Human Capital Investments[1]
In-Class Problem[2]

Suppose Lauren chooses to return to college to earn a Law degree under the belief that she can earn $35,000 more per year with the degree than she is earning now. Labor demand in this perfectly competitive market for someone with a Law degree is equal to 40 - .02W and labor supply is equal to 0.05W – 30; W equals wages in 100's and L = number of workers. Lauren is realistic about how she values opportunities and resources and has a personal discount rate of 6%. Lauren plans to take an LSAT prep course at an up-front cost of $5,000. The cost of getting a Law degree is approximately $150,000 ($50,000 annually for each of three years) and most people can earn the degree while still employed a few hours a week, but that's all. Lauren is very competitive and wants to earn straight A's so she has decided that she will cut back her hours at work by 75% - her pay will also reduce by the same percentage. You can account for annual costs and incomes at the end of each period.

i. What is the current wage for Lawyers in this market and how many of them does the market support at that wage?

$$L_S = L_D$$
$$40 - .02W = .05W - 30$$
$$70 = .07W$$
$$\frac{70}{.07} = W = 1{,}000$$
$$\boldsymbol{W^* = 1{,}000}$$

Remember that W = wages in $100's…
$1{,}000 * \$100 = \$100{,}000$
Also remember that these is no such notation in regards to L.

$$L = .05\,(1{,}000) - 30$$
$$= 50 - 30$$
$$\boldsymbol{L^* = 20}$$

ii. If Lauren expects to work for at least 20 years after receiving her degree, would you recommend that she make this investment?

$$PV = \sum \frac{\beta^t}{(1+r)^t}$$

$$PV = \frac{\frac{\Delta Tuition}{\Delta Ed\ Expense}}{\frac{\Delta Living\ Expense}{\Delta Income}} + \frac{\frac{\Delta Tuition}{\Delta Ed\ Expense}}{\frac{\Delta Living\ Expense}{\Delta Income}} + \frac{\Delta\ Living\ Expense}{\Delta\ Income} + \frac{\Delta\ Linving\ Expense}{\Delta\ Income}$$

$$PV = \frac{\frac{-50000}{-48750}}{(1+r)^1} + \frac{\frac{-50000}{-48750}}{(1+r)^3} + \frac{+35000}{(1+r)^4} + \frac{+35000}{(1+r)^{23}}$$

$$PV = \$73{,}102.92$$

[1] This In-Class Problem is intended to present an abbreviated discussion of the included economic concepts and is not intended to be a full or complete representation of them or the underlying economic foundations from which they are built.

[2] This problem was developed by Rick Haskell (rick.haskell@utah.edu), Ph.D. Student, Department of Economics, College of Social and Behavioral Sciences, The University of Utah, Salt Lake City, Utah (2014).

Since PV > $5,000, we'd recommend Lauren make the investment and go to Law School. Why are we comparing PV to $5,000 rather than 0? Because Lauren has an up-from cost of $5,000 for her LSAT prep course. We can either compare the PV from our equation to any up-front costs or we could endogenize it into the equation by subtracting it from the right side equation. If you think about it this $5,000 up-front cost is simply $\frac{B_0}{(1+r)^0} = \frac{-\$5{,}000}{1.06^0} = -\$5{,}000$ since value to the 0 power = 1.

iii. If Lauren decides to go back to school how will her entrance into the market, after earning a degree, impact that market in terms of the number of workers and wage? Give specific values for the new W* and L*.

Now we need to rethink Lauren's probable wage. This is a relatively small market and the addition on even one attorney represents a 5% increase in Labor Supply. The Labor supply we calculated in part i) was 20, so with the addition of Lauren the new Labor Supply = .05W-30+1 = .05W-29

$$L_D = L_S$$
$$40 - .02W = .05W - 29$$
$$.07W = 69$$
$$W = \frac{69}{.07} = 985.71$$
$$\boldsymbol{W' = 985.71}$$

Remember that W = wages in $100's…
$985.71 * \$100 = \$98{,}571$

$$L = .05\,(985.71) - 29$$
$$= 49.28 - 29$$
$$\boldsymbol{L' = 20.28}$$

This has enough of a change that we might need to reconsider the PV decision; the new post-college wage is $98,571 not $100,000. If we plug this into our equations we find that the new PV = 59341.12 < $73,102. Even though it's a lower PV than we found before, it's still >0 and we would still recommend Lauren make the investment.

iv. One more thing. We might want to think about what this means in respect to elasticity of demand for attorneys in this market. We know that W_1 = $100,000, W_2 = $98,571, L_1 = 20, and L_2 = 20.28, so let's use the simple elasticity equation:

$$\frac{\frac{L_2 - L_1}{L_1}}{\frac{W_2 - W_1}{W_1}} = \frac{\frac{20.28-20}{20}}{\frac{\$98{,}5710-\$100{,}000}{\$100{,}000}} = \frac{\frac{.28}{20}}{\frac{-\$1{,}429}{\$100{,}000}} = \left(\frac{.28}{20}\right)\left(\frac{\$100{,}000}{-\$1{,}429}\right) = -\frac{\$28{,}0000}{\$28{,}580} = -0.98$$

With own wage elasticity of demand < |-1|, then we know this is inelastic. The only real question we might then ask is, "Is it reasonable to expect that attorneys represent unitary elasticity in respect to changes in wage?" My guess is that this has changed in recent years and that the market for attorneys may be close to unitary.

