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ESTIMATING PRINCIPAL DUE IN NEXT 12 MONTHS WITH MONTHLY PAYMENTS

Eddy L. LaDue

Department of Agricultural Economics
New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Cornell University, Ithaca, New York 14853-7801

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Eddy L. LaDue[1]

The Farm Financial Standards Task Force recommends that principal to be repaid within the next 12 months on intermediate and long term loans be listed as a current liability on farm balance sheets. The basic reasons for this are to make current liabilities a better measure of obligations to be met during the next year, to improve the correspondence between current liabilities and current assets so that ratios such as the current ratio make more sense and to be consistent with Generally Accepted Accounting Principals. Thus, for each term loan, the preparer of a balance sheet must determine not only the total amount of principal outstanding, but also the amount of that principal which is due within the next 12 months. The principal amount due within the next 12 months is listed as a current liability and the remainder is listed as a noncurrent (intermediate or long term) liability.

Calculating the amount of principal due within the next 12 months is a simple task for some loans. Constant principal payment loans are, of course, the easiest. Loans with constant principal and interest payments and annual payments can also be handled quite simply: subtract one year's interest on the outstanding principal from the annual payment. However, making the calculations for loans with constant monthly (principal and interest) payments is a much more complicated undertaking. If the loan is on a computer system to which the balance sheet preparer has access, the information may be easily available. But, for those other loans, another procedure will be required.

This article presents alternate ways of calculating or estimating the principal due within the next 12 months for loans with monthly payments. The methods vary in the amount of information required and the degree of accuracy provided.

Full Information, Completely Amortized

For those cases where you have complete information and the loan payments are designed to exactly pay off the principal with the remaining payments, the principal due can be accurately calculated using present value tables or functions. This procedure makes use of the basic principle that the present value of the completely amortized payments on a loan will always equal the principal on the loan, if the present value is calculated using the interest rate charged on the loan.

The basic procedure is to calculate (1) the principal on the loan as of the date of the balance sheet, and (2) the principal on the loan as of 12 months later (the date of the next balance sheet). The principal due within the next 12 months is the difference between the two. This is entered as a current liability. The principal due 12 months later (number

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[1] Professor of Agricultural Finance, Cornell University. Helpful reviews of this paper were provided by Bernard Stanton and Wayne Knoblauch.

2 above) is entered as the noncurrent (intermediate or long term) liability for this loan. In succeeding years only one present value calculation will need to be made because the current principal balance will be the amount entered as the noncurrent liability for the preceding year.

Present values can be calculated from tables (available from the author and other sources) or direct application of the present value formula. The present value formula is:

$$V_o = P\left[\frac{1-\left[\frac{1}{(1+i)^n}\right]}{i}\right]$$

Where, V_o = principal outstanding on the loan (present value)
i = the annual interest rate divided by 12
n = the total number of monthly payments, and
p = the amount of each monthly payment

Fortunately, this formula is programmed into most financial calculators and computer spreadsheets. Spending a few minutes figuring out how to use these functions on your calculator or spreadsheet may save time in balance sheet preparation.

Table 1. Example Using Present Value Method

Loan Information:	Monthly payment:	$444.89
	Annual interest rate:	12%
	Monthly payments remaining:	60
Calculations:	Present value of 60 payments of $444.89 discounted at 12% (Formula or table value of 44.955 x 444.89)	$20,000.03
	Present value of 48 payments of $444.90 discounted at 12% (Formula or table value of 37.974 x 444.89)	16,894.25
	Principal due in next 12 months	$ 3,105.79

An example illustrating use of this method is presented in Table 1. For the example situation, the $3,106 is entered as the current liability and the $16,894 is entered as the intermediate liability for this loan.

Limited Information or not Exactly Amortized

Unfortunately, in many cases, the preparer of the balance sheet does not have sufficient information to calculate present value or the loan is not exactly amortized by the monthly payments now being made. Examples of such situations include (1) balloon payment loans, (2) variable rate loans where the amount of normal monthly payments do not change, (3) situations where the exact number of payments remaining is not known, (4) assignment of proceeds loans where the average monthly payment changes from year to year, and (5) loans where payments have been missed or extra payments have been made.

For these situations you could calculate the principal repaid each month for the next 12 months -- a time consuming activity (see Brute Force below). The complicating factor for these loans is that the amount of principal repaid changes each month. When a monthly payment is made, more of the next payment can go to principal because the amount of interest required is less.

Fortunately, the principal to be paid in the next 12 months can also be calculated by multiplying the principal paid on the next payment by a factor. That factor is a function of only the interest rate. Factors (to two decimal places) for representative interest rates are presented in Table 2. Example calculations using this method are shown in Table 3. The results using the present value method (Table 1) and next payment factor methods (Table 3) differ by only a few cents and that difference is due to rounding.

