Why do Parents Underinvest in their Children's Education? Evidence from China

Jiyuan (Jerry) Wang[1,3] **& Rob Alessie**[2,3] **& Viola Angelini**[2,3]

1. School of Insurance, Central University of Finance and Economics
2. Faculty of Economics and Business, University of Groningen
3. Netspar

jiyuanwangcufe@gmail.com — (86) 13521610195

Introduction

- The traditional theory predicts that the optimal amount of human capital investments is determined by equating its marginal returns to the market return (see e.g. Becker (2009)).
- Many papers, however, found that parents often underinvest in the human capital of their children, especially in developing countries such as China (Psacharopoulos, 1985; Heckman, 2005).
- In this paper, we extend the theoretical model of (Raut and Tran, 2005) by including parental liquidity constraints and fixed costs of investment as two potential explanations for the underinvestment in education.
- First, binding liquidity constraints might prevent the parents to invest sufficiently in the education of their children (see e.g. Barham et. al (1995)).
- Second, parents might face fixed costs when they perform such investments. One can think of the costs when the households have to pay for the children's preparation for the college entrance examination.

Model

- We extend the models from (Raut and Tran, 2005) by incorporating liquidity constraints faced by parents and educational fixed costs. The lifetime utility and budget constraint of the parent are:

$$\max_{c_{p1},c_{p2},T_1} \quad u(c_{p1}) + \beta[u(c_{p2}) + \gamma_p \nu_p(c_{k2})] \tag{1a}$$

$$\text{s.t.} \quad c_{p1} = E_{p1} - (s + nT_1 + nC\mathbf{1}(T_1 > 0)) \tag{1b}$$

$$c_{p2} = (1+r)s + E_{p2} + nT_2 \tag{1c}$$

$$s \geq 0 \tag{1d}$$

$$T_1 \geq 0, \tag{1e}$$

- The child's problem:

$$\max_{c_{k2},T_2 \geq 0} \quad \nu(c_{k2}) + \gamma_k u_k(c_{p2}) \tag{2a}$$

$$\text{s.t.} \quad c_{k2} = E_{k2}(T_1, \tau) - T_2, \tag{2b}$$

- After solving for Nash equilibrium, we have the optimal level of human capital investment

$$\frac{\partial E_{k2}(T_1,\tau)}{\partial T_1} = \frac{1+r}{\gamma_p \gamma_k} + \frac{\mu}{\nu'(c_{p2})\beta\gamma_p\gamma_k}, \tag{3}$$

- and optimal old-age transfer from children to parent under fixed costs:

$$T_2 = \begin{cases} \frac{\gamma_k}{\alpha\beta+\gamma_k} E_{k2} + \frac{(1+r)\alpha\beta}{\gamma_k+\alpha\beta}\left[T_1 - \frac{E_{p1}+\frac{E_{p2}}{1+r}}{n} + C \cdot \mathbf{1}(T_1 > 0)\right] \text{ if } \mu = 0 \ (s > 0) \\ \frac{\gamma_k}{\gamma_k+1} E_{k2} - \frac{1}{\gamma_k+1}\frac{E_{p2}}{n} \text{ if } \mu > 0 \ (s = 0). \end{cases} \tag{4}$$

Data

- We draw data from the China Health and Retirement Longitudinal Study (CHARLS) 2013
- T_1: College human capital investment by parents, and years of college schooling
- T_2: Net transfers from children to parents
- Liquidity index: using the Principle Component Analysis (PCA) approach to combine all six liquidity constraint indicators: (1) whether the family lived in a shack when the child was at college ages; (2) whether the income of the respondent was in the lowest 25% group of the sample when the child was at college ages; (3) whether the family had a shared toilet or a private one; (4) whether the family had a water closet or not; (5) whether the family was using clean water or not; (6) whether the family used electricity or not when children were at college ages
- E_{k2}: children's current income
- $E_{p1} + \frac{E_{p2}}{1+r}$: Household lifetime income

Empirical Strategy

- To empirically test liquidity constraint, we predict children's marginal returns MR_i to human capital investment and use the following specification

$$MR_i = \beta_0 + \beta_1 HHInc_i + \beta_2 Num_i + \beta_3 NumSq_i + \mathbf{z}_i'\theta + \beta_4 * Cons_i + Cons_i \times (\beta_5 HHInc_i + \beta_6 Num_i + \beta_7 NumSq_i + \mathbf{z}_i'\delta) + u_i, \tag{5}$$

- To empirically test fixed costs, we directly translate model (4) into an econometric model
- The results for liquidity constraint and fixed costs can be found in Table 1 and 2 respectively

Conclusions

- We first extend the theoretical model by (Raut and Tran, 2005) and we then empirically test the model predictions using data from the 2013 China Health and Retirement Longitudinal Study (CHARLS).
- The results show some evidence that binding liquidity constraints can affect the decision of the parents to invest in their children's college education.
- The results provide support for the importance of fixed costs in human capital investment decisions.

