Identity and Educational Choice: A Behavioral Approach

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Puzzle and Motivation

- Socioeconomic background greatly affects educational choice. For example, since 1980, despite the substantial increasing economic incentives to high education, the college participation rate increases more sharply in the high income groups than in the low ones.

- Credit constraint or lack of culture?

Assumptions

1. There is uncertainty of the returns to schooling.

2. The behavioral approach

1) Rational expected utility suggests that subjective and objective beliefs of the wage distribution coincide, while the behavioral approach claims the subjective beliefs often diverge from the objective ones.

2) Dominitz and Manski (1997): the "heterogeneity" nature of student's expectation of future income; most respondents tend to overestimate the degree of inequality of income distribution in American society.

3) Psychological studies have long documented the profound effects of emotions such as self-esteem on individuals' thinking process and action choice (Nathaniel Branden, 1969).

A story …

1. This paper proposes an approach that includes two components in the utility function.

(1) Economic rewards to schooling in future labor market based on perceived cognitive ability.

(2) At school, one experiences self-esteem emotion about her <u>perceived cognitive ability</u>, which is determined by her socioeconomic background.

2. Socioeconomic background decides one's preschool education, school quality and peer influences. These all affect schooling choice.

The Model

Stage 1:

1) Initial beliefs from her social community

$$\theta_i = \begin{cases} \theta_H & \text{with probability } \rho \\ \theta_L & \text{with probability } 1 - \rho \end{cases}$$

2) Conditional on Signal σ, the agent perceives her cognitive ability as θ_i (either θ_H or θ_L)
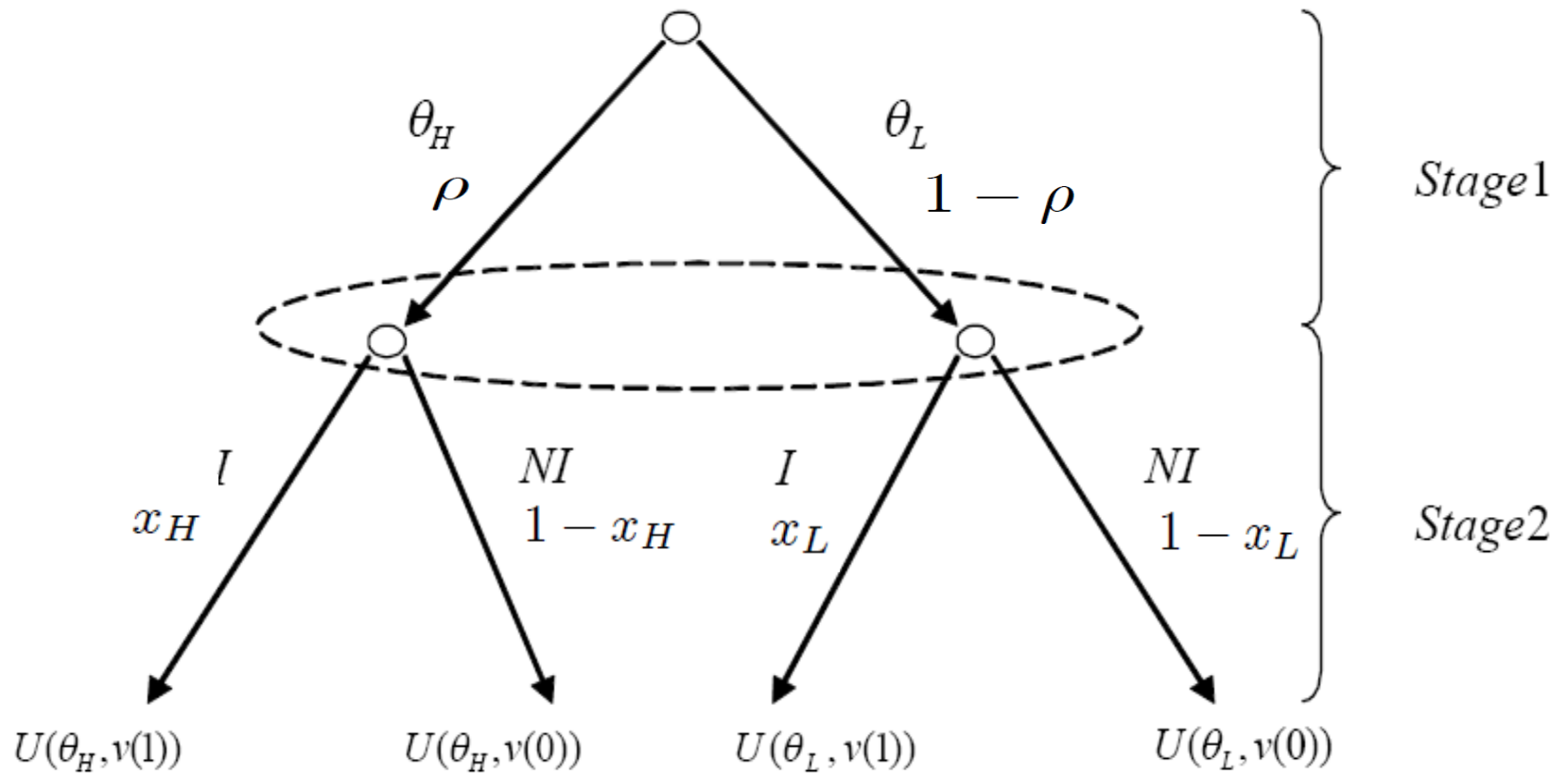
3) Preschool education S_0