Table 2. Factors for Estimating Principal Due in Next 12 Months From Principal Due Next Month

Interest Rate (Percent)	Next Payment Factor	Interest Rate (Percent)	Next Payment Factor
5.0	12.28	12.0	12.68
5.5	12.31	12.5	12.71
6.0	12.34	13.0	12.74
6.5	12.36	13.5	12.77
7.0	12.39	14.0	12.80
7.5	12.42	14.5	12.83
8.0	12.45	15.0	12.86
8.5	12.48	15.5	12.89
9.0	12.51	16.0	12.92
9.5	12.54	16.5	12.95
10.0	12.57	17.0	12.98
10.5	12.59	17.5	13.01
11.0	12.62	18.0	13.04
11.5	12.65	18.5	13.07

Next payment factors are independent of the original term of the loan and the number of payments remaining. They are also correct for partially amortized loans or cases where the payments to be made exceed those necessary to exactly amortize the loan. For example, a 25 year loan at 14 percent interest would require payments of $12.04 per thousand dollars loaned if exactly amortized. The first month principal paid would be $0.37 and the principal repaid in the first year would be 12.8 times that amount.

However, if the payments actually made were $11.75 or $12.50, the amounts of principal repaid in the first payment would be $0.08 and $0.83 respectively, but the principal repaid in the next 12 months would still be 12.8 times these amounts.

Table 3. Example Using Next Payment Factor Method

Loan Information:	Principal Outstanding	$20,000
	Monthly Payment	444.89
	Annual Interest Rate	12%
Calculations:	Next Monthly Payment	$ 444.89
	Next Month Interest	200.00
	Principal Repaid	$ 244.89
	Next Payment Factor (12%)	12.68
	Principal Due in Next 12 Months	$3,105.21

Quick and Dirty

Close examination of Table 2 indicates that the correct factors for most loans made within the current interest rate environment are close to 12.7. For expediency, lenders might encourage their loan officers and farmer borrowers to use a next payment factor of 12.7 for all loans. This might be referred to as the "rule of 12.7". Some error will exist for most loans. Principal due in the next 12 months will be slightly overestimated with rates at or below 12 percent and under estimated for loans with rates at or above 12.5 percent. However, since the total liability will be included on the balance sheet, the error may not be sufficient to result in a materially inaccurate balance sheet for most situations. For our example, employing this rule would imply a principal due within the next 12 months of $3,110 ($244.89 x 12.7).

Lenders desiring somewhat greater accuracy could use a "modified rule of 12.7". This would involve using 12.7 unless the rate was above 13 percent (then use 12.8) or below 12 percent (then use 12.6). This would provide quite close estimates for rates from nine to 15 percent. It is, however, somewhat more complex than the "rule of 12.7".

Brute Force

If you have incomplete information or a loan that is not exactly amortized and you want accurate information, you can always resort to brute force. That is, calculate the principal that will be repaid for each of the next 12 months. This procedure will work for cases where the amount of the payment is uneven, the interest rate changes, payments are skipped, etc. It also can be used by those who prefer to avoid present value or can not remember 12.7! This approach can easily be accomplished on a computer spreadsheet, setup for this purpose, but will still take some time. A table like Table 4 can be used. Totalling all three of the columns on the right hand side of the table allows you to check your arithmetic.

Table 4. Direct Calculation of Principal Paid

Month	Remaining Principal	Monthly Payment		Interest		Principal Paid
1	$20,000.00	$444.89		$200.00		$244.89
2	19,755.11	444.89		197.55		247.34
3	19,507.77	444.89		195.08		249.81
4	19,257.96	444.89		192.58		252.31
5	19,005.65	444.89		190.06		254.83
6	18,750.82	444.89		187.51		257.38
7	18,493.44	444.89		184.93		259.96
8	18,233.48	444.89		182.33		262.56
9	17,970.92	444.89		179.71		265.18
10	17.705.74	444.89		177.06		267.83
11	17,437.91	444.89		174.38		270.51
12	17,167.40	444.89		171.67		273.22
	$16,894.18	$5,338.68	(-)	$2,232.86	(=)	$3,105.82

Concluding Comments

Calculating the principal due within the next 12 months does make balance sheet preparation more complicated for monthly payment loans. However, there are a number of calculating or estimating methods that can be used. Once a lender decides which ones to use and gets comfortable with them, the added effort should be minimal.

Other Agricultural Economics Extension Publications

No. 90-21	Cornell Cooperative Extension Farm Business Management Program Guidelines Suggestions, and Resources	Stuart F. Smith Wayne A. Knoblauch Gerald B. White
No. 90-22	Fruit Farm Business Summary, Lake Ontario Region, New York, 1989	Darwin P. Snyder Alison M. DeMarree
No. 90-23	Poultry Farm Business Summary, New York 1989	Darwin P. Snyder Stewart Ackerman Kristen Park
No. 90-24	1989 New York Beef Cow-Calf Farm Business Summary	C. N. Rasmussen Stuart F. Smith Danny G. Fox
No. 90-25	Employee Recruitment and Selection Teaching Manual	Thomas Maloney Joann Gruttadaurio Walter Nelson Kristen Park Joan Petzen Alan White
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No. 90-29	Changes in the New York State Farm Minimum Wage Law	Thomas R. Maloney Kay Embrey
No. 90-30	New York Economic Handbook 1991 Agricultural Situation and Outlook	Extension Staff