Making Decisions Considering Opportunity Costs

Have you ever said to yourself: “If I had only done this instead of that,” or heard the saying, “hindsight is 20-20?” Wouldn’t making choices be a whole lot easier if you knew the outcome of choices *before* you made them?

There are times when making a choice to do one thing means giving up the opportunity to do another. Sometimes that decision works out well and you are very happy with the result. At other times, the choice works out badly and you end up saying to yourself:
“I wish I had made a better decision!”

Consider this scenario: You are driving along a little used highway in an area you’ve never been and you see a sign:

“Gas, Food and Rest Area 11 miles Straight Ahead”

You are thankful for the break you’ll get just 11 miles ahead; the drive has been monotonous and uninteresting. Shortly after, another sign announces a split in the road.

“Express Highway – Keep Left
Scenic Tourist Route – Keep Right”

Do you take the left or the right side of the road? If you choose to stay on the long boring highway you’ll arrive at the rest area in the shortest possible time. However, a scenic route may be filled with interesting sights and possibly places to stop that offer more than just a well-deserved break from driving.

You know what rest areas offer and what to expect. If you choose the scenic route you are giving up the opportunity to stop in the shortest amount of time. If you choose to stay on the highway, you are giving up the chance to end the monotonous drive and what wonders may be on the scenic route.

Every choice has some cost associated with it. The value of the choice *not chosen* is called the **opportunity cost** of the choice you made. For example, you have $10 and you could buy lunch with the money or you could use it to go to the movies. If you choose the lunch, the opportunity cost of that lunch is the movie you miss. If you choose the movie, the opportunity cost of that movie is your hunger.

Opportunity cost is the price we pay when we give up something in order to get something else. There may be several things we could have done and several others we give up, but the *most desirable* of those choices is the *opportunity cost* of our choice; not all of the things we gave up.

For example:

Let's say you have $100.

You have three choices to choose from:

1. A ticket to a cool concert
2. Dinner for two at a fancy restaurant
3. A ticket to Disney World with lunch included

Each choice costs $100. At first, it seems that if you choose the concert, then the opportunity cost of the concert is the dinner for two and the Disney Park pass with lunch. However, you can't have both choices anyway. Each is $100 so you can have one of the three. So, which purchase would you choose instead of the concert? That choice is the opportunity cost of the concert.

Making a choice always involves a cost. Making sound, wise decisions isn't always easy, especially when we take the opportunity costs of our decisions into consideration.

$5G: Walk or Ride?

Let's consider a responsible young lady, we'll call her Taylor. Taylor comes into an unexpected $5,000.

Taylor is always thinking and analyzing her best move.
She'll consider the opportunity cost of her choices when deciding how she can benefit most from her windfall of money.

Taylor considers a list of items she wants and narrows her choices down to two. What should she do with her $5G?

- Buy a sweet used car
- Invest the $5,000 and make it grow

Each choice becomes the opportunity cost of the other:

- If she buys the car, then the $5,000 is gone.
- If she invests in the $5,000, then she's walking.

To decide the better choice, we'll first need to put some value on each decision. If she chooses to buy the car, then the future value of a $5,000 investment is gone.

What would the future value of that investment likely be?

There are many ways to invest $5,000; stocks, bonds, mutual funds, to name a few. Let’s take a conservative, safe investment: a bank certificate of deposit (also called a CD).

What would be the future value of a bank certificate of deposit with a beginning balance of $5,000, an annual interest rate of 3.5% that compounds monthly and is held for the next five years?

First, start with $5,000 and calculate one month’s interest at a 3.5% annual rate. Add that to the $5,000 then repeating those steps for the next 60 months, could take some time!

Fortunately, there is a formula we can use to do this calculation called the **Compound Interest Formula.**

The **Compound Interest Formula** calculates the future, accumulated balance of an investment across multiple years and multiple compounding periods.

The formula looks like this:

$$A = P(1+\frac{r}{n})^{nt}$$

A = Accumulated Balance
P = Principal
r = APR expressed as a decimal
n = Number of compounding periods per year
t = Number of years the investment lasts

So, Taylor does the math:

Principal	**= $5,000**
APR	**= 3.5% or .035**
n	**= 12 (monthly compounding)**
t	**= 5 years (Investment lasts five years)**

$$A = P(1+\frac{r}{n})^{nt}$$

$$A = \$5{,}000(1+\frac{.035}{12})^{12(5)}$$

$$A = \$5{,}000(1.0029)^{60}$$

$$A = \$5{,}000(1.189756)$$

$$A = \$5{,}948.78$$

Investing the $5,000 in a bank CD would leave Taylor with a balance of $5,948.78 in five years.

