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

Sebastian Gomez-Cardona

UBC
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
Introduction

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Speed of adjustment:
- Little is known about its relationship to financial literacy (Bianchi, 2018)
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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?
Introduction

Fertility

- I document adjustment towards housing around the birth of children
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- Housing is an important part of wealth for many households
- Presence of adjustment costs can make financial literacy more relevant
Fertility

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Fertility

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- I document differences in the adjustment for different wealth levels
  - Relative importance of financial literacy
Fertility

- I document adjustment towards **housing** around the birth of children
  - Housing is an important part of wealth for many households
  - 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
Introduction

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 (↑ 8.6%) and decrease liquid financial (↓ 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
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%
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

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

\[ y_{i,t}^* = \beta^k X_{i,t} + \sum_{j=-N_0}^{N_1} \gamma_{j}^k \mathbb{1}\{birth_{t+j}\} + \epsilon_{i,t}^k \]  (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 ↑ 8.5%, deposits ↓ 3.5%
2. Anticipation in the adjustment (all wealth levels)

Figure: Share of housing. Control group: no children
Stylized facts - II: speed of adjustment

Financial literacy affects speed of adjustment

(a) Tercile 3
Stylized facts - II: speed of adjustment

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

Financial literacy affects speed of adjustment

Figure: Share of housing. Tercile 1 wealth. Double difference fertility and finlit
Figure: Share in portfolio. Control group: no children
Fertility - Path deposits

Figure: Share of deposits. Control group: no children
Fertility - Paths by wealth

Figure: Share in portfolio. Control group: no children

(a) Housing

(b) Deposits
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

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

s.t.

\[ b_{t+1} + h_t + c_t^a + d_t c_t^d + \phi(h_{t-1}, h_t) = R_b b_t + R_h h_{t-1} + y_t \]

\[ b_{t+1} \geq 0 \]

\[ h_t \geq 0 \]
Household problem - Functional forms

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

\[ g(d, A) = \begin{cases} 0 & d = 0 \\ \eta_{0-4} d - 1 & d > 0, A \leq 4 \\ \eta_{5-9} d - 1 & d > 0, 5 \leq A \leq 9 \\ \eta_{10-14} d - 1 & d > 0, 10 \leq A \leq 14 \\ \eta_{15-17} d - 1 & d > 0, 15 \leq A \leq 17 \end{cases} \]  \hspace{1cm} (4)

\[ \ln(y_t) = y_t^f + z_t + \epsilon_t \]  \hspace{1cm} (5)

\[ z_t = \rho_y z_{t-1} + \nu_t \]  \hspace{1cm} (6)
### Moments are excess of share in housing children vs no children

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Moment</th>
<th>Model</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\eta_{0-4}$</td>
<td>4.97</td>
<td>Child at home tercile 1</td>
<td>0.105</td>
<td>0.125</td>
</tr>
<tr>
<td>$\eta_{5-9}$</td>
<td>3.88</td>
<td>Child at home tercile 2</td>
<td>0.093</td>
<td>0.083</td>
</tr>
<tr>
<td>$\eta_{10-14}$</td>
<td>4.78</td>
<td>Child at home tercile 3</td>
<td>0.123</td>
<td>0.072</td>
</tr>
<tr>
<td>$\eta_{15-17}$</td>
<td>4.07</td>
<td>$R$</td>
<td>1.069</td>
<td>1.05</td>
</tr>
<tr>
<td>$\phi_0$</td>
<td>0.50</td>
<td>Low wealth, H v L fin. lit. 0-4</td>
<td>-0.032</td>
<td>-0.035</td>
</tr>
<tr>
<td>$\phi_2$</td>
<td>0.13</td>
<td>Low wealth, H v L fin. lit. 5-9</td>
<td>-0.060</td>
<td>-0.082</td>
</tr>
<tr>
<td>$R_{\text{lowfinlit}}$</td>
<td>1.064</td>
<td>Low wealth, H v L fin. lit. 10-14</td>
<td>0.025</td>
<td>0.063</td>
</tr>
<tr>
<td>$R_{\text{highfinlit}}$</td>
<td>1.078</td>
<td>Low wealth, H v L fin. lit. 15-17</td>
<td>0.010</td>
<td>0.070</td>
</tr>
</tbody>
</table>
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