4) Choose investment action $a \in \{0, 1\}$ with return r

$$c_i = \begin{cases} c_H & \text{for the high ability} \\ c_L & \text{for the low ability} \end{cases}, \quad c_H < c_L$$

$$S_1 = S_0 + ar$$

Stage 2: at school, perceived ability conditional on action a

(1)   Bayesian Updating after investment action a

$$\widehat{\rho}(1) = \frac{\rho x_H}{\rho x_H + (1-\rho)x_L}$$

$$\widehat{\rho}(0) = \frac{\rho(1-x_H)}{\rho(1-x_H) + (1-\rho)(1-x_L)}$$

$$v(1) = \widehat{\rho}(1)\theta_H + (1 - \widehat{\rho}(1))\theta_L$$

$$v(0) = \widehat{\rho}(0)\theta_H + (1 - \widehat{\rho}(0))\theta_L$$

Cognitive Dissonance ： the feeling of uncomfortable tension which comes from holding two conflicting thoughts in the mind at the same time

Stage 2: the self-perception of ability when two perceptions contradict

$$\lambda \theta_i + (1-\lambda)v(a)$$

The two meaning of exogenous variable λ

$$0 \leq \lambda \leq 1$$

1) Informational Loss: at stage 2, the agent recalls her "old ability" θ_i with probability λ and she update the "new ability" $v(a)$ with probability $1 - \lambda$

2) The type of agent: λ measures the degree of differences between being the "progressive" $(\lambda = 0)$ and the "conservative" $(\lambda = 1)$

Utility Function at stage 2:

$$\theta_i S_1 + q(\lambda\theta_i + (1-\lambda)v(a))S_1 - ac_i$$

(1) Monetary returns in future labor market
(2) Self-esteem: q shows the intensity the agent cares about her self-esteem (or educational identity), is assumed to be related to school influences.

Maximization

- At stage 1, the agent will optimally select action a , taking into account not only ***cognitive component*** of the returns to schoolings in future labor market, but also ***emotional payoffs (self-esteem)*** derived at stage 2.

$$\underset{a \in \{0,1\}}{Max} U(\theta_i, a, \lambda, S_0) = [\theta_i + q(\lambda \theta_i + (1-\lambda)v(a))](S_0 + ar) - ac_i$$

- The agent will choose to invest $a = 1$

$$U(\theta_i, 1, \lambda, S_0) - U(\theta_i, 0, \lambda, S_0) \geq 0$$

Perfect Bayesian Equilibrium

In order to obtain a ***Perfect Bayesian Equilibrium*** in this self-signaling game, assume that the agent is rational in the two senses: she will maximize her total utility and there is a set of strategies and beliefs $(a, \widehat{\rho}(a))$ such that at any stage of the game, strategies are optimal given the beliefs, and the beliefs are obtained from equilibrium strategies and observed actions using Bayes' rule.

Results

Proposition 1 *Given a set of parameters* $(\theta_H, \theta_L, c_H, c_L)$, *internal traits* (q, ρ, λ), *external constraints* (S_0, r), *there exists a uniquely dominating equilibrium under the following specific conditions:*

Equilibrium A: "no investment equilibrium", $x_H = x_L = 0$, *when*

$$\theta_H r + q\lambda\theta_H r + q(1-\lambda)\left[\theta_H(S_0 + r) - \overline{v}S_0\right] \leq c_H \qquad \text{(C1)}$$

Equilibrium B: "separating equilibrium", $x_H = 1, x_L = 0$, *when*

$$\theta_H r + q\lambda\theta_H r + q(1-\lambda)\left[\theta_H(S_0 + r) - \theta_L S_0\right] \geq c_H \qquad \text{(C2)}$$

$$\theta_L r + q\lambda\theta_L r + q(1-\lambda)\left[\theta_H(S_0 + r) - \theta_L S_0\right] \leq c_L \qquad \text{(C3)}$$

Equilibrium C: "semi-separating equilibrium", $x_H = 1, 0 < x_L < 1$, when

$$\theta_L r + q\lambda\theta_L r + q(1-\lambda)\left[v(1)(S_0 + r) - \theta_L S_0\right] = c_L \qquad (C4)$$

