Every Number Tells a Story

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To quote a line from a hit song, "It's late September and I really should be back at school." So this month, we are joining the rest of our family and friends that have returned to the academic routine by hitting the books to discuss the six functions of a dollar.

This topic is fairly robust so we will tackle it in two parts, discussing the first three functions this month and the last three functions next month. And don't fret – we have actually covered nearly all of the compounding and discounting functions in bits and pieces in past articles but never using an over-arching approach. So let's collect our books and get on back to school.

Before we get into each of the functions, a quick review of some concepts is in order. There are five primary components that are involved in compounding and discounting. They include present value (PV), future value (FV), payment (PMT), interest rate (I/YR) and time (n). And to help visually arrange these five components, we'll be using our good old friend, the CCIM T-bar. Solving the problems will require a financial calculator, such as an HP 10Bii or HP 12C but the T-bar helps set up the road map for each and looks like this:

n	$
0	PV
1	PMT
↓	PMT
n	PMT + FV
	I/YR

Function 1 - Compounding a single amount to a future value

This type of problem assumes a lump sum present value that grows at a compounded rate to some point in the future. A great example of this would be a CD, where an initial amount is deposited and earns compounding interest until

it matures. Pretend that we buy a CD for $10,000. It earns 5% interest (I did use the word 'pretend', didn't I) and will mature in five years. Setting this problem up into a T-bar would look like this:

n	$
0	($10,000)
1	0
2	0
3	0
4	0
5	0 + FV

I/YR = 5%

The PV is our initial CD purchase of ($10,000). It is negative because it represents money that is leaving our pocket. The PMT is zero because the CD is not releasing any money to the investor each year – any money earned is being kept inside of the investment. N represents the five-year term of the CD. And I/YR is the interest rate of the CD. If we enter all of these variables into a financial calculator and solve for FV, we come up with $12,763.

Function 2 – Compounding an annuity to a future value

This type of problem assumes that there is a regular deposit made over a certain period of years that will grow at a compounded rate. A good example of this is a college savings plan, where a set amount is deposited on a regular basis. Suppose that an investor deposits $5,000 each year for a period of 10 years and is able to earn 8% over that period. The T-bar would look like this.

n	$
0	0
1	($5,000)
2	($5,000)
↓	↓
10	($5,000) + FV

I/YR = 8%

There is no PV, since nothing is initially deposited but PMT is ($5,000), as this amount is subsequently deposited

each year. Again, it is negative because it represents money leaving our pocket. The investment time horizon, n, and the interest, I/YR, are given. If we enter these variables into a financial calculator and solve for FV, the result in $72,433.

Function 3 – Sinking fund payment

This is a great principal for real estate owners, as it illustrates how much money needs to be deposited over a set time period in order to reach a specific goal. The lump sum goal in the future is known and an assumption is made for the time period and interest rate. Suppose that the owner of a shopping center has a parking lot that is beginning to deteriorate. He thinks that it will last for three more years and assumes that it will cost $75,000 to replace. He can open a money market account that earns 5% annually, compounded monthly. How much will he have to deposit each month in order to reach his goal? The T-bar for this problem would look like this:

n	$
0	0
1	PMT
2	PMT
↓	↓
36	PMT + $75,000

I/YR = 5%

Again, no deposit is made upfront so the PV is zero. We know that $75,000 will be needed at the end of the time period, so that is the FV. The time period, n, and the interest rate, I/YR, are again given. Solving for PMT, we come up with ($1,935). It is negative because it represents money that will leave the investors pocket. There is one minor wrinkle with this specific problem. The examples that were used for the first and second functions both considered annual compounding. There was a single payment each year and the interest was only compounded once a year. But this problem is using monthly compounding, with 12 payments each year and interested compounded once a month or 12 times a year. And while the difference isn't much (a little over $500 annually in this example), switching between monthly compounding and annual compounding will result in different answers. So it is critical to understand what type of compounding is being used and make the appropriate entries.

That covers the first three functions, the compounding functions. Next month, we'll cover the last three functions, the discounting functions. P

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Daus, You Know?

TENANT TAKEOVER A growing trend in the office market has been the purchase of buildings by owner/users. The latest examples were the purchase of 800 Superior downtown and Point 5 in Westlake. The former was bought by AmTrust Realty, who is affiliated with small business insurer AmTrust Financial, while the latter was purchased by TravelCenters of America, a Fortune 500 company. This follows purchases by New York Community Bank (1801 E 9th Street), Broadvox (65-75 Erieview) and Dollar Bank (26949 Chagrin Blvd), all of whom purchased buildings in the last 12 months for a majority of occupancy. *–AP*