Ag Decision Maker

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Types of Term Loan Payment Schedules

Many loans are repaid by using a series of payments over a period of time. These payments usually include an interest amount computed on the unpaid balance of the loan plus a portion of the unpaid balance of the loan. This payment of a portion of the unpaid balance of the loan is called a payment of principal.

There are generally two types of loan repayment schedules – even principal payments and even total payments.

Even Principal Payments

With the even principal payment schedule, the size of the principal payment is the same for every payment. It is computed by dividing the amount of the original loan by the number of payments. For example, the $10,000 loan shown in Table 1 is divided by the 20 payment periods of one year each, resulting in a principal payment of $500 per loan payment. Interest is computed on the amount of the unpaid balance of the loan at each payment period. Because the unpaid balance of the loan decreases with each principal payment, the size of the interest payment of each loan payment also decreases. This results in a decrease in the total payment (principal plus interest) as shown in Figure 1. As shown in Table 1, the total payment decreases from $1,200 ($500 principal and $700 interest) in year one to $535 ($500 principal and $35 interest) in year 20. The total amount paid over the 20-year period is $17,350, which consists of the $10,000 loan plus $7,350 of interest.

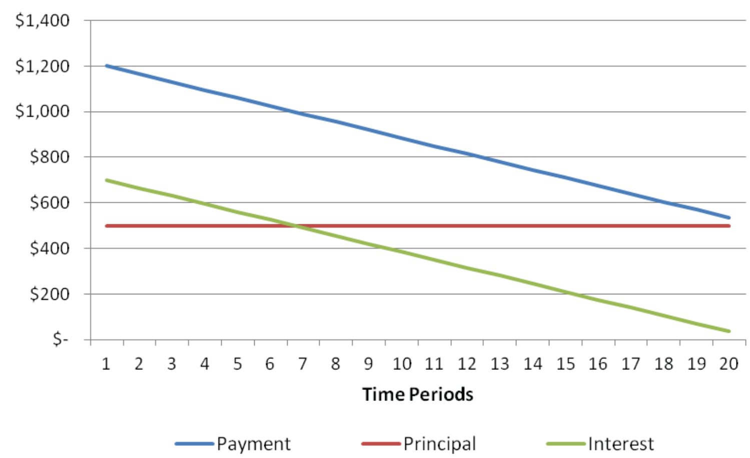
Table 1. Even Principal Payment Schedule

($10,000 loan, 7% annual interest, 20 annual payments)

Year	Total Payment	Principal	Interest [1/]	Unpaid Balance
0				$ 10,000
1	$ 1,200	$ 500	$ 700	$ 9,500
2	$ 1,165	$ 500	$ 665	$ 9,000
3	$ 1,130	$ 500	$ 630	$ 8,500
4	$ 1,095	$ 500	$ 595	$ 8,000
5	$ 1,060	$ 500	$ 560	$ 7,500
6	$ 1,025	$ 500	$ 525	$ 7,000
7	$ 990	$ 500	$ 490	$ 6,500
8	$ 955	$ 500	$ 455	$ 6,000
9	$ 920	$ 500	$ 420	$ 5,500
10	$ 885	$ 500	$ 385	$ 5,000
11	$ 850	$ 500	$ 350	$ 4,500
12	$ 815	$ 500	$ 315	$ 4,000
13	$ 780	$ 500	$ 280	$ 3,500
14	$ 745	$ 500	$ 245	$ 3,000
15	$ 710	$ 500	$ 210	$ 2,500
16	$ 675	$ 500	$ 175	$ 2,000
17	$ 640	$ 500	$ 140	$ 1,500
18	$ 605	$ 500	$ 105	$ 1,000
19	$ 570	$ 500	$ 70	$ 500
20	$ 535	$ 500	$ 35	$ 0
Total	**$ 17,350**	**$ 10,000**	**$ 7,350**	

[1/] interest = unpaid balance times 7 percent.

Figure 1. Even Principal Payment Schedule



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Even Total Payments

The even total payment schedule is comprised of a decreasing interest payment and an increasing principal payment. The decrease in the size of the interest payment is matched by an increase in the size of the principal payment so that the size of the total loan payment remains constant over the life of the loan (Figure 2). As shown in Table 2, the interest payment decreases as the unpaid balance decreases. The remainder of the loan payment is principal payment.

The large unpaid balance early in the life of the loan means that most of the total payment is interest with only a small principal payment. Because the principal payment is small during the early periods, the unpaid balance of the loan decreases slowly. However, as the payments progress over the life of the loan, the unpaid balance declines, resulting in a smaller interest payment and allowing for a larger principal payment. The larger principal payment, in turn, increases the rate of decline in the unpaid balance. For example, the interest payment is $700 and the principal payment is $244 during the first year as shown in Table 2. The interest payment is $62 and principal payment is $882 during the last loan payment in year 20. This is in contrast to the even principal payment schedule, in which the principal payment is constant over the repayment period and the unpaid balance declines by the same amount each period ($500 principal payment), resulting in a fixed reduction in the interest payment each period of $35 (7% x $500 = $35). The total amount paid over the 20-year period is $18,879, which consists of the $10,000 loan plus $8,879 of interest.

