

# Risks and Parental Investment in the Human Capital of Children

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# Main Contribution

Theoretically examines effects of two types of risks:

- parental future income risk and
- human capital investment risk (e.g. uncertainty about children's ability/motivation, future wages)

on the parental investment in the human capital of children.

**Main Question:** Effects of increasing risk (variance/mean-preserving spread) on the parental investment in the human capital of children.

## Risky Human Capital Investment (Levhari and Weiss (1974))

– Analyzes the effects of the human capital investment risk in which an individual undertakes human capital investment to increase its future income.

**Main Prediction:** Increasing human capital investment risk has a negative effect on the human capital investment.

## Empirical Evidence: Human Capital Investment Risk

- Focus on the effect of increasing risk on an individual's human capital investment.
- Mixed evidence mostly from developed countries (Hartog and Diaz-Serrano 2013, 2015)
- Negative effect (Hartog and Diaz-Serrano 2007 for Spain)
- Positive effect (Kodde 1986 for Netherlands, Belzil and Hansen 2002 for the U.S. )
- Insignificant effect (Hartog et. al. 2012 for China)

## Developing Countries

- Kaufmann (2008) and Attanasio and Kaufmann (2014) for Mexico
- Study the effects of individuals (subjective) expectation and perceptions about their returns to schooling on their school attendance decisions.
- Find that increasing variance has a significant negative effect on the decision of junior high school students to attend senior high school.

# Parental/Household Income Risk and Human Capital Investment

- Fizsimons (2007) finds that the household income risks have insignificant effect on schooling outcomes in Indonesia.
- Kazianga (2012) using data from Burkina Faso finds that the household income risks have a significant negative effect on schooling outcomes.
- Portner(2009) the household income risks have a significant positive effect on schooling outcomes in Guatemala.

## Basic Features of the Model

- ▶ Two-periods
- ▶ Unitary households consisting of an altruistic parent and a child (Becker 1991).
- ▶ Its utility depends not only on its own consumption, but also on the utility enjoyed by its child.
- ▶ The parent chooses its own consumption, saving, and the human capital investment and the amount of bequest for the child.

## Basic Features of the Model

- ▶ Human capital investment and saving decisions are made in the first period.
- ▶ A higher level of human capital investment in the first period leads to higher earnings for the child next period.
- ▶ While making human capital investment and saving decisions, the parent faces different kinds of *uninsurable idiosyncratic risks*.
- ▶ In particular, the future (second period) parental endowment income and the productivity of human capital investment are random.



## Key Aspects of the Model

1. The bequest plays a dual role in the model.
  - (a) It reduces the consumption inequality between the parent and the child, a role explored in the human capital models without risk (e.g. Becker 1991, Brown, Scholz and Seshadri 2012, Kumar 2013).
  - (b) It allows the parent and the child to share and diversify their risks.
2. The parent faces a version of the portfolio allocation problem. It can increase its future utility both by increasing the human capital investment of child and saving.

## Key Aspects of the Model

3. The parental endowment income risk and the human capital investment risk affect the parental human capital investment through different channels:

- ▶ The parental future income risk affects the parental decision only through the precautionary motive.
- ▶ The human capital is an asset. Risky human capital investment affects the parental decision both through
  - the (positive) precautionary motive and
  - the (negative) substitution effect, similar to the effects of capital income risk on saving (Sandmo 1970, Eeckhoudt and Schlesinger 2008).

# Model

The parental optimization problem is to

$$\max_{s,b,k} E \sum_{t=1}^2 U(c_t^p) + \delta U(c)$$

subject to the budget constraints. Assume that  $U_c() > 0$ ,  $U_{cc}() < 0$  &  $U_{ccc}() > 0$  (*Risk – Prudence*).

## Budget Constraints

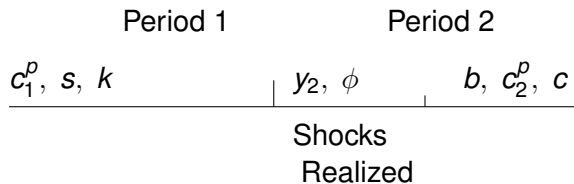
$$c_1^D + k + s = y_1; \quad (2.2)$$

$$c_2^D + b = y_2 + Rk \text{ \& } \quad (2.3)$$

$$c = b + \phi h(s) \quad (2.4)$$

where  $y_2$ , and the human capital productivity parameter,  $\phi$ , are random variables.  $y_2 \sim (\bar{y}_2, \sigma_{y_2}^2)$ ,  $\phi \sim (\bar{\phi}, \sigma_{\phi}^2)$ , and co-variance  $\sigma_{y_2, \phi}$ .