Equilibrium D: "full investment equilibrium", $x_H = x_L = 1$, when

$$\theta_L r + q\lambda\theta_L r + q(1-\lambda)\left[\overline{v}(S_0 + r) - \theta_L S_0\right] \geq c_L \qquad (C5)$$

The trade-offs between λ, r and S_0 and the equilibria:

Proposition 2 *The probability of investing increases when:*

(1) the preschool education S_0 increases
(2) the teaching quality r increases
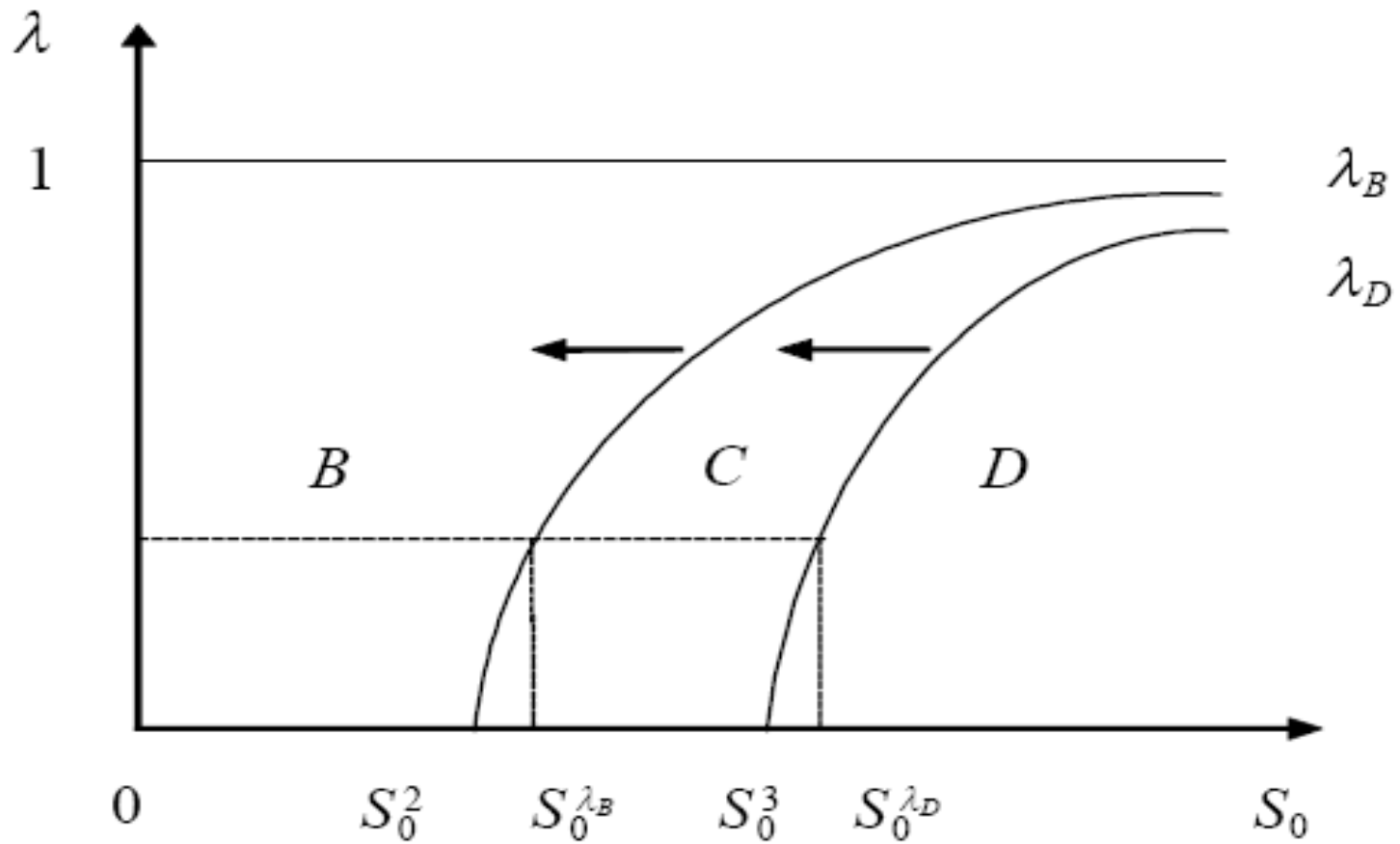*(3) the more progressive (the lower λ) the agent is*
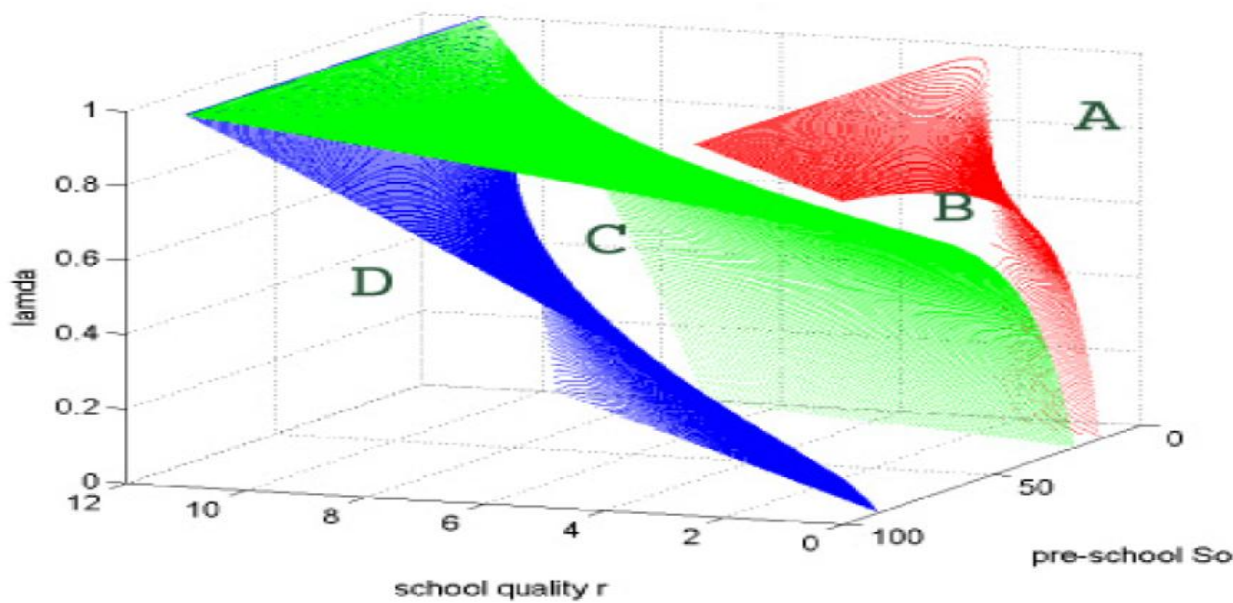
Figure 4. Four equilibria, S_0, r and λ

