Introduction to Loans Take Home Reading

Think back to Lesson 3 where we talked about balance sheets. We made a very simple statement about how you pay for the assets you purchase – you can either use your money (we called that equity or net worth) or you can use someone else's money (we called that liabilities). Many of a business' liabilities are either operating loans or term loans. Let's talk more about loans because chances are you will need a loan to purchase a house or a car in the future.

A loan is simply money that you borrow from someone with the intent of paying it back over time. You might use a loan to purchase land or a house or a car or business assets. Loans have become more necessary over time because assets have gotten more expensive, which makes it harder to purchase assets with cash. Your great-grandparents probably paid cash for everything that they owned. But as land values and house values increased it became much harder to save enough money to purchase these items. In today's economy an average house might have a selling price well over $150,000 – it might take a very long time to save enough money to purchase a house if you do not get a loan.

Business owners often use loans to purchase some of their assets. The main reasons that they use loans include:

- they don't have enough cash to purchase expensive assets (land, buildings, etc.)

- they want to purchase these assets today rather than waiting until they save enough cash

- they would rather use their cash to pay their operating expenses instead of using their cash to purchase assets

- loans provide cash in emergency situations when they are short on cash

- using loans can improve the profitability of the business by allowing the purchase of assets that will make the business more efficient.

For example, Greta is thinking about purchasing a new refrigerator so that she can have more produce to sell. Greta has $45,000 in her business checking account. The new refrigerator will cost $45,000. If Greta pays for the refrigerator in cash she will not have any money available to pay for the operating expenses of the refrigerator, and she will not have money to purchase the produce that she plans to store in the refrigerator. For her business it might make more sense to borrow money to purchase the refrigerator. This will allow her to purchase more produce with her cash.

How do loans work? In most cases the loan is obtained from a lender, such as a bank, credit union, or possibly an individual. Farm Credit is an example of a business that makes loans to people who are involved in agriculture and rural communities. The business owner will need to apply for the loan. A typical loan application includes:

- the reason for the loan (how the money will be used)

- how the borrower plans on repaying the money (your income statement or pay stub)

- a balance sheet

- a check of your credit history and credit score

Lenders usually require a borrower to make a "down payment" of cash to qualify for the loan. This shows the lender that you are serious enough to invest your own money into the purchase of the asset. The down payment also reduces the risk that the lender will have because they don't have to lend as much money. Down payments are usually based on a percentage of the purchase price of the asset. Lenders typically require a 20% down payment on home loans. For a house with a purchase price of $200,000, this would require a $40,000 ($200,000 x 20%) down payment. The down payment percentages will be different for various types of assets, and the percentages will vary between different lenders.

Here's an example of using a loan to purchase a new refrigerator. The purchase price of the refrigerator is $45,000. Greta's lender would like for her to make a 20% down payment – that would be $9,000 ($45,000 x 20%). That means she will need a loan for the remaining amount - $36,000 ($45,000 purchase price - $9,000 down payment). This $36,000 is called the "loan principal", or simply the "principal". So Greta will pay the seller the entire $45,000 purchase price using $9,000 of her money and $36,000 of the lender's money. Then, Greta will may regular payments to the lender over the next few years to repay the loan principal plus any interest that she owes on the loan.

There are several different types of loans, but most of the loans work in the same general manner: you borrow the principal from the lender, then make regular payments of principal and interest to the lender until it is repaid in full. From a personal standpoint you might use an auto loan to purchase a car or truck; you might use a mortgage to purchase a house or land; you might use a student loan to pay for your education; or you might use a credit card to purchase smaller items. Credit cards tend to have the highest interest rates (currently averaging close to 17% APR versus 4-6% for mortgages and auto loans) – thus, credit card debts should be repaid as quickly as possible so that you don't have to pay too much interest over time.

From a business standpoint we classify loans into two main types: operating loans and term loans. Operating loans are used to purchase your inventory and to pay the main operating expenses of the business. Greta might use an operating loan to purchase the produce and items that she sells. She may also use an operating loan to pay for her largest operating or overhead expenses such as utilities, rent, or hired labor. Operating loans are usually paid back to the lender in full within one year. Just to make loans more confusing, lenders usually have two different types of operating loans. One is called an "operating loan" and the other is called an "operating line of credit". Here's the difference – when you get an operating loan the lender gives you a specific amount of money that you have to pay back, usually within one year. With an "operating line of credit", they lender tells you that you can borrow up to a certain dollar amount (called a "credit limit"), but you do not have to borrow the entire amount. However much you borrow, you still need to repay the principal within one year. Operating lines of credit are very similar to credit cards. Operating lines of credit are very useful for purchasing your inputs like fertilizer, feed, or your inventory of items that you sell.