Empirical Results

VARIABLES	(1) MR (Years of College Schooling)	(2) MR (HC Investment)
Liquidity Index	0.219	-0.240
	(0.158)	(3.166)
HH Income	0.00981	0.175*
	(0.00637)	(0.102)
Years of Schooling (Parent)	0.00946***	0.0892***
	(0.00171)	(0.0334)
Num. of Children	-0.0573***	-0.709***
	(0.0119)	(0.255)
Num. Children Squared	0.00579***	0.0808**
	(0.00156)	(0.0352)
HH Income × Liquidity Index	-0.00223	-0.0351
	(0.00241)	(0.0407)
Years of Schooling (Parent) × Liquidity Index	-0.000968	0.0205
	(0.00127)	(0.0254)
Num. Children × Liquidity Index	0.00752	-0.165
	(0.00930)	(0.178)
Num. Children Squared× Liquidity Index	-0.00106	0.00762
	(0.00131)	(0.0278)
Macroeconomic Control		
Admission Rate	0.176***	-1.165
	(0.0666)	(1.261)
Admission Rate × Liquidity Index	-0.0736	1.016
	(0.0613)	(1.013)
Constant	-0.302	-2.809
	(0.220)	(4.369)
Other Controls	YES	YES
Other Controls * Liquidity Index	YES	YES
Observations	17,311	17,311
R-squared	0.125	0.091
Log likelihood	-14993	-66456
Chow Test (F-statistic)	2.884	3.820
P-value Chow Test	0.0000	0.0000

Table 1: Tests for Liquidity Constraint

	VARIABLES	(1) Probit ME DependOnChild	(2) Tobit Parameter Estimates	(3) ME Two-part $P(trans.>0\|\boldsymbol{x})$	(4) ME Two-part $E(\ln(trans.)\|\boldsymbol{x}, trans.>0)$
Parent	Age	-0.00194	0.518***	0.0418***	-0.00751
		(0.00820)	(0.0851)	(0.00704)	(0.0259)
	Age Squared	-8.49e-06	-0.00366***	-0.000289***	-3.89e-05
		(6.14e-05)	(0.000625)	(5.28e-05)	(0.000188)
	Female	0.0491***	0.0809	0.00833	0.0171
		(0.0136)	(0.124)	(0.0112)	(0.0359)
	Years of Schooling	-0.00647***	-0.0436***	-0.00473***	0.0209***
		(0.00173)	(0.0168)	(0.00150)	(0.00482)
	$\frac{HHNetIncome}{Num.ofChildren}$	-0.0721***	-0.204**	-0.0257***	0.00375
		(0.00992)	(0.0799)	(0.00726)	(0.00697)
	$\frac{HHNetWealth}{Num.ofChildren}$	-3.88e-05	-0.000216	-1.86e-05	9.10e-05*
		(2.87e-05)	(0.000228)	(1.79e-05)	(4.94e-05)
	$\frac{HHLifetimeIncome}{Num.ofChildren}$	2.52e-06	-0.00199	-0.000191	0.00101*
		(0.000337)	(0.00264)	(0.000205)	(0.000562)
Child	Age	-0.0125***	0.247***	0.0211***	-0.0167
		(0.00442)	(0.0499)	(0.00413)	(0.0139)
	Age Squared	0.000111**	-0.00301***	-0.000254***	0.000142
		(5.25e-05)	(0.000595)	(4.99e-05)	(0.000160)
	Female	-0.189***	1.321***	0.134***	-0.236***
		(0.00901)	(0.101)	(0.00875)	(0.0298)
	Num. of Children	0.0301***	0.265***	0.0306***	-0.130***
		(0.00687)	(0.0694)	(0.00642)	(0.0206)
	Agric. Hukou	0.159***	0.0774	0.0246*	-0.262***
		(0.0149)	(0.147)	(0.0129)	(0.0442)
	Income	0.00914***	0.231***	0.0168***	0.0839***
		(0.00154)	(0.0156)	(0.00176)	(0.00437)
	HC Investment	0.00887**	-0.0548	-0.00256	-0.00621
		(0.00451)	(0.0590)	(0.00443)	(0.00824)
	Fixed Costs ($T_1 > 0$)	0.0140	0.288	-0.00325	0.485***
		(0.0277)	(0.338)	(0.0267)	(0.0662)
	Observations	12,700	12,700	12,700	8,056
	lnL	-8049.102	-28363.358	-7805.221	-12575.384

Table 2: Tests for Fixed Costs

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