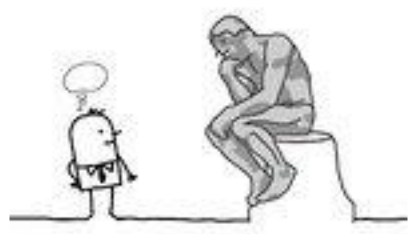
The opportunity cost of buying the car is giving up $5,948.78 in five years if you invest in a bank certificate of deposit. What other costs come with the purchase of a car? What will the car be worth five years from now? What is the cost of gas, insurance and maintenance in five years?

Choosing to invest the $5,000 in a bank CD means the opportunity cost of the CD is the car. Without a car she may not be able to drive to work. Without transportation to work she may not be able to sustain an income. What are the true costs of not having the car?

Taylor estimates the car will be worth about $2,000 in five years. So, if she uses the $5,000 to pay cash for the car, her asset will be worth $2,000 in five years. If she decides to invest the $5,000, her asset will be worth $5,948.78 in five years. Paying cash for the car, results in an opportunity cost of: $3,948.78.

The opportunity cost of investing the money, however, is foregoing the car.
Taylor really likes that car.

Can she find a way to have both?



Can she invest the $5,000, see her investment grow to $5,948.78 in five years and have the car? Well, she can't buy the car and invest the money unless she finances the car and invests the money. Only one use of that $5,000 is possible. So, what would it cost to finance the car?

There is a formula to calculate the monthly payment necessary to pay off a balance, at a certain interest rate in a certain amount of time. The formula to calculate the monthly payment on an original **Principal Loan Amount (P),** at an annual **Interest Rate (I),** that will be necessary to pay the entire loan off in **N** months is:

$$MonthlyPayment = \frac{(P \times (I \div 12))}{(1-(1+(I \div 12))^{-N})}$$

Where: P = Principal Amount of the loan
I = Interest Rate of the loan
N = Number of months to pay off the loan

Let's say the interest rate at Taylor's bank on a used car loan is 7.5%.
The five years the CD collects interest becoming $5,948.78 is 60 months of car payments.
The monthly payment, if she finances the car is:

P = $5,000
I = 7.5% = .06
N = 5 years = 60 months

$$MonthlyPayment = \frac{(P \times (I \div 12))}{(1-(1+(I \div 12))^{-N})} = \frac{(\$5{,}000 \times (.075 \div 12))}{(1-(1+(.075 \div 12))^{-60})}$$

$$= \frac{(\$5{,}000 \times .00625)}{(1-(1+.00625)^{-60}}$$

$$= \frac{(31.25)}{((1-(1.00625)^{-60}}$$

$$= \frac{(31.25)}{(1-.68809)}$$

$$= \frac{(31.25)}{.31191} = \$100.19$$

Taylor can invest her $5,000 in the CD and buy the car if she is willing to take on a monthly car payment of $100.19. Over 60 months she will pay $6,011.40 in car payments. The difference between what she would pay ($6,011.40) and what her CD is worth ($5,948.78) is only $62.62. Taylor likes the idea of having that $5,000 CD around for five years and she can afford $100.19 per month for a car payment.

Also, she calculates that her assets five years from now would be $5,948.78 from the CD and $2,000 that she estimates the car will be worth $7,948.78. If she initially bought the car for cash, her assets would be only $2,000; if she initially invested the money and didn’t buy the car they would be $5,948.78. The opportunity cost of $100.19 per month is whatever she could do with that money besides buying the car. What would you do?

As luck would have it, Taylor has a brother named Tyler. Tyler is quite a bit different than Taylor. Tyler enjoys immediate gratification and living for the moment.

Tyler sees his sister with her fat bank account and shiny new ride. He'd like those opportunities too. Yet if Tyler gets a \$5,000 windfall, he will manage his money differently because he doesn't consider his options like his sister Taylor.

Tyler can't resist concerts, dinners and a new wardrobe. He likes to go places and do fun things and buy things all along the way. As a result, Tyler has accumulated a \$5,000 debt on his credit card. Currently, he is paying the minimum monthly payment of 2% of the balance on his credit card from the wages he earns at his part-time job.

Tyler's credit card carries a hefty 17% interest along with the balance.

Seventeen percent of \$5,000 = \$850 /year in interest or \$850/12 = \$70.83 per month.
Tyler's first month's balance, then, is: \$5,070.83.