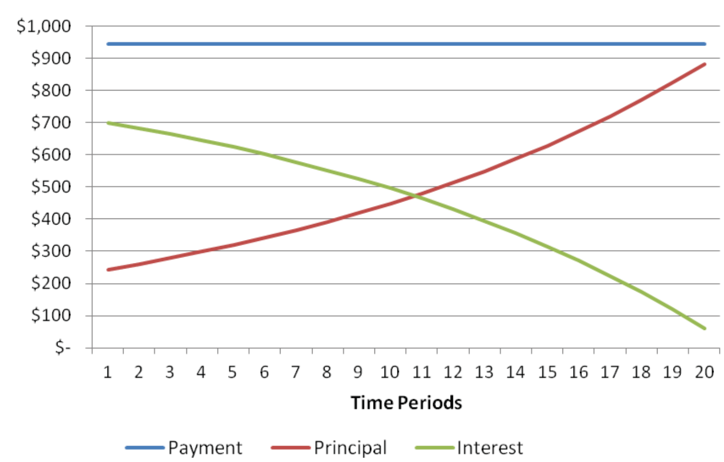
Table 2. Even Total Payment Schedule

($10,000 loan, 7% annual interest, 20 annual payments)

Year	Total Payment	Principal	Interest [1/]	Unpaid Balance
0				$ 10,000
1	$ 944	$ 244	$ 700	$ 9,756
2	$ 944	$ 261	$ 683	$ 9,495
3	$ 944	$ 279	$ 665	$ 9,216
4	$ 944	$ 299	$ 645	$ 8,917
5	$ 944	$ 320	$ 624	$ 8,597
6	$ 944	$ 342	$ 602	$ 8,255
7	$ 944	$ 366	$ 578	$ 7,889
8	$ 944	$ 392	$ 552	$ 7,497
9	$ 944	$ 419	$ 525	$ 7,078
10	$ 944	$ 448	$ 495	$ 6,630
11	$ 944	$ 480	$ 464	$ 6,150
12	$ 944	$ 513	$ 430	$ 5,636
13	$ 944	$ 549	$ 395	$ 5,087
14	$ 944	$ 588	$ 356	$ 4,499
15	$ 944	$ 629	$ 315	$ 3,870
16	$ 944	$ 673	$ 271	$ 3,197
17	$ 944	$ 720	$ 224	$ 2,477
18	$ 944	$ 771	$ 173	$ 1,706
19	$ 944	$ 825	$ 119	$ 882
20	$ 944	$ 882	$ 62	$ 0
Total	**$ 18,879**	**$ 10,000**	**$ 8,878**	

[1/] interest = unpaid balance times 7 percent.

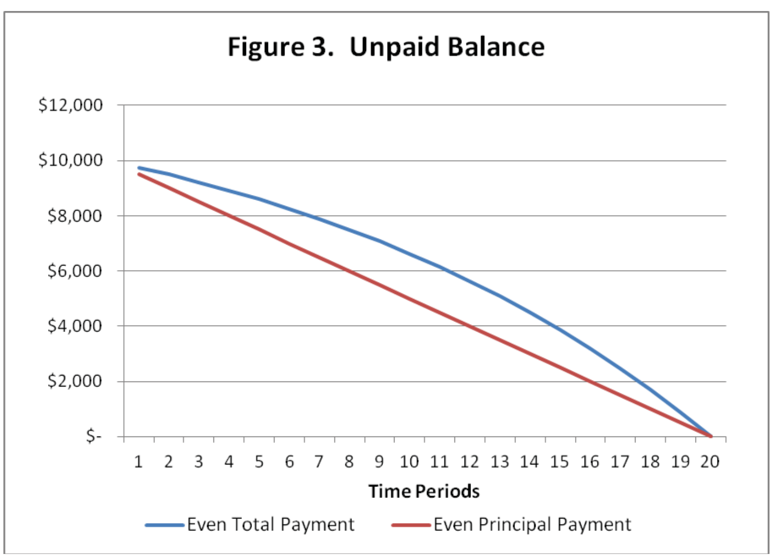
Figure 2. Even Total Payment Schedule



Unpaid Balance

The unpaid balance of the loan using the even principal payment schedule decreases by a fixed amount with each payment. As shown in Table 1, the unpaid balance is reduced by $500 each year. After 10 years (halfway through the repayment period), the unpaid balance of the loan is $5,000 (half of the original $10,000 loan). By contrast, the size of the unpaid balance of the even total payment schedule declines slowly during the early term of the loan (e.g., $244 the first year) and declines quickly towards the end of the loan term (e.g., $822 in year 20). As shown in Table 2, the unpaid balance in year 10 (halfway through the term of the loan) is $6,630. Over half of the loan is yet to be repaid. This difference in the rate of decline of the unpaid balance of the two repayment schedules is shown in Figure 3.

