

Credit Score -Analytical Exercises

Using a Credit Card as an Installment Loan

Let's say you decide to use a credit card like you would an installment loan.

You will make a large purchase on the card creating a balance. Then, you **won't use the card again** until the entire balance is paid off.

When using this strategy, it would be useful to know how to calculate a monthly payment on the card, so you can decide what kind of payment you will need to pay off this debt over a certain period of time. There is a formula you can use to do this calculation.

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 **Number of Months (N)** is:

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

P = Principal Amount of the loan

I = Interest Rate of the loan

N = Number of months to pay off the loan

Let's try it out.

A buyer wants to purchase a \$25,000 automobile at 6% interest and pay the loan off entirely in 3 years.

P = \$25,000

I = 6% = .06

N = 3 years = 36 months

Now, use the formula:

$$\begin{aligned} \text{MonthlyPayment} &= \frac{(P \times (I \div 12))}{(1 - (1 + (I \div 12))^{-N})} = \frac{(25,000 \times (.06 \div 12))}{(1 - (1 + (.06 \div 12))^{-36})} \\ &= \frac{(25,000 \times .005)}{(1 - (1 + .005)^{-36})} \\ &= \frac{(125)}{((1 - (1.005)^{-36})} \\ &= \frac{(125)}{(1 - .83564)} \\ &= \frac{(125)}{.16436} = \$760.53 \end{aligned}$$

Your monthly payment will be **\$760.53**.

Did you get the same answer?

Now, it's your turn:

You are deciding if you can afford to take on \$8,000 in new debt at an annual interest rate of 11%. You want to pay this debt off in 2.5 years. What will your payment be?

P = \$8,000

I = 11% = .11

N = 2.5 years = 30 months

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

Can you afford this debt?



ANSWER: Monthly Payment = \$306.23

Calculating Monthly Payments

In the examples we've examined, we make a **very important** assumption. We use the credit card like an installment loan because we create a balance and then we **don't use the card again** until the **entire balance is paid off**.

This is a very important point and deserves a closer look. Next you'll understand **why** we don't use the card again.

Option A

Example: We create a \$3,000 balance on a credit card that has an 11% interest rate. We can afford to make equal monthly payments of \$100 per month.

We don't use the card again.

We will be paying \$100 per month to pay off this loan.

Let's see how our payments are being used:

1st Month

$$\begin{aligned} \$3,000 \times 11\% &= 3000 \times .11 = \$330 \text{ in interest per year} \\ \$330/12 &= \mathbf{\$27.50 \text{ interest for the 1}^{\text{st}} \text{ month}} \end{aligned}$$

If I pay my 1st month's \$100 payment, they take \$27.50 for interest.
 $\$100 - \$27.50 = \mathbf{\$72.50 \text{ applied toward the loan balance.}}$

This means **\$72.50** of my \$100 payment will pay down what I owe.

$$\$3,000 - \$72.50 = \mathbf{\$2,927.50 \text{ balance}}$$

2nd Month

$$\begin{aligned} \$2,927.50 \times 11\% &= 2927.50 \times .11 = \$322.03 \text{ in interest per year} \\ \$322.03 / 12 &= \mathbf{\$26.84 \text{ interest for the 2}^{\text{nd}} \text{ month}} \end{aligned}$$

If I pay my 2nd month's \$100 payment, they take \$26.84 for interest.
 $\$100 - \$26.84 = \mathbf{\$73.16 \text{ applied toward the loan balance.}}$

$$\$2,927.50 - \$73.16 = \mathbf{\$2,854.34 \text{ balance}}$$

3rd Month

$$\begin{aligned} \$2,854.34 \times 11\% &= 2854.34 \times .11 = \$313.98 \text{ in interest per year} \\ \$313.98 / 12 &= \mathbf{\$26.17 \text{ interest for the 3}^{\text{rd}} \text{ month}} \end{aligned}$$

If I pay my 3rd month's \$100 payment, they take \$26.17 in interest.
 $\$100 - 26.17 = \73.83 applied toward the loan balance.

$\$2,854.34 - \$73.83 = \$2,780.51$ balance

Here's a table that shows the information for the first three payments:

| Payment | Interest Paid | Principal Paid | Balance |
|---------|---------------|----------------|-------------|
| Month 1 | \$ 27.50 | \$ 72.50 | \$ 2,927.50 |
| Month 2 | \$ 26.84 | \$ 73.16 | \$ 2,854.34 |
| Month 3 | \$ 26.17 | \$ 73.83 | \$ 2,780.51 |

As each month passes and each payment is made, notice how the amount of interest being paid gets **smaller** each month. This happens because once the \$100 payment is made and the interest due is taken from that payment, the rest of what's left of the \$100, is used to pay back the loan balance.