# Timing



## Effects of (Small) Risks

Distinguish among three cases:

1.  $k$  &  $b > 0$  for all the realizations of the random variables. Unconstrained parent.
2.  $k > 0$  &  $b = 0$  for all the realizations of the random variables. Parent facing binding bequest constraint.
3.  $k = 0$  &  $b \geq 0$ . Parent facing binding borrowing constraint.

Methodological Approach: Taking the second order Taylor approximation around the certainty case  $(\bar{y}_2, \bar{\phi})$ . Using Cramer's rule derive the effects of  $\sigma_{y_2}^2$  and  $\sigma_{\phi}^2$  on the human capital investment.

## Case I: $k$ & $b > 0$

Suppose that the parental endowment income and the human capital investment are independently distributed,  $\sigma_{y_2, \phi} = 0$ :

### **Proposition 4:**

1. *Parental Endowment Income Risk:* An increase in  $\sigma_{y_2}^2$  increases the human capital investment.
2. *Human Capital Investment Risk:* An increase in  $\sigma_{\phi}^2$  reduces the human capital investment.

## Case II: $k > 0$ & $b = 0$

### Proposition 7:

1. An increase in  $\sigma_{y_2}^2$  reduces the human capital investment.
2. An increase in  $\sigma_{\phi}^2$  increases (decreases) the human capital investment if the *relative risk-prudence* of the child

$$r\rho(c) \equiv -\frac{U_{ccc}(c)}{U_{cc}(c)}c > (<)2. \quad (3.12)$$



## Numerical Analysis

The period utility function

$$U(x) = \frac{x^{1-\alpha}}{1-\alpha}. \quad (4.4)$$

The human capital investment function (Becker (1991) and Restuccia and Urrutia (2004))

$$\phi h(s, g) = a \exp^\zeta (s + g)^\mu, \quad \zeta \sim N(0, \sigma_\zeta^2) \quad (4.5)$$

where  $a$  is the ability level of the child,  $\exp^\zeta$  is the wage of (adult) child per-unit of human capital and  $g$  is the government expenditure.

The parental endowment income in the second period

$$y_2 = \exp^\lambda \tilde{y}_2, \quad \lambda \sim N(0, \sigma_\lambda^2) \quad (4.6)$$

where  $\exp^\lambda$  is the wage of the parent per-unit of its human capital.

## Budget Constraints

$$c_1^D + k + s = (1 - \tau)y_1 + tr_1; \quad (4.1)$$

$$c_2^D + b = (1 - \tau)y_2 + Rk + tr_2 \quad \& \quad (4.2)$$

$$c = b + \phi(1 - \tau)h(s, g) + tc_2. \quad (4.3)$$

# Numerical Analysis

- Values of parameters to match salient features of labor market outcomes, educational expenditure and inter-generational transfers in the United States.
- Baseline Time-period: 25 years,  $\alpha = 1.5$ ,  $\sigma_{\lambda}^2 = \sigma_{\zeta} = 0.36$ .
- Three ability levels of children: High, Medium, and Low
- Three Cases:  $\sigma_{\zeta,\lambda} = 0$ ,  $\sigma_{\zeta,\lambda} = 0.18$ ,  $\sigma_{\zeta,\lambda} = -0.18$ ,

# Results

1. Risks reduces the parental human capital investment by 20.4% relative to the deterministic case.
2. Effects of risks depend crucially on the ability of child. The parental income risk has a larger negative effect on the human capital investment of high ability child. On the other hand, the human capital investment risk has a larger negative effect on the human capital investment of low ability child.
3. For the parent facing binding borrowing constraint, the parental income risk has a positive effect on the human capital investment of low ability child.

## Policy Experiments

1. Providing income subsidy to parents which is financed by future (lump-sum) taxes on parents has little effect on the human capital investment, except for the parents facing binding borrowing constraint.
2. If income subsidy is financed by future (lump-sum) taxes on adult children, it has a large positive effect on the human capital investment.
3. Increasing government expenditure on schooling, has little effect on overall human capital investment.

## Conclusion

1. Developed a model to analyze the effects of parental income risk on the human capital investment of its child, when the human capital investment is risky.
2. Finds that the effects of these risks on the human capital investment depends on whether bequest constraint binds. Bequest provides an instrument through which parents and children can share risks.
3. If the bequest and borrowing constraints do not bind, increasing parental income risk has a positive effect on the human capital investment, but increasing human capital investment risk has a negative effect.
4. If the bequest constraint is binding, the effects of increasing these risks are reversed.

## Future Research

- Old Age Income Support by Children (Education Repayment Hypothesis)
- Distinction between early education expenditure (primary schooling) and later education expenditure (high school/college).