Human Capital: Introduction

Investing in education and training:

Spend money now in order to have higher wages in the future

Example:

Income endowment:

$I_0 = 25k$
$I_1 = 25k$

Can also take classes in period 0 to raise income in period 1:

Define variables:

Tu = tuition paid at 0
Ra = raise in period 1

Suppose the following options are available:

Classes	Tu	Ra
0	0	0
1	5k	10k
2	10k	17k
3	15k	23k
4	20k	28k
5	25k	32k

Each class costs $5k and raises income, but at a decreasing rate

Resulting options for *net income* (disposable income) after accounting for tuition and raise:

$$I_0^{net} = I_0 - Tu$$

$$I_1^{net} = I_1 + Ra$$

In thousands:

Classes		I_0	Tu	I_0^{net}		I_1	Ra	I_1^{net}
0		25	0	25		25	0	25
1		25	5	20		25	10	35
2		25	10	15		25	17	42
3		25	15	10		25	23	48
4		25	20	5		25	28	53
5		25	25	0		25	32	57

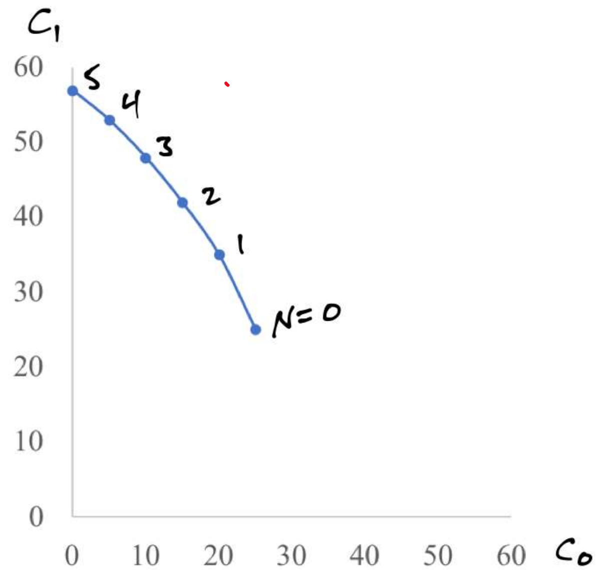
Can choose *net income* bundle by adjusting number of classes.

Which number of classes is best?

Initially, suppose can't borrow or save: must consume net income

$$C_0 = I_0^{net}$$
$$C_1 = I_1^{net}$$

Graphing the options:

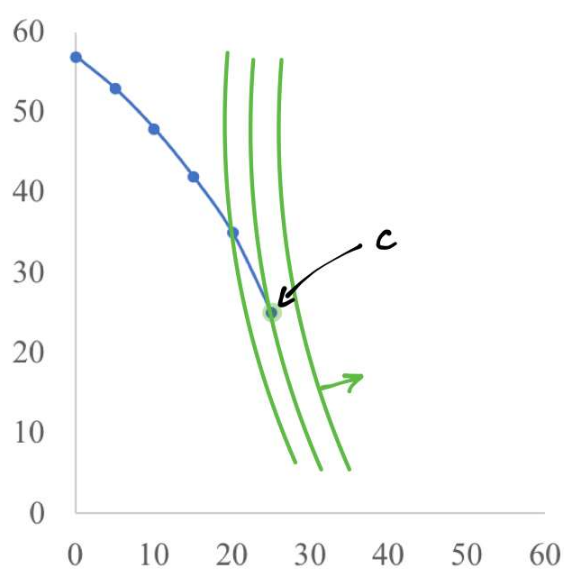


Known as a "human capital production function"

Feasible set of consumption bundles achievable by school alone.

Now add ICs to find the option chosen:

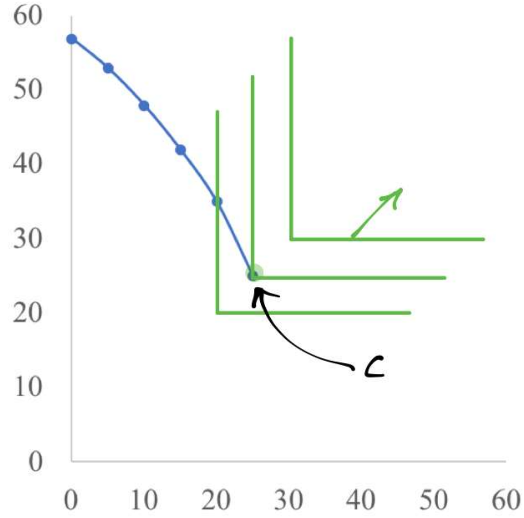
Case 1: Very steep ICs



N=0

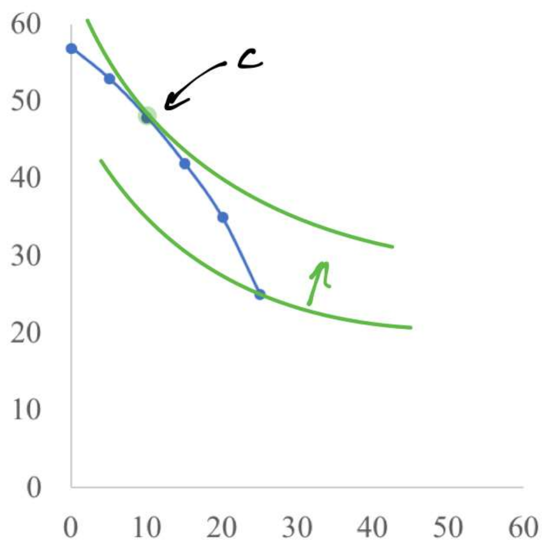
Case 2: Perfect complements

$$\frac{C_0}{C_1} = \frac{1}{1}$$



N=0

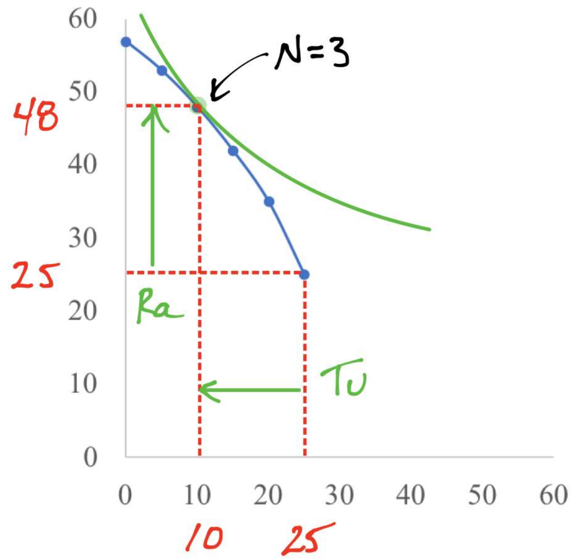
Case 3: ICs with more willingness to trade C_0 for C_1



Now, N>0

With the ICs shown:
N=3

Linking N, tuition (Tu) and the raise (Ra):



At N=3:

$$Tu = 15k$$
$$Ra = 23k$$

Key insight:

Without access to borrowing or saving:

Many preferences lead to N=0

Examples: case 1 (impatient), case 2 (PC)

Now add option to borrow or save

Suppose $r = 5\%$

Now have *two* decisions:

1. Number of classes to take
2. Amount to borrow or save

Can think them through in that order

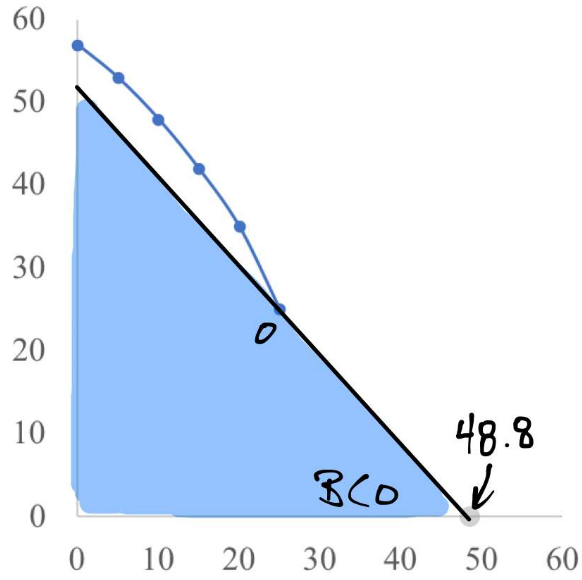
Suppose chooses N=0; what bundles are feasible?

Net income for N=0:

$$I_0^{net} = 25k$$
net

$$I_1^{net} = 25k$$

$$PVI = 25k + \frac{25k}{1.05} = 48.8k$$

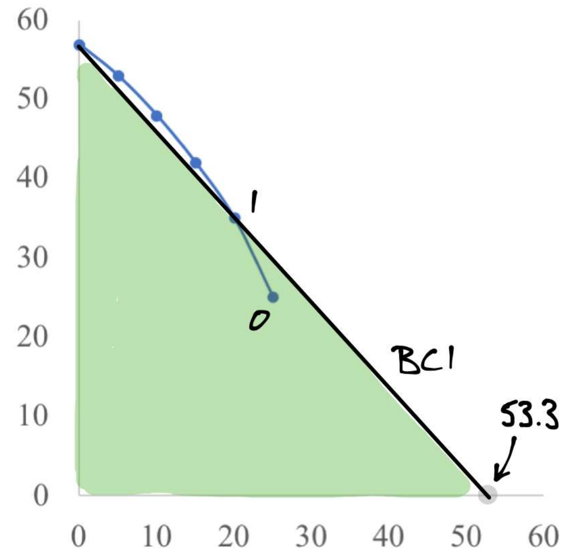


Suppose chooses N=1; what bundles are feasible?

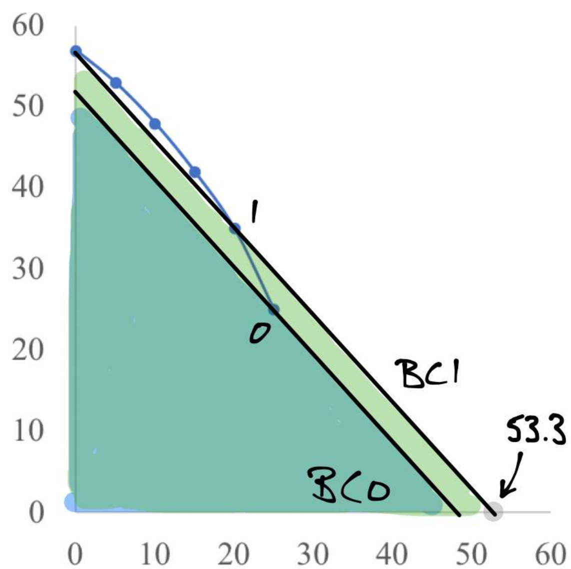
Net income for N=1:

$$I_0^{net} = 25k - 5k = 20k$$
$$I_1^{net} = 25k + 10k = 35k$$

$$PVI = 20k + \frac{35k}{1.05} = 53.3k$$



Overlaying the BC0 and BC1 sets:



Feasible set for BC1 contains:

- **All** bundles in BC0 (darker color)
- **Plus** bundles with more C_0, C_1 or both (lighter color)

Implication:

BC1 is better for *all* preferences

Technically, BC1 dominates BC0