Three Scenarios:
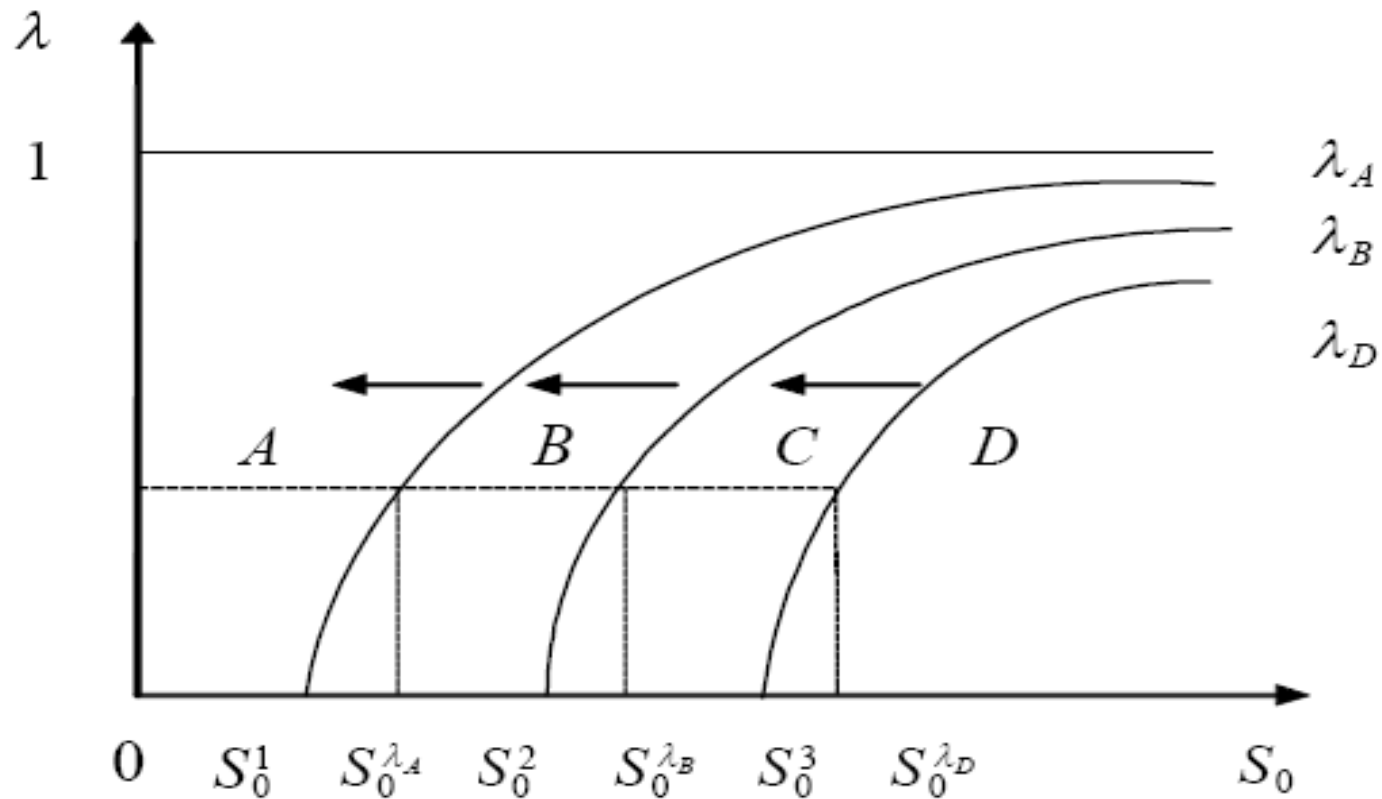1. Good quality school $r \geq \frac{c_L}{(1+q)\theta_L}$