Since the amount **owed** gets smaller, the amount of **interest due** gets smaller too. Each month, more and more of the \$100 payment is used to pay back the loan and less and less is needed to pay interest due.

If you keep making the monthly calculations until the loan is completely paid off, you'll see that it takes **36 months (3 years)** to pay the loan off completely. You will end up paying **\$524.32 in total interest**.

Understanding Your Interest and Principal Balance

The most important thing to notice about the previous example is that the \$100 payment is enough to pay the interest due each month with some money left over to pay down the loan balance. Since we aren't continuing to use the card, the balance gets smaller and smaller each month.

What if we **continue to use the card**?

Looking at the 1st month's payment in the example table, we see the \$100 payment is divided up into \$27.50 for interest and \$72.50 is used to make the loan balance **decrease**.

However, if we continued to use the card for purchases, we'd **increase** the loan balance. If we spent more than \$72.50 in new charges, the balance of the loan would **increase, not decrease**. So, the next month we'd owe more interest than the month before, not less.

Below is a specific example of what would happen to your monthly payments if you charge on the card, adding to your existing balance.

Option B

Example: We create a \$3,000 balance on a credit card that has an 11% interest rate. We can afford to make equal monthly payments of \$100 per month.

We continue to use the card, charging \$50 additional dollars per month.

We will be paying \$100 per month to pay off this loan.

Let's see how our payments are being used:

1st Month

$\$3,000 + \$50 \text{ new charges} \times 11\% = 3050 \times .11 = \335.50 in interest per year
 $\$335.50/12 = \mathbf{\$27.96}$ interest for the 1st month

If I pay my 1st month's \$100 payment, they take \$27.96 in interest
 $\$100 - \$27.96 = \mathbf{\$72.04}$ applied toward the loan balance.

Then **\$72.04** of my \$100 payment will pay down what I owe.

$\$3,050 - \$72.04 = \mathbf{\$2,977.96}$ balance

2nd Month

$\$2,977.96 + \$50 \text{ new charges} \times 11\% = 3,027.96 \times .11 = \333.08 in interest per year
 $\$333.08 / 12 = \mathbf{\$27.76}$ interest for the 2nd month

If I pay my 2nd month's \$100 payment, they take \$27.76 in interest
 $\$100 - 27.76 = \mathbf{\$72.24}$ applied toward the loan balance.

$\$3,027.96 - \$72.24 = \mathbf{\$2,955.72}$ balance

3rd Month

$\$2,955.72 + \$50 \text{ new charges} \times 11\% = 3,005.72 \times .11 = \330.63 in interest
 $\$330.63 / 12 = \mathbf{\$27.55}$ interest for the 3rd month

If I pay my 2nd month's \$100 payment, they take \$27.76 in interest
 $\$100 - 27.55 = \mathbf{\$72.45}$ applied toward the loan balance.

$\$3,005.72 - \$72.45 = \mathbf{\$2,933.27}$ balance

The table below shows the information for the first three payments:

| Payment | Interest Paid | Principal Paid | Balance |
|---------|---------------|----------------|-------------|
| Month 1 | \$ 27.96 | \$ 72.04 | \$ 2,977.96 |
| Month 2 | \$ 27.76 | \$ 72.24 | \$ 2,955.72 |
| Month 3 | \$ 27.55 | \$ 72.45 | \$ 2,933.27 |

Compare this table with the table in the previous example when we didn't use the card for any new spending.

Luckily, the \$100 payment is still enough to pay the interest due and the loan balance is still getting smaller. However, the balance is coming down at a much slower rate. If we continued our calculations, it would take **89 months (7.4 years)** to pay this loan completely off and we would have paid **\$1,437.89 in total interest!**

Using the card for just \$50 a month means we jump from 36 to 89 months to pay off the loan and from \$524.32 in interest to \$1,437.89 in interest.

Now you try:

Can you predict what would happen to the exact same loan with the exact same \$100 per month payment if we continue to use the card and charge \$100 per month in new charges on it?