Present Value Example
Lauren's Law School Decision
In-Class Problem

Expenses (annual)	
Tuition Costs	50000
Other Education Expenses	0
Cost of living in college	0
Cost of living pre-college	0
Cost of living post-college	0
Income Pre-college	65000
Income in college	16250
Income post college	100000
Personal Discount rate	6%
Years in College	3
Years after college	20

$$PV = \sum \frac{\beta^t}{(1+r)^t}$$

$$PV = \frac{\substack{\Delta Tuition \\ \Delta Ed\ Expense \\ \Delta Living\ Expense}}{(1+r)^1} + \ldots + \frac{\substack{\Delta Tuition \\ \Delta Ed\ Expense \\ \Delta Living\ Expense}}{(1+r)^3} + \frac{\substack{\square \\ \square \\ \Delta Living\ Expense}}{(1+r)^4} + \ldots + \frac{\substack{\square \\ \square \\ \Delta Living\ Expense}}{(1+r)^{23}}$$

$$PV = \frac{\substack{\square \\ \square \\ -50000}}{(1+r)^1} + \ldots + \frac{\substack{\square \\ \square \\ -50000}}{(1+r)^3} + \frac{\substack{\square \\ \square \\ +35000}}{(1+r)^4} + \ldots + \frac{\substack{\square \\ \square \\ +35000}}{(1+r)^{23}}$$

College Years

1	2	3	4	5	Total
$ (93,160.38)	$ (87,887.15)	$ (82,912.40)	$ -	$ -	$ (263,959.93)

Post-College Years

4	5	6	7	8	9	10	11	12
$ 27,723.28	$ 26,154.04	$ 24,673.62	$ 23,277.00	$ 21,959.43	$ 20,716.45	$ 19,543.82	$ 18,437.56	$ 17,393.93

13	14	15	16	17	18	19	20	21	22	23	Total
$ 16,409.37	$ 15,480.53	$ 14,604.28	$ 13,777.62	$ 12,997.75	$ 12,262.03	$ 11,567.96	$ 10,913.17	$ 10,295.44	$ 9,712.68	$ 9,162.90	$ 337,062.85

College years + Post college years

$ 73,102.92 = PV

The goal then is to compare PV with zero (0). A PV > 0 suggests that this investment yields sufficient return to be worthwhile. PV < 0 suggests this investment does **not** yield sufficient results to be worthwhile, and PV = 0 suggests that the investor is indifferent. Remember that the threshold for this decision is embodied in the rate and that the assignment of a particular rate is intended to capture all necessary conditions.

For further detail and clarification see the Instructional Primer, Net Present Value and Discounted Present Value Calculations, posted in Canvas.

Present Value Example
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$$PV = \sum \frac{\beta^t}{(1+r)^t}$$

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$$PV = \frac{\substack{\square \\ \square \\ -50000}}{(1+r)^1} + \ldots + \frac{\substack{\square \\ \square \\ -50000}}{(1+r)^3} + \frac{\substack{\square \\ \square \\ +35000}}{(1+r)^4} + \ldots + \frac{\substack{\square \\ \square \\ +35000}}{(1+r)^{23}}$$

College Years (5)

1	2	3	4	5	Total
$ (93,160.38)	$ (87,887.15)	$ (82,912.40)	$ -	$ -	$ (263,959.93)

Post-College Years (20)

4	5	6	7	8	9	10	11	12
$ 26,591.38	$ 25,086.20	$ 23,666.23	$ 22,326.63	$ 21,062.86	$ 19,870.62	$ 18,745.87	$ 17,684.78	$ 16,683.76

13	14	15	16	17	18	19	20	21	22	23	Total
$ 15,739.39	$ 14,848.49	$ 14,008.01	$ 13,215.10	$ 12,467.07	$ 11,761.39	$ 11,095.65	$ 10,467.60	$ 9,875.09	$ 9,316.12	$ 8,788.80	$ 323,301.05

College years + Post college years

$ 59,341.12 = PV

The goal then is to compare PV with zero (0). A PV > 0 suggests that this investment yields sufficient return to be worthwhile. PV < 0 suggests this investment does **not** yield sufficient results to be worthwhile, and PV = 0 suggests that the investor is indifferent. Remember that the threshold for this decision is embodied in the rate and that the assignment of a particular rate is intended to capture all necessary conditions.

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