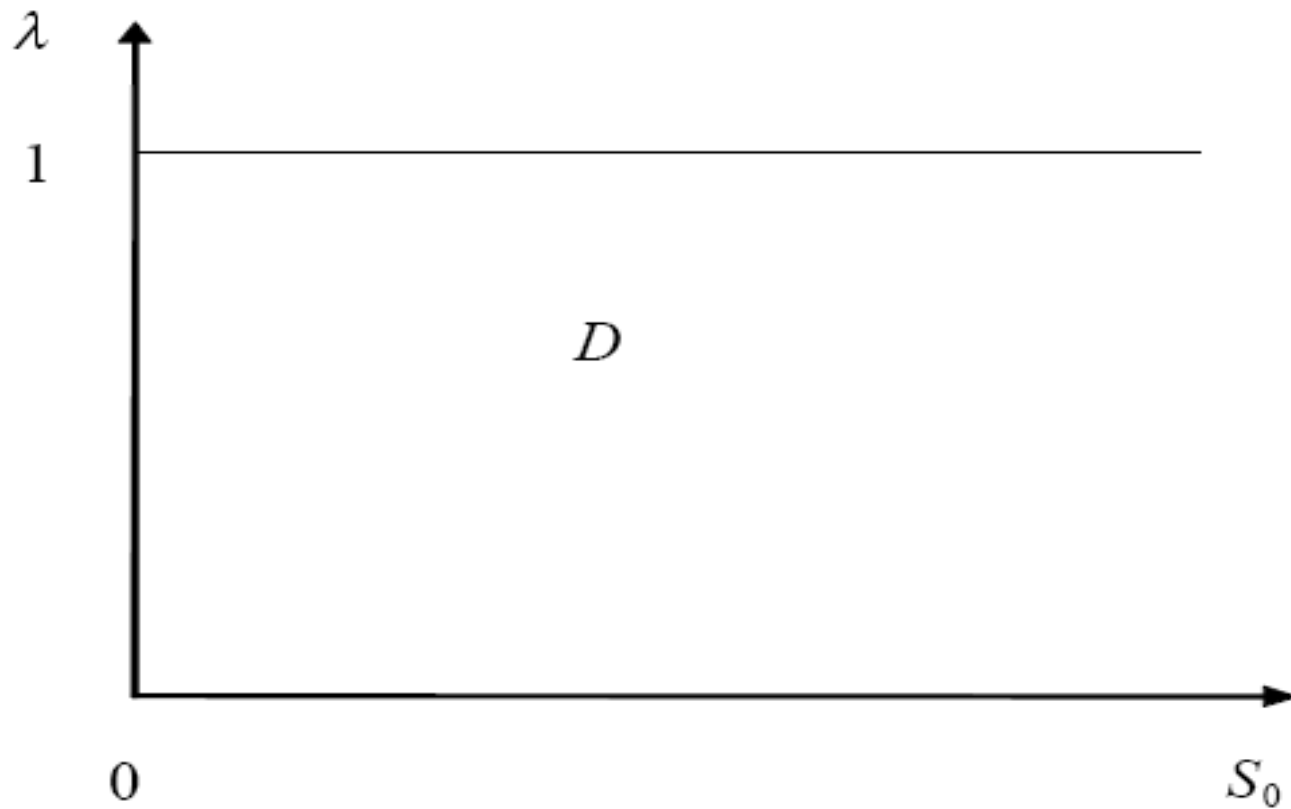
2. Medium quality school $\frac{c_H}{(1+q)\theta_H} \leq r < \frac{c_L}{(1+q)\theta_L}$