Term loans are used to purchase assets that will be used by the business for several years (over a longer "term" than operating loans). Greta might use term loans to purchase delivery vehicles, refrigerators, land, or other buildings, and pay these loans back over a 3-year to 30-year period ("term"). Equipment is usually repaid over a 3-year to 10-year term. Land and building (known together as "real estate") loans are usually repaid over 10-year to 30-year terms.

When you borrow money with a term loan, the lender usually states very clearly how you are to repay to loan. The lender will specify the number of payments per year, the number of years, the annual interest rate (known as the "APR" – Annual Percentage Rate), and the dollar amount of each payment. Greta's refrigerator loan might have the following details:

- $36,000 of principal borrowed for a 5-year term

- 5% APR interest rate

- 4 payments per year – January 1, April 1, July 1, and October 1

- each payment will be $2,045.53

When you think about loans, you normally think about the "interest" that you will pay on the loan. Interest is the cost of borrowing money. The interest expense is usually calculated on the amount of principal that you owe the lender. To calculate the amount of interest you owe the lender for the year, simply multiply the annual interest rate (the APR) times the amount of principal you owe the lender.

The math behind loans can be confusing, but here's a way to simplify it. We call it "The 3-Step Process". The first step is to calculate the interest that you will pay this year. The second step calculates how much loan principal you will repay this year. The third step calculates how much principal you still owe the lender after this payment is made:

Step 1:   Calculate the interest that you will pay this year

            = Annual Interest Rate x Principal That You Owe the Lender

                    This amount will be listed as an Overhead Expense on the Income Statement

Step 2:   Calculate the amount of principal you will repay this year

            = Annual Loan Payment – Interest Paid (from Step 1)

                    This amount will be listed as a Current Liability on the Balance Sheet

Step 3:   Calculate how much principal you will owe the lender after this payment is made

            = Principal Owed at Beginning of Year – Principal Paid This Year (from Step 2)

                    This amount will be listed as a Non-Current Liability on the Balance Sheet

As an example, assume that on January 1, 2016 you borrow $1,000 at 4% interest for a 2-year term. You will make one payment per year. Your annual payment will be $530.20/year (you'll learn how to calculate this payment soon!). It is now January 1, 2017, one full year later. You owe the lender interest for one full year. Here's how you calculate the interest that you owe the lender:

Step 1:   Annual Interest Expense = Annual Interest Rate x Principal Owed to the Lender

            Annual Interest Expense = 4% APR x $1,000 = $40 of interest

Step 2:   Principal Repaid This Year = Annual Loan Payment – Annual Interest Expense

                         Principal Repaid This Year = $530.20 - $40 = $490.20

Step 3:   Principal Owed After This Payment

          = Principal Owed at Beginning of Year – Principal Repaid This Year

          = $1,000 - $490.20 = $509.80

Move ahead one more year to January 1, 2018. You owe the lender $509.80 of principal. Let's repeat the 3-Step Process for the second year of this loan:

Step 1:   Annual Interest Expense = Annual Interest Rate x Principal Owed to the Lender

                         Annual Interest Expense = 4% APR x $509.80 = $20.40 of interest

Step 2:   Principal Repaid This Year = Annual Loan Payment – Annual Interest Expense

                         Principal Repaid This Year = $530.20 - $20.40 = $509.80

Step 3:   Principal Owed After This Payment

          = Principal Owed at Beginning of Year – Principal Repaid This Year

          = $509.80 - $509.80 = $0.00

You see, at the end of two years you have repaid the loan principal (the $1,000) in full and you have paid the lender all of the interest that you owed. A couple of things to notice:

 - The amount of interest you pay in each payment will get smaller with each payment. In the example you paid $40 of interest in the first payment but only $20.40 of interest in the second payment.

 - The amount of principal that you repay in each payment will get larger with each payment. You paid $490.20 of principal in the first payment, and $509.80 of principal in the second payment.

Here's a quick way to estimate the total amount of interest that you will pay over the life of a loan. Rather than working through the 3-Step Process for each payment, we can take this shortcut:

          Total Interest Paid Over the Life of the Loan

                 = (Scheduled Payment x Total Number of Payments) – Initial Principal Borrowed

For the $1,000 loan example:

          Total Interest Paid = ($530.20/year x 2 years) - $1,000 borrowed = $60.40 of interest

          That is exactly equal to what we calculated above ($40 + $20.40 = $60.40)!

