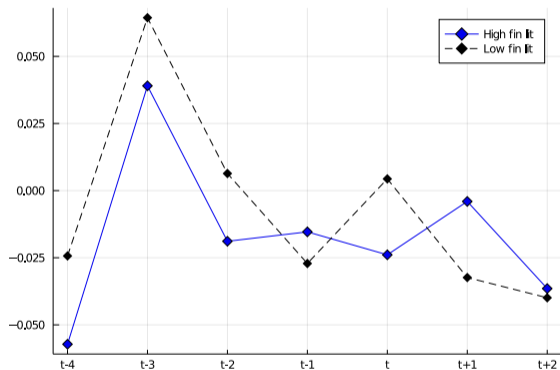


Figure: Share of housing. Control group: “planned” births

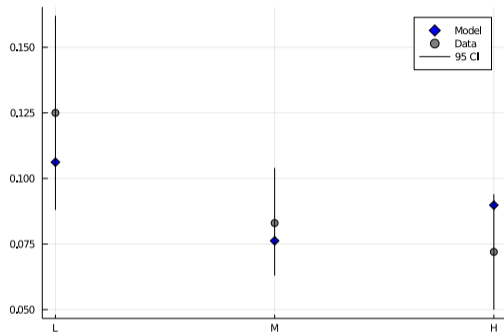
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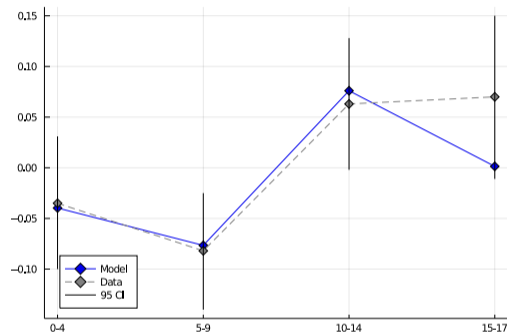
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η_{5-9}	3.71	Child at home tercile 2	0.081	0.083
η_{10-14}	3.93	Child at home tercile 3	0.089	0.072
η_{15-17}	2.90	σ_R	0.253	0.16
ϕ_0	0.56	Low wealth, H v L fin. lit. 0-4	-0.036	-0.035
ϕ_2	0.13	Low wealth, H v L fin. lit. 5-9	-0.082	-0.082
$\sigma_{R,lowfinlit}$	0.224	Low wealth, H v L fin. lit. 10-14	0.068	0.063
$\sigma_{R,highfinlit}$	0.056	Low wealth, H v L fin. lit. 15-17	0.010	0.070

▶ Back

Targeted moments - Robustness



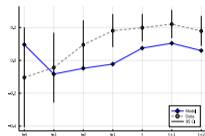
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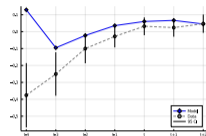
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Figure: Share of housing. Control group: no children

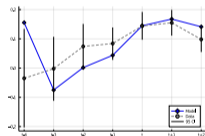
Non-targeted moments - Robustness



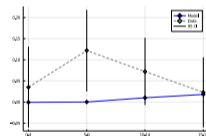
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(b) Medium wealth



(c) High wealth



(d) High vs Low fin. lit. Wealth 2

Figure: Share of housing around time of birth

Welfare comparison - Robustness

Table: Comparison in non-durable consumption units

Group	Median	Mean
No child. High vs Low finlit	3.89%	4.04%
Planned child. High vs Low finlit	4.54%	4.74%
Unplanned. High vs Low finlit	4.20%	4.35%
Low finlit. Planned vs "Unplanned" children	0.22%	0.38%
High finlit. Planned vs "Unplanned" children	0.45%	0.75%

200 simulations. Initial persistent component of income set at lowest value.