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

s.t.
\[ b_{t+1} + h_t + c_t + \phi(h_{t-1}, h_t) = R_b b_t + R_h h_{t-1} + y_t \]
\[ b_{t+1} \geq 0 \]
\[ h_t \geq 0 \]
## Table: Parameter values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\rho$</td>
<td>0</td>
<td>Fernández-Villaverde and Krueger (2011)</td>
</tr>
<tr>
<td>$\alpha_1$</td>
<td>0.85</td>
<td>Kaplan and Violante (2014)</td>
</tr>
<tr>
<td>$\alpha_2$</td>
<td>0.15</td>
<td>Kaplan and Violante (2014)</td>
</tr>
<tr>
<td>$\sigma$</td>
<td>2.0</td>
<td>Fernández-Villaverde and Krueger (2011)</td>
</tr>
<tr>
<td>$\psi$</td>
<td>0.92</td>
<td>Attanasio et al. (2016)</td>
</tr>
<tr>
<td>$y^f_t$</td>
<td></td>
<td>Hansen (1993)</td>
</tr>
<tr>
<td>$\rho_y$</td>
<td>0.935</td>
<td>Fernández-Villaverde and Krueger (2011)</td>
</tr>
<tr>
<td>$\sigma_\nu$</td>
<td>0.247</td>
<td>Fernández-Villaverde and Krueger (2011)</td>
</tr>
<tr>
<td>$\sigma_\epsilon$</td>
<td>0.130</td>
<td>Fernández-Villaverde and Krueger (2011)</td>
</tr>
<tr>
<td>$\kappa$</td>
<td>0.031</td>
<td>Cooper and Zhu (2016)</td>
</tr>
<tr>
<td>$\phi_{beq}$</td>
<td>1.834</td>
<td>Cooper and Zhu (2016)</td>
</tr>
<tr>
<td>$\beta$</td>
<td>0.88</td>
<td>Kaplan and Violante (2014)</td>
</tr>
<tr>
<td>$R_h$</td>
<td>1.03</td>
<td>Shiller (2011) and average 2000-2020</td>
</tr>
<tr>
<td>$\phi_1$</td>
<td>0.06</td>
<td>Bajari et al. (2013)</td>
</tr>
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</table>
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

Share of unplanned births

Wealth tercile

Sebastian Gomez-Cardona (UBC)
“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 ® 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: ↓ housing

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

Compare households

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

\[
\mathbb{E} \sum_{t=0}^{T} \beta^t u(c^1_t, h^1_t, d_t) = \mathbb{E} \sum_{t=0}^{T} \beta^t u(m \times c^2_t, h^2_t, d_t)
\]  

(7)
Welfare comparison - Financial literacy

Table: Comparison in non-durable consumption units

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<tr>
<th>Group</th>
<th>Median</th>
<th>Mean</th>
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<tr>
<td>No child. High vs Low finlit</td>
<td>0.15%</td>
<td>0.13%</td>
</tr>
<tr>
<td>Planned child. High vs Low finlit</td>
<td>0.31%</td>
<td>1.08%</td>
</tr>
<tr>
<td>Unplanned. High vs Low finlit</td>
<td>0.34%</td>
<td>1.20%</td>
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200 simulations. Initial persistent component of income set at lowest value.
Welfare comparison - Planned births

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<td>Low finlit. Planned vs “Unplanned” children</td>
<td>0.19%</td>
<td>0.27%</td>
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<td>High finlit. Planned vs “Unplanned” children</td>
<td>0.12%</td>
<td>0.25%</td>
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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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<td>$\eta_{15-17}$</td>
<td>2.90</td>
<td>$\sigma_R$</td>
<td>0.253</td>
<td>0.16</td>
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<td>$\phi_0$</td>
<td>0.56</td>
<td>Low wealth, H v L fin. lit. 0-4</td>
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Targeted moments - Robustness

(a) Child at home by wealth tercile

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

Figure: Share of housing. Control group: no children
Non-targeted moments - Robustness

Figure: Share of housing around time of birth
### Table: Comparison in non-durable consumption units

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<td>3.89%</td>
<td>4.04%</td>
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<tr>
<td>Planned child. High vs Low finlit</td>
<td>4.54%</td>
<td>4.74%</td>
</tr>
<tr>
<td>Unplanned. High vs Low finlit</td>
<td>4.20%</td>
<td>4.35%</td>
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<td>Low finlit. Planned vs “Unplanned” children</td>
<td>0.22%</td>
<td>0.38%</td>
</tr>
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<td>High finlit. Planned vs “Unplanned” children</td>
<td>0.45%</td>
<td>0.75%</td>
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200 simulations. Initial persistent component of income set at lowest value.