At good or medium quality school, the high type agent always invests. The school quality is defined in two dimensions:

1) How much market-valued skills r the school imparts to its students?

2) How strongly (q) the school promotes educational identity.

Poor Quality School $r < \frac{c_H}{(1+q)\theta_H}$

At poor quality school, whether the high type agent will invest or not depends on (S_0, λ), given the value of λ, the threshold of preschool education encourages the high type agent to invest is,

$$S_0^{\lambda_A} = \frac{c_H - (1+q)\theta_H r}{q(\theta_H - \overline{v})(1 - \lambda)}$$

This threshold level increases with ρ

$$\frac{dS_0^{\lambda_A}}{d\rho} > 0$$

Endogeneity of λ and influences of social environment

- Memory λ is shapeable and reconstructive. In order to achieve to be willing to invest in education, will the high ability agent in low quality school adapt to be progressive ($\lambda = 0$)?

- On the one hand, there is a demand for λ to construct a good self-image.

- On the other hand, to modify memory exhausts real resources, time, psychic stress from repressions. The cost is related to the social environment the agent has access to.

Two Extreme Memory Supply Functions

1. The conservative social environment
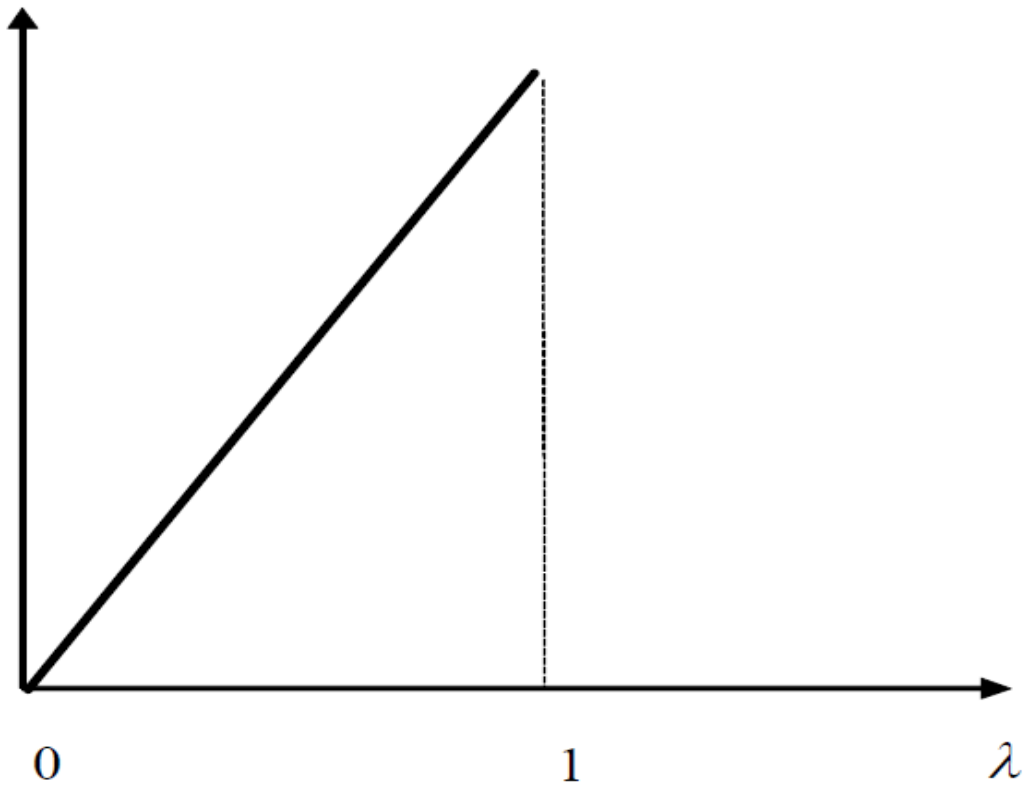
$$M(\lambda) = m(1 - \lambda) \qquad m > 0$$
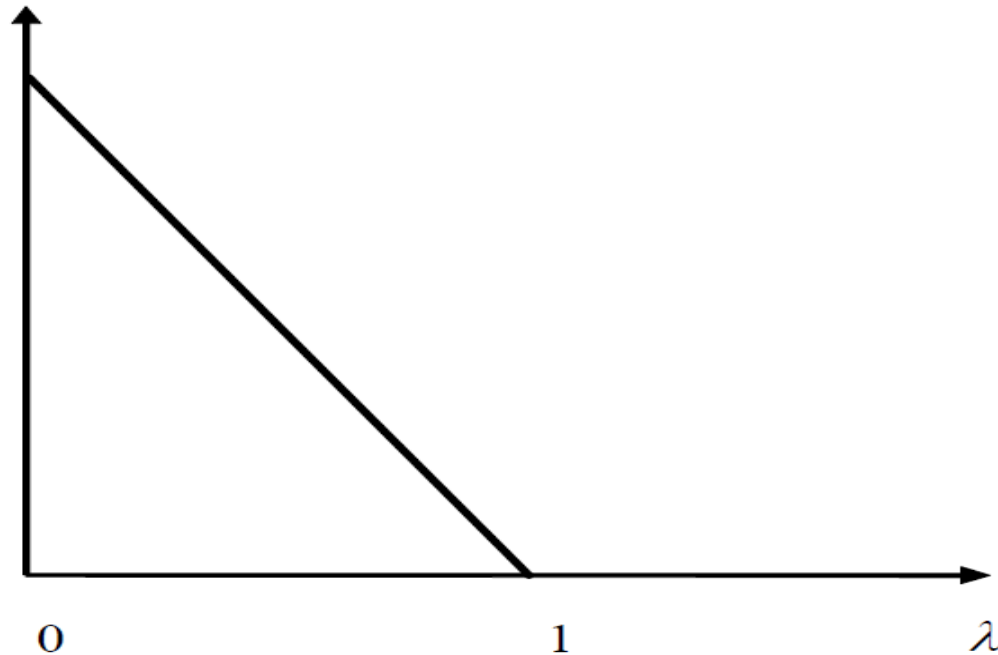
2. The progressive social environment