The *minimum monthly payment* Tyler is required to make to his credit card company is 2% of the outstanding balance:

0.02 x \$5,070.83 = \$101.42

From that payment, the credit card company will take their \$70.83 in interest. The rest of the payment will reduce his balance to:

\$101.42 – \$70.83= \$30.59
\$**5,000 – \$30.59 = \$4,969.41**

This is Tyler's balance at the beginning of next month.

Month Two

\$4,969.41 x .17 = \$844.80 \$844.80/12 = \$70.40 per month
\$4,969.41+70.40 = \$5,039.81
.02 x 5,039.81 = **\$100.80** is **his 2nd month's payment**

From that payment, the credit card company will take their \$70.40 in interest. The rest of the payment will reduce his balance to:

\$100.80-\$70.40 = \$30.40
\$**4,969.41 – \$30.40 = \$4,939.01**

As you can see, Tyler's balance is being reduced very slowly. In fact, since Tyler is paying only the 2% minimum required each month, in 60 months, Tyler will still have an outstanding balance of \$3,519.83. This is not great, considering the value of the car in five years is only \$2,000.

While Taylor had the luxury of investing her \$5,000 windfall and financing her car, Tyler does not enjoy the same choices. Taylor decided the opportunity cost of allocating \$100/month toward a monthly payment on the car was worth it. The car was her first choice. However, Tyler does not have the same options. He has already allocated the $100/month toward his credit card balance. The decision regarding what to do with 100/month has already been made.

So what are Tyler's choices? He has a $5,000 windfall just like his sister, but his options are different.

Tyler's choices are:

- Invest the $5,000.
- Buy a car.
- Use the $5,000 to pay off the debt he has foolishly accumulated.

We've seen he can get the $5,000 to become $5,948.78 in five years (60 months). If he does, his debt will still be **$3,519.83,** but he'll have some savings. In five years, his assets will be: $5,948.78 – $3,519.83 = **$2,428.95**

He can buy a car and pay the $5,000 in cash. Then, he'd have a car, but still have the $100/month payment for the debt, not the car. Remember, the estimated value of the car in five years is $2,000. In 60 months his assets will be: $2,000.00 – $3,519.83 = **(- $1,519.83)**

Clearly, the value of his assets makes this decision easy. Investing the money instead of buying the car leaves him with some value after five years from now. However, buying the car leaves him $1,519.83 in the red. Between these two choices, investing the money is the wiser move. But what about investing the money versus using the money to pay off his debt?

On the previous page, we did a calculation for the first two months of Tyler's loan payments on his $5,000 debt at 17%. If we carried on doing each calculation every month for 60 months, we could come up with an exact figure for the amount of interest Tyler will have paid in five years, yet, his loan won't even be half paid off yet.

However, doing this calculation isn't necessary. We see the interest amount on his first two payments is around $70 per month. The amount of interest will decline as his balance decreases. In 60 months, he won't be even half way paid up on this debt so his interest payments will not be cut in half either. That means his interest each month for that first 60 months will be between $70 and $35 per month.

Let's estimate the interest by going half way between $70 and $35, which is $52.50 per month.

In 60 months, Tyler has paid:

$5,000.00 – $3,519.83 = $1,480.17 of his loan back.

$52.50 x 60 = $3,150 in interest.

On average, Tyler will have paid around $3,150 in interest, which is $1,480.17 of his original $5,000 borrowed and still owe $3,519.83.

$3,150 + $1,480.17 = $4,630.17 he has already paid and still owes over $3,500 more.

If Tyler invests the $5,000 and then pays the balance of his loan off in five years, he will have: 4,630.17+3519.83 = $8,150 in total payments on his loan, minus $5948.78 that the investment will be worth is **(- $2,201.22).**

Tyler's final option is to use the entire $5,000 windfall right now to pay off this $5,000 debt. The opportunity cost of this decision is not having a car and not having the investment either. Tyler would end up with no debt, but nothing else either, right? Not quite.

Remember, Tyler has accumulated a debt of $5,000 which is financed at 17% interest.
We calculated that if Tyler paid the loan for five years and then was able to pay the entire balance off at that point, he'd end up paying $8,150 in total on this debt. That's $3,150 more than he borrowed and far more than the $948.78 he'd earn in interest on the five year investment.
It appears Tyler has no choice but to pay off the loan and begin again.

Once we are aware of opportunity costs, we begin to stop and take a moment to think before we make any quick decisions. We begin to realize there are opportunity costs attached to each and every decision we make and hopefully, start making better decisions.

In the cases of Taylor and Tyler, we can see that not only do opportunity costs affect the decisions we make, but the decisions we make affect the opportunities that come our way.