COLLEGE OF ACCOUNTING

FINANCIAL SKILLS

Video Transcription: Using a Financial Calculator: Time Value of Money (TVM) – Part 1

Hi there, my name is Michael. Today, we will be looking at the concept of time value of money. In Part One of this video, we will be looking at what time value of money is. In Part Two, we will be looking at how to use a financial calculator as well as how to answer time value of money questions in a test or exam.

Imagine you have won a competition.

The competition gives you two options for prizes. Option One is to receive R1 000 now. Option Two is to receive R1 000 in 10 years' time. Which one would you choose?

Well, I know which one I would choose. I would choose the R1 000 now.

Today, R1 000 can buy a number of things, but the cost of things increases every year – this is known as inflation. R1 000 now will be able to buy more things than R1 000 in 10 years' time.

The inflation rate has been pretty high in South Africa over the past 20 years. Why don't you ask your parents what they could have purchased for R1 000, 20 years ago? So, the value of money changes over time. This is really what time value of money is all about. To help us understand how time value of money works, I am going to break this down into three core principles, or parts.

"Monetary value", "Changes" and "Over time" – Let's see what these mean.

What is monetary value? This question might seem strange at first but let's think about it. A R100 note in 10 years' time will still be a R100 note. It is a piece of paper. The number "100" does not change. However, the value of what it can purchase changes. In fact, money is not about the number on the piece of paper at all, money really only has value in relation to what it can purchase. We call this the "purchasing power" of money. You can use it to purchase an asset for your company, for instance, or to settle a liability for your company.

So the second part is "Changes". How and why does monetary value change over time? Let us assume you chose the R1 000 now. What could you do with the R1 000? Well, the wise consumer would take it and invest it in the bank, as the R1 000 will earn them interest. Each year, the bank will multiply the R1 000 by the interest rate and add the interest earned to the bank balance. Without you having to do anything at all, after 10 years, the R1 000 invested will be worth a different value. How much will you have in the bank? Let's assume an interest rate of 10% per year. At the end of year one, we will have the original R1 000, plus interest at 10%. This gives us R1 100. In year two, 10% interest is charged on the closing balance from the prior year. If we repeat the calculation for 10 years, we will see that there is R2 593.74 in our bank account.

Each year, the interest is charged on the opening balance of your bank account. In other words, interest earns interest on interest. We call this the compounding nature of interest per annum. As the saying goes, Einstein once said: "Never underestimate the power of compounding interest". Many people in the world have become quite wealthy because they have invested their money over a long period of time earning interest on interest. So now we see how the value of money changes over time because of the interest rate.

This means that the choice of receiving R1 000 now or R2 593.74 in 10 years time is really exactly the same if the interest rate is 10%. Let's look at what would happen if you borrow R1 000 and agree to pay it back in 10 years time. The lender would want some compensation for lending the money. They would not give away the R1 000 for free. Why? Well, because if you did not borrow from them, they could invest the money themselves. The interest rate here is the price of money.

We have seen that the interest rate changes the value of money every year. But in fact, it changes the value every month. No, every week, every day! Assume you borrowed R1 000 at compounding interest. Now, would you rather want to borrow that at 12% per annum, compounded per annum, or would you rather borrow it at 1%, compounded per month? Now on the face of it, it might seem that those are both the same – 1% for 12 months will give us 12%. However, this is not actually true. Let us see why.

If you borrow R1 000 at 12% per annum, you will have R1 120 at the end of the year. However, if you borrow R1 000 at 1% per month, compounded per month, you will have R1 126,80 at the end of the year. Why? Well, the interest is compounded 12 times during the year. If we continue this calculation for the 12 months, we will get R1 126,80. Monetary value changes over time. And in "time value of money" calculations, we call this "periods". In Option One, we had one period. In Option Two, however, we had 12 periods.

The final way by which we can change the value of money over time is through something called "the payment". We have seen that interest is calculated on the opening balance of whatever we have outstanding. If we pay something during the period, then the interest will be charged on a different amount. Let's look at Option Two again and assume that you paid it back after the first month. How much will you have outstanding at the end of the year?

Well, we are charged interest for a month after the first month. We then repay R210. This reduces our outstanding balance by R210 down to R800. In the second month, R8 interest is charged on this balance. If we carry on with the calculations, we can see that at the end of the year, we will owe R892.50.

Compare this to the previous amount of R 1 126,80 from the previous Option Two. The reason for this lies in the total interest that is charged over time. This is why you should always try and pay back your loans as quickly as possible. This concludes Part One of the video. We focused on how monetary value changes over time and how interest, payments and periods affect this changing value. In Part Two of the video, we will be looking at how to use our financial calculator.