$$M(\lambda) = m\lambda$$

Maximization

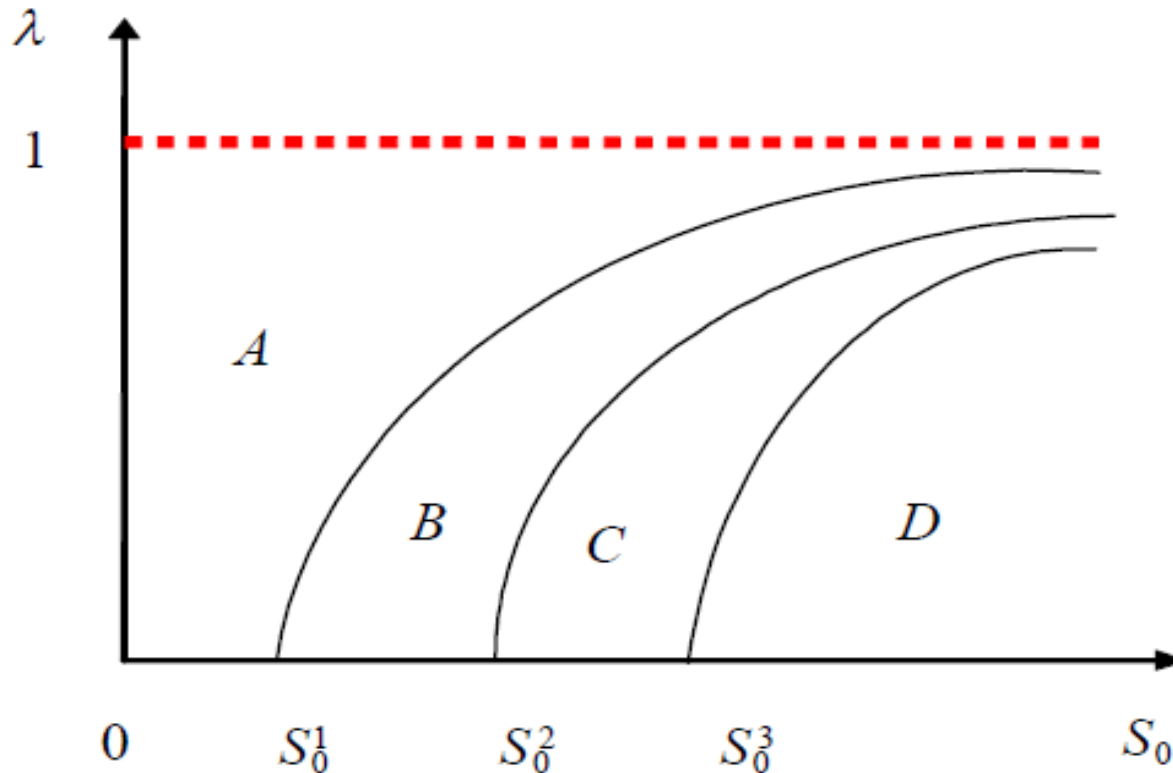The high type agent optimally chooses λ according to:

$$\underset{0 \leq \lambda \leq 1}{Max} \, U(\theta_H, a, \lambda, S_0) = \left(\theta_H + q\lambda\theta_H + q(1-\lambda)v(a)\right)\left(S_0 + ar\right) - ac_H - M(\lambda)$$

$$\frac{\partial U}{\partial \lambda} = q\left(\theta_H - v(a)\right)\left(S_0 + ar\right) - M'(\lambda)$$

Results

1. In the <u>conservative social environment</u>, the high type agent at poor quality school chooses $\lambda = 1$ and does not invest in education.