Now let's calculate the total amount of interest you will owe on a 30-year mortgage with monthly payments. That's a total of 360 payments (30 years x 12 payments/year). Assume that you borrow $200,000 to purchase a house. The interest rate is 5% APR. You monthly payment will be $1,073.65/month. Rather than doing the 3-Step Process 360 times, let's estimate the total interest you will pay over the 30-year period:

(Monthly Payment x 360 Months) – Initial Loan Principal = Total Lifetime Interest

($1,073.65/month x 360 months) - $200,000 = $185,511.57 of interest

In this example you will pay $185, 511.57 of interest if you make all of your loan payments on schedule. That is the cost of borrowing the money! Hopefully the value of your house increased by more than $185,511.57 over this 30-year period to make this a good investment!

How do I calculate the amount of the loan payments? There are four methods of calculating loan payments:

- using a mathematical formula

- using a financial calculator

- using loan repayment tables

- using an Excel spreadsheet

We will focus on using the loan repayment tables and the Excel spreadsheet. To use the loan repayment tables (Tables 3-5) you need to know the following information:

- The annual interest rate (the APR)

- The number of years (the term) of the loan

- The amount of principal borrowed

You will use Table 3 "Annual Loan Payments" to calculate the amount of each annual loan payment for a loan that has just one payment per year. Let's use Table 3 to calculate the loan payment for the $1,000 loan example. The loan was at 4% for 2 years. On Table 3, the interest rates are listed at the top of each column – they range from 1% to 12%. The row headings on the left side of Table 3 show the number of years (the term of the loan). Go across the table until you get to the 4% Interest Rate Column. Now, go down that column until you get to the row labelled "2" at the left side of the table. You should see a loan repayment factor of 0.5302 at the intersection of the 4% column and the "2" row. Calculate the annual loan payment by multiplying this factor by the amount of loan principal that you borrowed:

0.5302 x $1,000 = $530.20/year

What if Greta gets a 20-year loan to purchase a new storage building. The loan is for $200,000 for 20 years at 6% APR. Calculate the annual payment on this loan:

Loan Repayment Factor for 6% for 20 years = 0.0872

Annual Payment = 0.0872 x $200,000 = $17,440/year

We use a very similar method of calculating monthly payments (12 payments/year) and quarterly payments (4 payments/year). There is just one difference – we need to divide the principal amount by $1,000. That's because the factors for these loans are very small and would have lots of decimal places if we didn't make any adjustments. Let's calculate the monthly loan payment on a $20,000 auto loan – 5 years at 7% APR. Use Table 4:

Monthly Loan Repayment Factor for 7% for 5 years = 19.80

Monthly Loan Payment = 19.80 x $20,000 / $1,000 = $396.00/month

Greta is considering making monthly payments instead of annual payments for the new storage building. Calculate her monthly payment for a $200,000 loan at 7% for 20 years:

Monthly Loan Repayment Factor for 7% for 20 years = 7.75

Monthly Loan Payment = 7.75 x $200,000 / $1,000 = $1,550/month

You use the exact same method for quarterly payments. Use Table 5 to get the repayment factors for quarterly loans.

Computer spreadsheets are an easy way to calculate loan payments. Open the Lesson 7 – Loan Payments spreadsheet. This spreadsheet calculates loan payments for you. All you need to do is enter the following information in the cells with the blue font:

Original Loan Principal

Annual Interest Rate (APR)

Life of the Loan (the loan term)

Number of Payments/Year

After you enter this information the spreadsheet will calculate the loan payment for you. It also contains a table that shows the math involved with the 3-Step Process. The table shows how much principal you owe the bank at the beginning of the period ("principal outstanding"), the amount of interest you will pay that period, the amount of principal you will repay that period, and how much principal you still owe the lender after that payment is made ("remaining principal"). This table only looks at the first 20 payments of the loan.

Let's do some examples. Calculate the annual loan payment for a $50,000 loan for 5 years at 5% APR. Enter this information:

Original Loan Principal	$50,000 (you don't have to enter the $)
Annual Interest Rate (APR)	5% (you don't have to enter the %)
Life of the Loan (the loan term)	5
Number of Payments/Year	1

The spreadsheet shows that your annual payment will be $11,548.74/year. If you were to use the loan repayment factors from Table 3, you should get $11,550/year instead of $11,548.74. This small difference is due to rounding of the factors on Table 3. The spreadsheet answer is more exact because it doesn't round the calculations.

Now, look at the table on the spreadsheet to see how you will be repaying this loan over the next 5 years. You should see that the amount of "Interest Due" gets smaller every year and the "Principal Due" gets larger each year. Also, the "Remaining Principal" gets smaller each year as you pay down the loan.

Play around with the spreadsheet to see what the loan payments would be for several loans. Use the spreadsheet to double check your answers that you get by using Table 3-6. Remember, there might be a small difference due to rounding – don't worry about the small stuff!