

Decision Making in Finance: Present Value of an Investment

VI.B Student Activity Sheet 5: A Cool Tool!

Vanessa is a financial planner specializing in retirement savings. She realizes the importance of using mathematical formulas and the appropriate tools to help her clients understand the reasoning behind the advice she is giving.

One of her favorite tools is a time-value-of-money (TVM) calculator. In Student Activity Sheet 4, you met Josephine, one of Vanessa’s clients who wanted to retire with \$1 million in savings.

1. In Josephine’s initial situation, she plans to retire in 50 years with \$1 million in savings. Vanessa advised her to find an account that earned at least the current rate of inflation. Use this information to complete the table below.

Variable	Definition of Variable	Value in Josephine’s Situation
<i>FV</i>	future value, or value of the investment at maturity	
<i>t</i>	number of years of investment until maturity	
<i>i</i>	annual interest rate (as a decimal)	
<i>PV</i>	principal, or present value	
<i>n</i>	number of compounding periods per year	

Vanessa uses a TVM calculator to help Josephine understand how the different variables affect one another.

2. Identify the values in Josephine’s situation for each variable that the TVM calculator uses.

Variable	Definition of Variable	Value in Josephine’s Situation
<i>N</i>	number of compounding periods between the time of investment and the time of retirement	
<i>I%</i>	annual interest rate (as a percent)	
<i>PV</i>	principal, or present value	
<i>PMT</i>	amount of each regular payment	
<i>FV</i>	future value, or value of the investment at maturity	
<i>P/Y</i>	number of payments per year (usually the same as the number of compounding periods per year, <i>C/Y</i>)	
<i>C/Y</i>	number of compounding periods per year	

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3. Use the TVM calculator to determine the present value (*PV*) of the investment required to meet Josephine’s retirement goal. How does this amount compare to what you determined in Student Activity Sheet 4?

Use the TVM calculator to answer the following questions for some of Vanessa’s other clients.

4. Reginald wants to find the future value of an investment of \$6,000 that earns 6.25% compounded quarterly for 35 years.

Variable	Definition of Variable	Value in Reginald’s Situation
<i>N</i>	number of compounding periods between the time of investment and the time of retirement	
<i>I%</i>	annual interest rate (as a percent)	
<i>PV</i>	principal, or present value	
<i>PMT</i>	amount of each regular payment	
<i>FV</i>	future value, or value of the investment at maturity	
<i>P/Y</i>	number of payments per year (usually the same as the number of compounding periods per year, <i>C/Y</i>)	
<i>C/Y</i>	number of compounding periods per year	

5. Hilda wants to have \$10,000 in 10 years after investing in an account that earns 3.6% compounded monthly.

Variable	Definition of Variable	Value in Hilda’s Situation
<i>N</i>	number of compounding periods between the time of investment and the time of retirement	
<i>I%</i>	annual interest rate (as a percent)	
<i>PV</i>	principal, or present value	
<i>PMT</i>	amount of each regular payment	
<i>FV</i>	future value, or value of the investment at maturity	
<i>P/Y</i>	number of payments per year (usually the same as the number of compounding periods per year, <i>C/Y</i>)	
<i>C/Y</i>	number of compounding periods per year	

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6. Juan wants to invest \$1,250 in an account that earns 2.34% interest, compounded monthly. How many years will it take for the account to have a value of \$5,000?

Variable	Definition of Variable	Value in Juan's Situation
<i>N</i>	number of compounding periods between the time of investment and the time of retirement	
<i>I%</i>	annual interest rate (as a percent)	
<i>PV</i>	principal, or present value	
<i>PMT</i>	amount of each regular payment	
<i>FV</i>	future value, or value of the investment at maturity	
<i>P/Y</i>	number of payments per year (usually the same as the number of compounding periods per year, <i>C/Y</i>)	
<i>C/Y</i>	number of compounding periods per year	

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7. Another of Vanessa’s clients, Ronnie, wants to save for retirement. Ronnie believes that he will need \$2,000,000, since he is planning to be retired for 20 to 30 years. He can save in investments that have the following parameters:

- The number of years to save is 20 to 40.
- The number of compounding periods is annually, quarterly, monthly, weekly, and daily.
- The interest rate can be 2.77% to 5.23% or any rate between.

Ronnie wants to know the effect that each variable has on the present value. Select a variable, and use the following steps to complete the table below:

- Start with the minimum value of your variable.
- Use the average value of the other variables that have parameters.
- Calculate the present value of the investment.
- Decide the next value of your variable to test and repeat the process for a total of five different values.

Present-Value Analysis

Variable Value:	Present Value (PV)	Percent Change in Present Value
Minimum:		
Maximum:		

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Variable Value:	Present Value (PV)	Percent Change in Present Value
Minimum:		
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8. Overall, what impact on the present value does each variable have?
9. **REFLECTION:** Of all the variables, which seems to have the greatest effect on lowering the present value of Ronnie's investment? Explain your reasoning.
10. **EXTENSION:** Prepare a short presentation of your findings for one of the following scenarios to share with the class.
 - Sarah wants to save for a car. She has \$4,250 in a savings account earning 1.49% compounded quarterly. If Sarah has four years until she gets her driver's license, will she have enough to buy a car? If not, what do you recommend that she do to reach her goal?
 - Find the median price of a home in your area and the current annual rate of growth for home values. If you buy a home at the median price and expect it to increase in value at the current growth rate, what will the future value of your home be in 30 years? Would you buy the house knowing that the interest rate on the mortgage (that is, the loan needed to buy the house) is 6% and you must invest an additional 2% of the home's value in upkeep per year? Why or why not?
 - Students often take out large loans to go to college. Currently, these loans have a payoff time of 25 years at an interest rate of about 7.5% compounded monthly. Suppose the remaining principal of Dexter's student loans is \$33,760 and the remaining payoff time is 15 years at the 7.5% rate. Dexter recently inherited \$40,000 and wants to know if he should pay off his student loans or invest the money. What do you recommend? Why?
 - The state lottery offers to pay winnings in 25 annual payments or one lump sum, sometimes called a cash-out option. This week's lottery has a jackpot of \$30 million and a cash-out value of \$18.2 million. Granted that the odds are highly unlikely one would win, which option should a winner take—annual payments or a lump sum? Why?
 - Pick an expensive item you want to buy within the next five years. Using current interest rates, find out how much you would have to save today. List the possible roadblocks to reaching the goal.