Answer:

| Payment | Interest Paid | Principal Paid | Balance |
|----------------|----------------------|-----------------------|--------------------|
| Month 1 | \$ 28.42 | \$ 71.58 | \$ 3,028.42 |
| Month 2 | \$ 28.68 | \$ 71.32 | \$ 3,057.09 |
| Month 3 | \$ 28.94 | \$ 71.06 | \$ 3,086.03 |

In this scenario, interest rises every month as the principal reduction falls, which means that the loan balance **grows every month**. This loan can **never be paid off!** The balance gets bigger and bigger every month along with the amount of interest owed.

In our last example, it took 89 months to pay the loan off by spending an additional \$50 per month on the card.

In this example, by spending \$100 additional per month, at the 89 month point, the interest that will be due that month will be \$63.43.

The principal being paid against the loan balance will be only \$36.57 and the total loan balance due at that time will increase to \$6,883.28.

That's more than double the balance we started with 89 months from where we started!

Avoiding Damage to Your Credit Score

Now that you know how to decide **if** you can afford to take on a new debt, let's see if you can determine **if you should** take on that new debt and how you can do so without **damaging** your **credit score**.

You are currently carrying a \$2,000 balance on a credit card with an annual interest rate of 9%. Your credit limit is \$15,000. You are deciding how to finance the \$8,000 purchase we described above.

- Will this new purchase fit on your existing account?
- Would that have any impact on your Credit Score?
 - How & Why?

Your credit score is currently very good so you have a couple of offers for new credit. You have an offer for an installment loan at the same 9% rate and a credit limit of \$8,000.

You also have an offer for a card at 11% with a credit limit of \$15,000, the same as your existing card.

If **Option A = 9% rate, credit line \$8,000** and **Option B = 11% rate, credit limit \$15,000**

Which option would you choose to add?

Why?

How would you structure your debt once all transactions were complete?

Why?

Analysis

You currently owe \$2,000 at a 9% interest rate. In order to pay this debt off in 2.5 years (30 months), you are currently making a monthly payment of \$74.70.

If you select the installment loan (**Option A**) you will have a new debt of \$8,000 at an interest rate of 9% and pay \$ 298.79 per month to pay this loan off in 2.5 years.

Your combined monthly payments will be: $\$74.70 + \$298.79 = \mathbf{\$373.49}$

How will selecting **Option A** affect your credit score?

- You have brand new debt and that hurts your score slightly at first.
- You have a new **type** of debt so that helps your score slightly.
- Both the “New Debt” and “Mix of Debt” categories have a weight of 10% on your credit score.
- With one positive and one negative effect, you would expect the combination to have a neutral impact on your score.

Your “Total Credit” just jumped from \$15,000 to \$23,000 of which you are using \$10,000 which leaves you a **debt percentage** of $10,000/23,000 = .434 = \mathbf{43.4\%}$

This debt percentage is not too bad.

Since debt percentage is 30% weighted in calculating your credit score, you would expect a decrease in your credit score as a result of selecting **Option A**.

If you select the credit card option (**Option B**) you will have a new debt of \$8,000 at an interest rate of 9% and pay \$ 306.23 per month to pay this loan off in 2.5 years.

However, if you decide to put only \$5,000 of the new debt on this card, your monthly payment will decline to **\$191.39!**

The remaining \$3,000 of the new debt would then be added to the existing \$2,000 debt on your original card. That card is now \$5,000 at 9% leaving you with a monthly payment of **\$186.74**.

Your combined monthly payments will be: $\$186.74 + \$191.39 = \mathbf{\$378.13}$

How will selecting **Option B** affect your credit score?

- You have brand new debt and that hurts your score slightly at first.
- Your “Total Credit” just jumped from \$15,000 to \$30,000 of which you are using \$10,000 which leaves you with a debt percentage of $10000/30000 = .333 = \mathbf{33.3\%}$

This is much better.

Since debt percentage is 30% weighted in calculating your credit score, and 33.3% of debt used is a very good indicator of using credit responsibly, you could expect to increase in your credit score as a result of selecting **Option A**.

Explaining the Advantages of Payment Plans

Option A has advantages over **Option B** because you would create a new type of credit and you would have a lower “Total Available Credit” of (\$23,000 vs. \$30,000). **Option A** also has a lower monthly payment total of \$373.49, a savings of \$4.64 over **Option A**.

