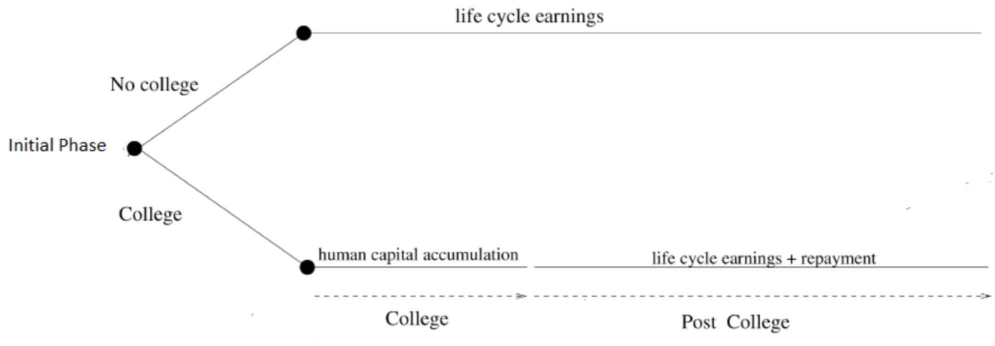
1 Overview



Timing of decisions.

2 Third Phase

Time Period

$Tb + 1 \rightarrow \infty$

State Space

$\Omega_t = \{a_t, H_t, d, \epsilon_t^w\}$

a_t - assets

H_t - human capital

d - entered this phase in default

ϵ_t^w - iid shock on wages

Choice Set

$\theta_t = (a_{t+1})$

a_{t+1} - savings

Value Function

$$V_3(\Omega_t) = \max_{\theta_t \in \Theta_t} \frac{c_t^{1-\gamma}}{1-\gamma} + \beta E(V_3(\Omega_{t+1}|\Omega_t, \theta_t)) \tag{1}$$

Subject to:

$$a_{t+1} + c_t = w_t + (1 + r_i)a_t \tag{2}$$

where:

$a_{t+1} \geq \underline{a}$, $i = nd, d$ and $r_d > r_{nd}$

$ln(w_t) = w(H_t) + \epsilon_t$ where $\epsilon_t^w \sim N(0, \sigma^w)$

3 Second Phase

Time Period

$Ta + 1 \rightarrow Tb$

State Space

$\Omega_t = (a_t, a_t^s, H_t, AFQT, Race, d_t, type)$

a_t - assets

a_t^s - oustanding student loans

H_t - human capital

$AFQT$ - Ability

$Race$ - Race

d_t - default

$type$ - unobserved type

Choice Set

$\Theta = (a_{t+1}, l_t)$

a_{t+1} - savings

l_t - work intensity

Value Function[1]

$$V_2(\Omega_t) = \max_{\theta_t \in \Theta_t} \frac{c_t^{1-\sigma}}{1-\sigma} + \gamma(l_t, type, \epsilon) + \beta E[V_2(\Omega_{t+1})|\theta_t, \Omega_t] \tag{3}$$

Subject to:

$$c_t = a_t - (1+r)a_{t+1} - I(d=1)\frac{a_t^s}{1+\sum_{t=Ta}^{Tb-1}\frac{1}{(1+r_s)^{Tb}}} + w_t l_t + tr_t \tag{4}$$

$BA_t = 1$ if $Cr_t >= 20$

$Cr_{t+1} = Cr_t + cr_t$

$H_{t+1} = (1-\delta)H_t + h_t$

$h_t = h_t(AFQT, cr_t, j, l_t, BA_t, type)$

$d = 1$ if $w_t l_t + tr_t + a_t < \frac{a_t^s}{1+\sum_{t=Ta}^{Tb-1}\frac{1}{(1+r_l)^{Tb}}}$

if $d = 1$: $a_{t+1}^s = (1+\mu)a_t^s$ - if default percentage gets added to their loan

4 First Phase

Time Period

$1 \to Ta$

State Space

$\Omega_t = \{a_t^s, H_t, AFQT, j, cr_t, INC, Y, SAT, Race, nsib_t, type\}$

[1]Different interest rates for those who defaulted here?

a_t^s - outstanding student loans

H_t - human capital

$AFQT$ - ability

j - school attended

Cr_t - credits

INC - Parental income

Y - Parents wealth

SAT - test score

$RACE$ - race

$nsib_t$ -siblings in school

$type$ - unobserved type

Choice Set

att_t - attend school

l_t - work intensity

a_{t+1}^s - school borrowing

Value Functions

For $t = 1, 2, ...T_a$

Enrolled in College:

$$V_1(\Omega_t) = \max_{\theta_t \in \Theta_t} \frac{c_t^{1-\sigma}}{1-\sigma} + \gamma(j_t, l_t, type, \epsilon) + \beta E[W(\Omega_{t+1})|\theta_t, \Omega_t] \tag{5}$$

Subject to:

$$c_t = (1 + r_s)a_{t+1}^s - a_t^s + w_t l_t + tr_t + I(att_t = 1)(aid_j - tu_j) \tag{6}$$

Where:

$E[W(\Omega_{t+1})|\theta_t, \Omega_t] =$

$\{I(t < 10) \max[V_1(\Omega_{t+1}|\theta_t, \Omega_t), V_2(\Omega_{t+1}|\theta_t, \Omega_t)]$

$+I(t = 10)V_2(\Omega_{t+1}|\theta_t, \Omega_t)\}$

$cr_t = \pi(cr|AFQT, l_t, type)$ - Probability of earning cr_t credits

$BA_t = 1$ if $Cr_t >= 20$

$Cr_{t+1} = Cr_t + cr_t$

$H_{t+1} = (1 - \delta)H_t + h_t$

$h_t = h_t(AFQT, cr_t, j, l_t, BA_t, type)$

$BA_t = 1$ if $Cr_t + cr_t >= 20$

5 Initial Period

State Space

$\Omega = \{H_t^0, AFQT, INC, Y, SAT, nsib, RACE, type\}$

H_0 - human capital

$AFQT$ - ability

INC - Parental income

Y - Parents wealth

SAT - test score

$Race$ - race

$nsib_0$ -siblings in school

$type$ - unobserved type

Choice Set

$\Omega = j_0$

j_0 - School choice

Value Function

$V_0 = \max_j\{V_1(Omega_1|Omega_0, theta_0 = 1), ..., V_1(Omega_1|Omega_0, theta_0 = 4), V_2(Omega_1|Omega_0, theta_0 = 0)\}$