Every Number Tells a Story, Part II

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Last month, with a little help from Rod the Mod, we began a discussion of compounding and discounting, known as the six functions of the dollar. In September, we detailed the first three functions, which were all compounding functions that move money forward in time. Although I don't have the space to review those concepts here, you can always find past *Properties Magazine* columns on my blog – www.sbequitiesinc.com.

This month, we will cover the last three functions, which are all discounting functions that move money backward in time.

Function 4 – Discounting a single future amount to a present value.

This function discounts a single amount to be received in the future back to a present value. A good example of this function would be a piece of raw land that is anticipated to increase in value over time. Suppose that an investor expects a parcel of land to be worth $1,000,000 in 10 years. If his required return is 12%, how much should he pay for the land today? Setting this problem up in a T-bar would look like this:

n	$
0	PV
1	0
↓	↓
10	0 + $1,000,000

I/YR = 12%

The FV of $1,000,000 is our expectation of what the land will be worth in the future. The PMT is zero because the land will not produce any cash flow during the hold period (I am ignoring the inevitable costs during the hold period, such as real estate taxes). N represents the 10-year anticipated holding period. And I/YR is the investor's return requirement of 12%. If we enter all of these variables into a financial calculator and solve for PV, we come up with $321,973.

Function 5 – Discounting an annuity to a present value.

This type of calculation discounts a regular stream of equal payments to a present value. A great example is buying an existing mortgage, which has become very popular the past few years. Suppose that an investor is analyzing the purchase of a loan. He wants to know how much he should pay today for a mortgage that produces regular equal payments of $8,000 each year. There are 15 years left on the loan and the investor's return requirement is 12%. The T-bar for this problem would look like this.

n	$
0	PV
1	$8,000
2	$8,000
↓	↓
10	$8,000 + $0

I/YR = 12%

The PMT is $8,000 and represents the annual mortgage payment that the investor will receive. N is 15 years, as this is the remaining period for the mortgage. It is assumed to be fully amortizing, so FV will be $0. And the investor's rate of return is given to be 12%. If we enter these vari-

ables into a financial calculator and solve for PV, the result is $54,487.

Function 6 – Determine a series of equal payments necessary to amortize a present value.

This is one of those things that sound more daunting than it actually is. It is also familiar to most readers: a loan payment. More specifically, it is determining the periodic regular payment, including principal and interested, needed to repay a specific initial amount. Now for an example: what is the monthly payment on a $500,000 loan amortized over 20 years at a 6% interest rate? The T-bar for this problem would look like this:

n	$
0	$500,000
1	PMT
1	PMT
↓	↓
300	PMT + $0

I/YR = 6%

The PV is $500,000 and represents the initial amount of the loan. The loan is fully amortizing, which result in a future value of $0. The interest rate, I/YR, is given to be 6% and the amortization period, n, is given to be 25 years. If we enter these four variables into a financial calculator and solve for PMT, we will come up with $3,221.

Daus, You Know?

NO SHOW Last month, the Euclid Arcade went up for Sheriff sale. Despite what appeared to be a bargain basement opening bid of $7.5 million, the property failed to garner a single bid. SLOW SHOW Last month, the Beachwood office complex known as Commerce Park 1, 2 & 3 finally sold. This followed a prolonged effort first by the original owners and subsequently by the lender to sell the property. *–AP*

Before wrapping up this series, I would like to discuss a couple concepts that often trip people up when working with these types of calculations. The first is sign convention – when a number is positive and when it is negative can cause confusion. The critical thing to remember with these calculations is the perspective. If I am trying to solve a problem using the 6th function of a dollar (a loan) and I'm borrowing the money, the PV is going to be positive (since I'm receiving the initial loan amount) and the PMTs are going to be negative (since I am subsequently responsible for repaying the periodic payments). However, if I am running this same calculation as the lender, the sign conventions would be the opposite – the PV is going to be negative (since I am giving the initial loan amount) and the PMTs are going to be positive (since I am subsequently receiving the periodic payments). As we like to say in the CCIM classroom – 'if you want to get, you have to give and if you give, then you will get'. The second concept is the relationship between the compounding period, the time component of 'n' and the interest component of 'I/YR'. Suppose we are considering annual compounding. In this instance, n would represent one year payment increments over the hold period (year 1, year 2, year 3, etc) and I/YR would represent annual interest compounding. However, if we are considering monthly compounding, things change a bit. In this instance, n would represent one month increments over the hold period (month 1, month 2, month 3, etc) and, although I/YR would still represent the annual interest rate, it would be compounded monthly. A favored CCIM classroom analogy is a snowball rolling down a hill. With annual compounding, the snowball rolls down the hill one time per year but with monthly compounding, it rolls down the hill 12 times per year. All of the modern financial calculators are smart enough to make the appropriate adjustment to I/YR, so the user doesn't have to worry about dividing the annual interest rate by 12 when considering monthly compounding. However, you do need to understand the difference between annual and monthly compounding and make the appropriate adjustment to 'n', the number of payments per year.

Understanding the six functions of the dollar will allow an investor to analyze any type of time value of money situation. And it sure beats stealing your daddy's cue and making a living out of playing pool. P

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