III. FUTURE VALUE (FV) OF A LUMP SUM

A. Applications

This calculation is used to determine how much a sum invested today at a specific interest rate will be worth at the end of a certain number of periods. The formula for finding the future value of a sum is:

$$FV = PV\ (1 + i)^N$$

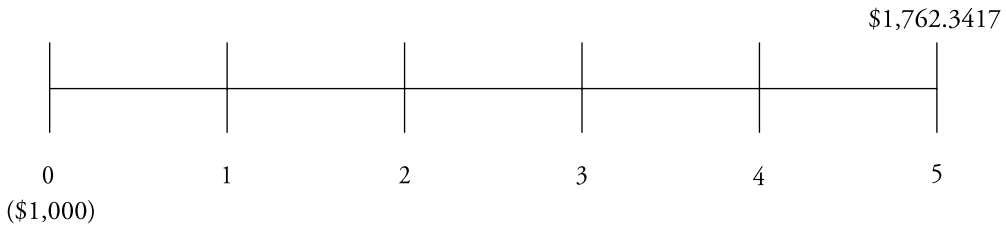
This is a classic example of an everyday problem of "if I invest 'x' today, how much will I have at a future date? This is the analysis that motivates many people to save, as opposed to consume. In a sense, you are saying, "If I forgo consumption today, how much will I be able to consume later?" or, "If I consume today, how much consumption will it cost me later?"

To solve the problem, you must know or estimate the interest rate. This calculation can be used:

1: To project future dollar amounts in situations where no additional funds are added to the original balance.
2: To project future dollar amounts in situations where additional funds are added to the original balance in uneven or different amounts. For example, this type of calculation can be used with any investment (e.g., savings account, zero coupon bond, non-dividend-paying stock).
3: To estimate a future cost where the present cost is known. For example, future cost of education, home purchases, medical costs, nursing home care, or any other lump sum expenditure. The appropriate interest rate for these cost problems is probably some form of the consumer price index (CPI) or some specific cost driver index, where appropriate (such as a long-term trend line). For example, the projected rate of increase for the cost of education is well above the projected CPI, as are medical costs. Selecting the appropriate interest rate in these types of problems is critical and requires some understanding of basic economics.

B. Annual Interest

Calculate the future value of $1,000 invested for five years assuming an annual interest rate of 12%.



HP 12C		TI BA II Plus		SHORTCUT	
Keystrokes	*Display*	*Keystrokes*	*Display*		
1,000 [PV]	1,000.0000	1,000 [PV]	PV = 1,000.0000	PV	–1,000.0000
0 [PMT]	0.0000	0 [PMT]	PMT = 0.0000	N	5.0000
12 [i]	12.0000	12 [I/Y]	I/Y = 12.0000	I	12.0000
5 [n]	5.0000	5 [N]	N = 5.0000	PMT	0.0000
[FV]	**–1,762.3417**	[CPT][FV]	FV = **–1,762.3417**	FV	**1,762.3417**

TIME VALUE OF MONEY PROBLEMS

I. FUTURE VALUE

A. Future Value—Compounded Annually

Today Tom Smith purchased an investment-grade gold coin for $150,000. He expects it to increase in value at a rate of 7% compounded annually for the next 5 years. How much will the coin be worth at the end of the fifth year if his expectations are correct?

HP 12C		TI BA II Plus		SHORTCUT	
Keystrokes	*Display*	*Keystrokes*	*Display*		
5 [n]	5.0000	5 [N]	N = 5.0000	PV	–150,000.0000
7 [i]	7.0000	7 [I/Y]	I/Y = 7.0000	N	5.0000
150,000 [PV]	150,000.0000	150,000 [PV]	PV = 150,000.0000	I	7.0000
0 [PMT]	0.0000	0 [PMT]	PMT = 0.0000	PMT	0.0000
[FV]	**–210,382.7596**	[CPT][FV]	FV = **–210,382.7596**	FV	**210,382.7596**

B. Future Value—Compounded Monthly

A client invested $20,000 in an interest-bearing promissory note earning a 9% annual rate of interest compounded monthly. How much will the note be worth at the end of 8 years assuming all interest is reinvested at the 9% rate?

HP 12C		TI BA II Plus		SHORTCUT	
Keystrokes	*Display*	*Keystrokes*	*Display*		
8 [ENTER]	8.0000	8 [×]	8.0000	PV	–20,000.0000
12 [×][n]	96.0000	12 [=][N]	N = 96.0000	N	96.0000 (8 × 12)
9 [ENTER]	9.0000	9 [÷]	9.0000	I	0.7500 (9 ÷ 12)
12 [÷] [i]	0.7500	12 [=][I/Y]	I/Y = 0.7500	PMT	0.0000
20,000 [PV]	20,000.0000	20,000 [PV]	PV = 20,000.0000	FV	**40,978.4246**
0 [PMT]	0.0000	0 [PMT]	PMT = 0.0000		
[FV]	**–40,978.4246**	[CPT][FV]	FV = **–40,978.4246**		