2(1). In the <u>progressive environment </u>(the cost of being conservative is <u>not very high</u>), the high type agent will not invest.
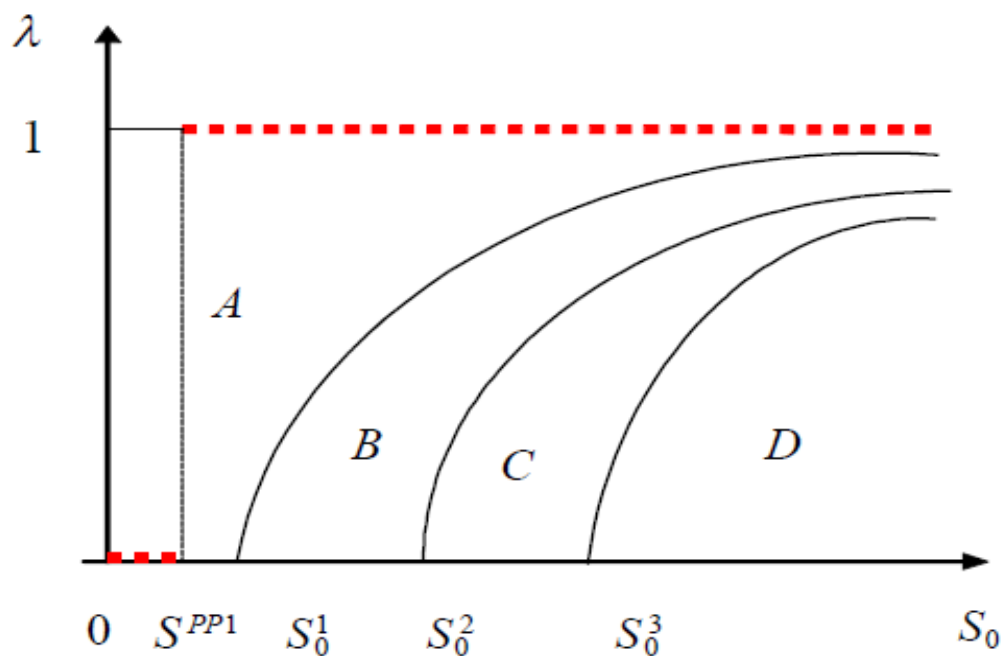

Figure 15. Poor quality school, high type, progressive environment $-(1+q)\theta_H r + c_H > m$

2 (2). In the <u>progressive environment</u> (the cost of being conservative is <u>high enough</u>), the high type agent at poor quality school may choose $\lambda = 0$, so that it could lead her to invest in education when $S_0 > S_0^1$
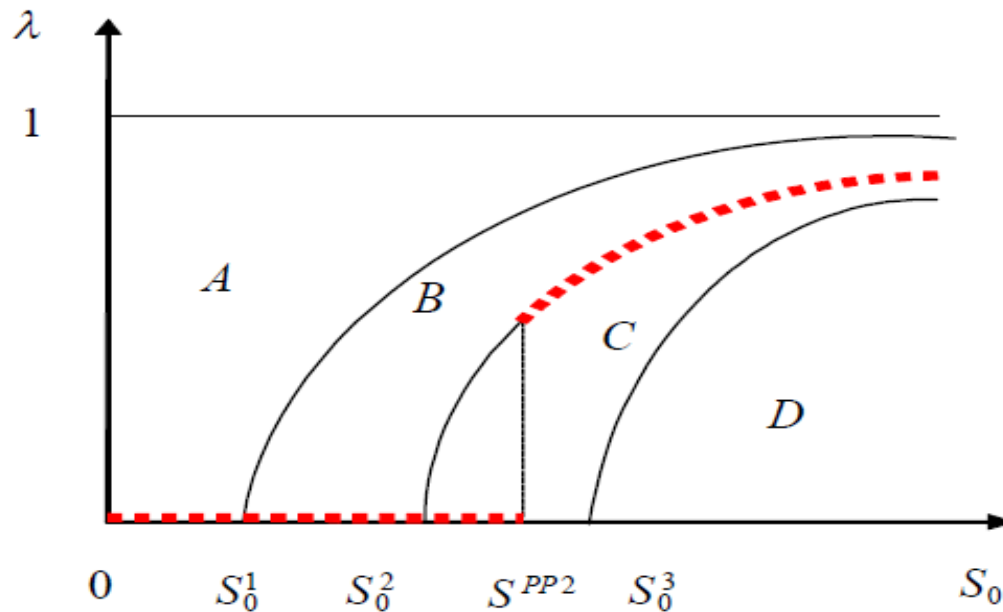

Figure 16. Poor quality school, high type, progressive environment $c_H - (1+q)\theta_H \leq m$

Conclusions

The quality of school, the preschool education and the social pressures are key in deciding one's educational achievements. Pure economic incentives in the labor market could fail to attract the high ability individuals to invest in high education, public policy should improve both the early and later education at school to offset the disadvantaged endowed effects.