

# Exercise CI-151

Choosing a training program

The Economic Skills Project

## 1 Problem

### Problem

An individual expects to have \$50,000 of income in period 0 and \$60,000 in period 1. She is considering the training programs in the table below. Each program would have a tuition cost but would also raise her future income. Using  $r = 20\%$ , which program, if any, would she choose? What is her new net present value of income?

## 2 Answer

### Answer

Here's the solution:

- She would choose C and it would raise her net PVI to \$102,000.

Program	Tuition in 0	Raise in 1
A	\$14,000	\$18,000
B	\$20,000	\$24,000
C	\$10,000	\$14,400

Program	Tuition in 0	Raise in 1	$I_0^{\text{net}}$	$I_1^{\text{net}}$
None	\$0	\$0	\$50,000	\$60,000
A	\$14,000	\$18,000	\$36,000	\$78,000
B	\$20,000	\$24,000	\$30,000	\$84,000
C	\$10,000	\$14,400	\$40,000	\$74,400

### 3 Method

#### Solution method

Here's one approach:

1. Calculate her net income in each period under each option.
2. Calculate the present value of her net income under each.
3. Choose the option with the highest net PVI.
4. Check using net present value.

### 4 Solution

#### 4.1 Step 1

##### Calculate her net income under each option

If  $T$  is tuition and  $R$  is the raise, her net incomes in each period are  $I_0^{\text{net}} = I_0 - T$  and  $I_1^{\text{net}} = I_1 + R$ . The results are shown below. For reference, "None" shows her situation if she chooses not to take any of the programs.

#### 4.2 Step 2

##### Calculate her net PVI under each

Each program's net PVI will be:

$$\text{PVI} = I_0^{\text{net}} + \frac{I_1^{\text{net}}}{1 + r}$$

Computing it:

Program	PVI
None	$\$50,000 + \frac{\$60,000}{1.2} = \$100,000$
A	$\$36,000 + \frac{\$78,000}{1.2} = \$101,000$
B	$\$30,000 + \frac{\$84,000}{1.2} = \$100,000$
C	$\$40,000 + \frac{\$74,400}{1.2} = \$102,000$

Program	NPV
None	$\frac{\$0}{1.2} - \$0 = \$0$
A	$\frac{\$18,000}{1.2} - \$14,000 = \$1,000$
B	$\frac{\$24,000}{1.2} - \$20,000 = \$0$
C	$\frac{\$14,400}{1.2} - \$10,000 = \$2,000$

### 4.3 Step 3

**Choose the option with the highest net PVI**

Option C has the highest net PVI so it's the best choice. Her new PVI is \$102,000, which is a gain of \$2,000 relative to not taking any of the programs.

### 4.4 Step 4

**Check using net present value**

Another way to solve the problem is to compute the net present value of each program:

$$NPV = \frac{R}{1+r} - T$$

Computing it:

The decision is the same: C is best and it produces a gain of \$2,000.

Everything checks - done!