Introduction to the Time Value of Money

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☰ **WHAT'S COVERED**

In this lesson, you will learn the basic concepts associated with the time value of money. Specifically, this lesson will cover:

1. **Defining the Time Value of Money**
2. **The Importance of the Time Value of Money**

1. Defining the Time Value of Money

One of the most fundamental concepts in finance is the time value of money. It states that money today is worth more than money in the future.

Imagine you are lucky enough to have someone come up to you and say, "I want to give you $500. You can either have $500 right now, or I can give you $500 in a year. What would you prefer?" Presumably, you would ask to have the $500 right now. If you took the money now, you could use it to buy a TV. If you chose to take the money in one year, you could still use it to buy the same TV, but there is a cost. The TV might not be for sale, inflation may mean that the TV now costs $600, or simply, you would have to wait a year to do so and should be paid for having to wait. Since there's no cost to taking the money now, you might as well take it.

There is some value, however, that you could be paid in one year that would be worth the same to you as $500 today. Suppose it's $550; you are completely indifferent between taking $500 today and $550 next year, because even if you had to wait a year to get your money, you think $50 is worth the wait.

In finance, there are special names for each of these numbers to help ensure that everyone is talking about the same thing.

- **Present Value (PV)** is what the money is worth right now.
- **Future Value (FV)** is what the money today is worth after the time period (t).

In this example, money with a PV of $500 has a FV of $550. The rate that you must be paid per year in order to not have the money is called an **interest rate (i or r)**.
All four of the variables (PV, FV, r, and t) are tied together in the equation below.

Simple Interest

$$FV = PV \cdot (1 + rt)$$

☆ BIG IDEA

Simple interest is when interest is only paid on the amount you originally invested (the principal). You don't earn interest on interest you previously earned. Don't worry if this seems confusing; the concept will be explored in more depth later.

📄 TERMS TO KNOW

Present Value (PV)

The value of the money today.

Future Value (FV)

The value of the money in the future.

Interest Rate

The percentage of an amount of money charged for its use per some period of time. It can also be thought of as the cost of not having money for one period, or the amount paid on an investment per year.

2. The Importance of the Time Value of Money

The time value of money is integral to making the best use of a financial player's limited funds.

The time value of money is a concept integral to all parts of business. A business does not want to know just what an investment is worth today; it wants to know the total value of the investment. What is the investment worth in total?

Let's take a look at a couple of examples.

IN CONTEXT

Suppose you are one of the lucky people to win the lottery. You are given two options on how to receive the money.

- Option 1: Take $5,000,000 right now.
- Option 2: Get paid $600,000 every year for the next 10 years.

In option 1, you get a total of $5,000,000 and in option 2 you get a total of $6,000,000. Option 2 may seem like the better bet because you get an extra $1,000,000, but the time value of money theory says that since some of the money is paid to you in the future, it is worth less.

By figuring out how much option 2 is worth today (through a process called **discounting**), you'll be able to make an apples-to-apples comparison between the two options. If option 2 turns out to be worth less than $5,000,000 today, you should choose option 1, or vice versa.

IN CONTEXT

Suppose you go to the bank and deposit $100.

Bank 1 says that if you promise not to withdraw the money for 5 years, they'll pay you an interest rate of 5% a year. Before you sign up, consider that there is a cost to you for not having access to your money for 5 years. At the end of 5 years, Bank 1 will give you back $128.

But you also know that you can go to Bank 2 and get a guaranteed 6% interest rate, so your money is actually worth 6% a year for every year you don't have it.

Use the following compounding interest formula to convert the present cash worth into future value using the two different interest rates offered by Banks 1 and 2.

⚗ FORMULA TO KNOW

Compound Interest
$$FV = PV \cdot (1+i)^t$$

Bank 1
$$FV = PV \cdot (1+i)^t$$
$$FV = \$100 \cdot (1+0.05)^5$$
$$FV = \$100 \cdot (1.05)^5$$
$$FV = \$100 \cdot 1.28$$
$$FV = \$128$$

Bank 2
$$FV = PV \cdot (1+i)^t$$
$$FV = \$100 \cdot (1+0.06)^5$$
$$FV = \$100 \cdot (1.06)^5$$
$$FV = \$100 \cdot 1.34$$
$$FV = \$134$$

We see that putting our money in Bank 1 gives us roughly $128 in 5 years, while Bank 2's interest rate gives $134. Between these two options, Bank 2 is the better deal for maximizing future value.

🗎 TERM TO KNOW

Discounting
The process of finding the present value using the discount rate.

📋 **SUMMARY**

In this lesson, you learned that **the time value of money** is a concept in finance which holds that money today is worth more than money in the future, and vice versa. The present value and future value of money can be calculated using the interest rate, the period of time under consideration, and whether the interest is simple or compounding. The **importance of the time value of money** rests in a business's interest in maximizing its investments.

Best of luck in your learning!

📄 **TERMS TO KNOW**

Discounting
The process of finding the present value using the discount rate.

Future Value (FV)
The value of the money in the future.

Interest Rate
The percentage of an amount of money charged for its use per some period of time. It can also be thought of as the cost of not having money for one period, or the amount paid on an investment per year.

Present Value (PV)
The value of the money today.

🔬 **FORMULAS TO KNOW**

Compound Interest
$$FV = PV \cdot (1 + i)^t$$

Simple Interest

$$FV = PV \cdot (1 + rt)$$