GEPM-375
Professional Practices and Construction Management

Time Value Money

Time Value of Money:

- If you're like most people, you would **choose to receive** the $10,000 **now.**
- After all, three years is a long time to wait.
- For most of us, taking the money in the present is just plain instinctive.
- So at the most basic level, the '**time value of money**' **demonstrates** that **all things being equal,** it seems **better to have money now rather than later**.

But why is this?

- A **$100 bill** has the same value as **a $100 bill one year from now**, doesn't it?
- Actually, although the **bill is the same**, you can do much more with the money if you have it now because **over time** you can **earn more profits on your money**.

Previous Example:

Option-A:

- By **receiving $10,000 today**, you are poised to **increase the future value of your money** by **investing and gaining interest** **over** **a period of time**.

Option-B:

- You **don't have time on your side**, and the payment received in **three years** would be your future value.

Explain TVM with Time line

For choosing Option A:

- Future value will be **$10,000 plus any profit** acquired over the **three years**.

For choosing Option B:

- **Future value for Option B**, on the other hand, would only be $10,000.

So how can you **calculate exactly how much** ***more Option A is worth***, compared to Option B?

Let's take a look.:

Time value of money ***often*** ***ignores detrimental impacts to finance*** *such as* ***negative interest rates*** *or* ***capital losses****.*

In situations where losses are known and unavoidable, ***negative growth rates can be used****.*

Future Value Basics:

- If you **choose Option A** and **invest the total amount** at a simple **annual rate of 4.5%,** the future value of your investment at the end of the **first year is $10,450**.
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- We arrive at this sum by multiplying the principal amount of $10,000 by the interest rate of 4.5% and then adding the interest gained to the principal amount.

- If the **$10,450 left in your investment account at the end of the first year is left untouched** and you invested it at 4.5% for another year, how much would you have?

- To calculate this, you would take the $10,450 and multiply it again by **10450 (0.045 +1).** At the **end of two y**ears, you would have **$10,920.25**.

Present Value Basics

- If you **received $10,000 today**, its present value would, of course, be $10,000 because the present value is what your investment gives you now **if you were to spend it today**.

- If you were to **receive $10,000 in one year**, the **present value** of the amount **would not be $10,000** because you **do not have it in your hand now**, in the present.

- **To find the present value of the $10,000 you will receive in the future**, you **need to pretend that the $10,000 is the total future value of an amount that you invested** today.

- In other words, to find the present value of the future $10,000, we **need to find out how much we would have to invest today** in order to receive that $10,000 in one year.

- To calculate the present value, or the amount that we would have to invest today, you must **subtract** the (hypothetical) accumulated interest from the $10,000.

- To achieve this, we can discount the **future payment amount ($10,000)** by the **interest rate** for the period.

Calculating Present Value

- Let's walk **backward from the $10,000** offered in Option B.

- Remember, the $10,000 to be received in **three years is really the same** as the future value of an investment.

- If we had **one year to go before getting the money**, we would **discount the payment back** one year.

- Using our present value, at the current two-year mark, the present value of the $10,000 to be received in **one year** would be **$10,000 x $(1 + .045)^{-1}$ = $9569.38.**

- Note that if today we were at the **one-year mark**, the above **$9,569.38 would be considered the *future value*** of our investment one year from now.

- Continuing on, at the end of the first year we would be expecting to receive the payment of $10,000 in two years. At an interest rate of 4.5%, the calculation for the present value of a $10,000 payment expected in two years would be **$10,000 x $(1 + .045)^{-2}$ = $9,157.30.**

- So the present value of a future payment of $10,000 is worth $8,762.97 today if interest rates are 4.5% per year. In other words, choosing Option B is like **taking $8,762.97** now and **then investing it for three years.**

- **Option A is better** not only because it offers you money right now but because it offers you $1,237.03 **($10,000 - $8,762.97) more in cash**!

- Furthermore, if you invest the $10,000 that you receive from Option A, your choice gives you a **future value that is $11,411.66** (=$11,411.66 - $10,000=) greater than the future value of Option B.

Present Value of a Future Payment

Let's up the ante on our offer.

- What if the future payment is more than the amount you'd receive right away?
- Say you could **receive either $15,000 today or $18,000 in four years**.
- The **decision is now more difficult**.
- If you **choose to receive $15,000 today** and **invest the entire amount**, you may actually end up with an amount of cash in four years that is less than $18,000.

How to decide?

- You could find the future value of $15,000, but since we are **always living in the present**, let's find the **present value of $18,000**.
- This time, we'll **assume interest rates are currently 4%.**

- In the equation above, all we **are** **doing is discounting the future value** of an investment.

- Using the numbers above, the **present value of an $18,000 payment** in four years would be calculated as $\$18{,}000 \times (1 + 0.04)^{-4} =$ **$15,386.48.**

- From the above calculation, we now know **our choice today is between** opting for **$15,000 or $15,386.48.**

- Of course, we should choose to postpone payment for four years!

What is Concept Time Value of Money?

- Time value of money is the **concept that money today is worth** more than money tomorrow.
- Because money today can be **used, invested, or grown**.
- Therefore, $1 earned today is **not the same** as $1 earned one year from now because the money **earned today** can generate profit, **unrealized gains, or unrealized losses**.

What Is the Difference Between Present Value and Future Value?

Present value is the time value of money for **a series of cash flow that calculates the value of the money today.**

- For example, if you want to find the value of **$1,000 to be received one year from now** or the value of **$2,500 to be received each month for the next two years**, you are trying to find the present value.

Alternatively, **future value** is time value of money **concept of finding the value of a series of cash flows at a point in time in the future**.

- You'd be calculating the future value if you want to know what **your $500 may be worth in 10 years.**
- You'd also be finding the future value if you want to find out what your **retirement balance will be if you contribute $250 every month for 10 years.**

Why Does Time Value of Money Matter?

- **Helps decision-makers select the best option**.
- **Equalizes options based on timing,** as absolute dollar amounts spanning different time spans **should not be valued equally**.
- **Businesses** often use **to compare projects with varying cash flows**.
- **Businesses** also use to determine whether a project with an **initial cash outflow and subsequent cash inflows will be profitable.**
- **Companies** may also be required to use time value of money principles for **external reporting requirements**.
- **Individual investors** use time value of money to better understand the **true value of their investments and obligations over time.**
- Time value of money is used to **calculate what an investor's retirement balance** will be in the future.

- **Calculations demonstrate that time literally is money**—the value of the money you have now is not the same as it will be in the future and vice versa.

- So, it is important to know how to calculate the time value of money so that you can **distinguish between the worth of money related options offered to you now and in the future**.

These options could be **investment opportunities**, **loan transactions**, **mortgage payment** options, or even charity related donations.

- Whenever, **money coming or going**, at some point in time, is involved, **time value of money should be considered.**

Time Value of Money

Thanks