However, **Option B** has advantages over **Option A**, as well. Your outstanding debt to available credit ratio is a full 10% lower with **Option A** (33% vs. 43%). This category is 30% of your credit score calculation, making this difference quite significant.

In addition, when the 2.5 years of repayment is complete, you will have an active credit line that is 2.5 years old, which you can continue to use responsibly. This will help in your “Length of Credit” category (15% of your score) and the credit will still be available for your use. With these advantages, it sounds like this option is worth the additional \$4.64 per month.

For these reasons, **Option B** appears to be the smarter financial choice.

Additional Computation Exercises

Calculate these monthly payments below.

What is the monthly payment required to bring each account from the current **balance** at this **interest rate** down to a balance of **\$0.00** in these many **months**:

| Balance | Interest Rate | Months Until \$0.00 |
|----------------|----------------------|----------------------------|
| \$5,000 | 13% | 36 |
| \$6,500 | 14.5% | 48 |
| \$7,200 | 16% | 60 |
| \$2,700 | 15.9% | 24 |

Answers:

| Monthly Payment Required |
|---------------------------------|
| \$ 168.47 |
| \$ 179.26 |
| \$ 175.09 |
| \$ 132.07 |

Additional Analytical Exercises

Examine the table below. A friend has the following outstanding debts:

| Account | Current Balance | Interest Rate | Credit Limit |
|----------------|------------------------|----------------------|---------------------|
| Card A | \$2,000 | 12% | \$8,000 |
| Card B | \$4,200 | 10% | \$5,000 |
| Card C | \$3,300 | 9% | \$5,000 |

His/her credit score is starting to suffer.

Your friend asks you for your help and advice on how to improve his/her credit score.

Currently, your friend is using what percentage of his/her "Total Available Credit"?

Your friend tells you:

- No balance transfers are possible at this time.

- No **new credit** will be extended to him/her at this time.
- Each account has a **\$15.00/month minimum payment requirement**.

Your friend has only \$600 per month from his/her income that can be used to service this debt.

What advice do you give your friend on how to improve his/her credit score?

- Where should your friend focus his/her attention?
- Why?
- How could \$600 **best** be used to service this debt?

Sound Analytical Answer:

Your friend is using $\$9,500/\$18,000 = .5277 = .53 = 53\%$ of his total available debt.

Card A is using $\$2,000/\$8,000 = .25 = 25\%$ of his available credit on this card.

This is very good, responsible usage of the card.

Card A has a \$2,000 balance with a 12% interest rate.

This translates into: $2000 \times .12 = 240.00$ interest per year or $240/12 = \$20.00$ interest per month.

Even though each account has a \$15 per month minimum payment, this payment would not be sufficient to pay the interest charge on **Card A**. **Card A** should have a payment **no less than \$20 per month** in order to keep the balance level at \$2,000 and not **increase** the debt.

Out of the \$600/month available for credit service, no less than \$20 should be allocated to **Card A** leaving \$580/month available to service the other two cards.

Card B is using $\$4,200/\$5,000 = 21/25 = .84 = 84\%$ of his available credit for this card. This is way too high. This card will cause his credit score to fall.

Card C is using $\$3,300/\$5,000 = 33/50 = .66 = 66\%$ of his available credit for this card. This is also **way too high** and this card could hurt his credit score.

Between **Cards B** and **C**, **Card B** is the bigger problem. I would advise my friend to focus his attention on paying off **Card B** and then on **Card C**.

Card B can be paid off in 12 months by paying a monthly payment of \$369.25.

I still have \$580/month to work with, so I would advise my friend to use \$369.25 of the \$580 to pay **Card B**. This would leave \$210.75 to use to pay off **Card C**.

Paying off **Card C** in 12 months would cost \$288.59/month. I don't have that much money to use for payments.

Paying off **Card C** in 14 months would cost \$249.19/month. I don't have that much money to use for payments.

Paying off **Card C** in 16 months would cost \$219.64/month. I don't have that much money to use for payments.

Paying off **Card C** in 18 months would cost \$196.67/mo. I **can** pay this amount!

That would leave $\$210.75 - \$196.67 = \$14.08$ left over.

I can put this toward **Card A** so the balance does indeed decrease while I am focusing on **Cards B and C**.

Therefore:

I would advise my friend to pay \$34.08 on Card A, \$369.25 on Card B and \$196.67 on Card C every month.

This will eliminate Card B in 12 months, Card C in 18 months and reduce Card A balance to lower than it is now in the 18 months.