Because the unpaid balance of the loan using the even total payment repayment schedule declines more slowly than the even principal payment repayment schedule, the total amount of interest paid over 20 years is greater with the even total payment schedule. For example, in Tables 1 and 2, the total amount of interest paid over the life of the loan is $7,350 using the even principal payment schedule and $8,878 using the even total payment schedule, for an increase of $1,528. Correspondingly, the total cost of repaying the loan is greater by the same amount for the even total payment schedule.



Balloon Payments

Some term loans include a balloon payment. With this structure, the remaining balance of the loan comes due after a portion of the annual payments have been made. Table 3 shows an even total payment schedule that is amortized (spread over) 40 years. However, at the tenth annual payment the remaining balance of the loan comes due. This is the balloon payment of $10,058, which is comprised of $9,400 remaining balance on the loan and $658 of annual interest due in year 10, as shown in Table 3.

Table 3. Even Total Payment Schedule with Balloon

($10,000 loan, 7% annual interest, 40 year amortization, balloon payment after 10 years)

Year	Total Payment	Principal	Interest [1/]	Unpaid Balance
0				$ 10,000
1	$ 750	$ 50	$ 700	$ 9,950
2	$ 750	$ 54	$ 696	$ 9,896
3	$ 750	$ 57	$ 693	$ 9,839
4	$ 750	$ 61	$ 689	$ 9,778
5	$ 750	$ 66	$ 684	$ 9,712
6	$ 750	$ 70	$ 680	$ 9,642
7	$ 750	$ 75	$ 675	$ 9,567
8	$ 750	$ 80	$ 670	$ 9,486
9	$ 750	$ 86	$ 664	$ 9,400
10	$ 10,058	$ 9,400	$ 658	$ 0
Total	**$ 16,809**	**$ 10,000**	**$ 6,809**	

[1/] interest = unpaid balance times 7 percent.

The balloon provision may be used when a business has limited repayment capacity in the early years but is able to repay or refinance the loan after several years of operation (10 years in this case). The length of the amortization schedule and the timing of the balloon payments can be designed to fit the individual situation. The loan may be amortized over a long period of time (e.g., 40 years in the example) to keep the payments small in the early years. In some cases, the early payments may not be paid but compounded into the balloon payment.

Even Loan Payment Computation

A financial calculator or an electronic spreadsheet on a personal computer is a useful tool for computing loan payments using the even total payment schedule.

- "PV" represents the amount borrowed.
- "Rate" or "i" represents the interest rate per payment period.
- "N" or "Nper" represents the number of payment periods.
- "PMT" represents the loan payment per payment period.

You can compute any of the four loan values above as long as you know the other three values.

You can compute the loan payment if you know the amount borrowed, the interest rate, and the length of the loan (number of payment periods). For example, if you borrow $10,000 at 7 percent over 20 years, your annual payment is $943.93.

- Amount Borrowed (PV) = $10,000
- Interest Rate per Period (Rate) = 7% per year
- Number of Periods Borrowed (Nper) = 20 years
- Loan Payments (PMT) = ?
- Loan Payments (PMT) = $943.93

You can compute the interest rate if you know the amount borrowed, the loan payment, and the length of the loan (number of payment periods). For example, if you borrow $10,000 over 20 years and your loan payment is $943.93, your interest payment is 7 percent.

- Amount Borrowed (PV) $10,000
- Loan Payments (PMT) $943.93
- Number of Period Borrowed (Nper) = 20 years
- Interest Rate (Rate) = ?
- Interest Rate (Rate) = 7%

You can compute the number of loan payments if you know the amount borrowed, the loan payment, and the interest rate. For example, if you borrow $10,000 at 7 percent interest and your payment is $943.93, it will take 20 years to repay the loan.

- Amount Borrowed (PV) = $10,000
- Interest Rate (Rate) = 7% per year
- Loan Payments (PMT) $943.93
- Number of Period Borrowed (Nper) = ?
- Number of Periods Borrowed (Nper) = 20 years

You can compute the amount borrowed if you know the loan payment, the interest rate, and the length of the loan (number of payment periods). For example, if your loan payment is $943.93, the interest rate is 7 percent and you will repay the loan over 20 years, the amount you are borrowing is $10,000.

- Loan Payments (PMT) $943.93
- Interest Rate (Rate) = 7% per year
- Number of Period Borrowed (Nper) = 20 years
- Amount Borrowed (PV) = ?
- Amount Borrowed (PV) = $10,000

A financial calculator or electronic spreadsheet on a personal computer can perform many more functions in addition to the ones discussed above.

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