

# Loan Comparison

**With this program, the user can compare two loan alternatives or evaluate the potential refinancing of an existing loan.**

Loans may differ in their interest rates, fees, payment schedules, variable-rate features, and other terms. This program assists the user in choosing the best loan alternative.

How two loans compare often depends upon the time horizon of the user. One loan may have lower up-front fees, but higher interest costs over time. A comparison of the after-tax cash flows is used to rank two loan alternatives.

## **Program Navigation**

The program contains four main sections. To navigate among them, click  or click the tabs at the bottom of the program.

**Main Loan Compare** Provides an analysis of the loan data for the loans being compared. The loans are briefly described and then evaluated. The refinancing of an existing loan option also can be evaluated.

**Alternative 1** Provides detailed cash-flow and present-value analysis for the first loan alternative.

**Alternative 2** Provides detailed cash-flow and present-value analysis for the second loan alternative.

**Summary** Allows the two loans to be compared side-by-side to assist the user in determining which loan is better for his/her situation and time horizon.



## **Main Loan Compare**

This section contains a menu on the left side and a loan summary on the right. The loan summary contains two graphs that allow the user to analyze two loans. Calculations are made using the yearly net present values (NPV) for the loan alternatives. A higher NPV means higher costs more over the lifetime of the loan.

**Net Present Value** The sum of the future cash flows for the principal and interest payments adjusted to reflect their value today. This adjusted number, the NPV, reflects the current value of future cash outflows accounting for the time value of money. For instance, a dollar that a borrower pays back in five years is worth less than the dollar he or she borrowed today. In the same way, a dollar paid back in 15 years is worth less in today's dollars than a dollar to be paid back in 5 years.

The following menu section offers these choices:

A screenshot of the FAST menu interface. It features a vertical stack of four elements: a button labeled "Compare Two Loans", a button labeled "Evaluate Refinancing", a drop-down menu with the text "-Select Report to Print" and a downward arrow, and another drop-down menu with the text "-Select Report to View" and a downward arrow.

**Compare Two Loans** Enter interest rate, length and fee information about the two loans being compared.

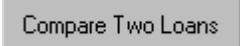
**Evaluate Refinancing** Enter loan information for the current loan and a potential new loan.

**Select report to print** Chose the section that you would like to print from the drop-down box.

**Select report to view** Chose the output report to print from the drop-down box.

## **Compare Two Loans**

Enter the loan information for the two loans being considered. The information needed to complete this section is: loan terms, interest rate terms, fees and costs of both loans, marginal tax rate, discount rate, and the evaluation horizon.

In the above example, click on . A menu like that shown on the next page appears with the tabs: "Variable-Rate Terms," "Loan Terms," and "Fees & Costs." The calculation area at the top of the menu determines the effective interest rate for each loan and the NPV difference. Another input area at the bottom of the menu offers the "Marginal Tax Rate", "Discount Rate" and the "Evaluation Horizon."

The “Effective Rate” section of the menu at right shows the effective before- and after-tax interest rates for each loan. The effective rate takes into account all loan fees and differences in compounding; it helps calculate the true cost of each loan alternative. For example, the before-tax rate on “Loan 1” shows an interest rate of 8.46%. The after-tax interest rate is 5.88%.

The difference between the net present values of the two loans over the selected time horizon is also shown in the column of the preferred loan. For example, in the screen on the right, “Farmers National Bank” (“Loan 2”) is preferred over “Loan 1” by \$13,908.10.

“Marginal Tax Rate,” located in the bottom section of the example, is the income tax rate for the user’s next dollar of income and includes income and Social Security taxes. The before-tax “Discount Rate” is the opportunity cost of money. For operations with

debt, the “Discount Rate” may be a blend of debt costs and equity capital. For farms with no debt, it may be the return of off-farm investments (CD rate). “Evaluation Horizon” is the number of years the user chooses to analyze the financial implications of the investment. For example, the user may have a 4-year loan, but choose to see the cash flows over a 5-year time span. To do this, the

user enters a “5” for the “Evaluation Horizon” (years) into the box or clicks arrows below the box to raise or lower the number.

**Variable-Rate Terms** Enter interest rate information for the two loans in this tab as shown in the menu on the left.

Check whether each loan has a fixed or variable interest rate. If “Variable Rate”

is chosen, the following information will be **required**:

**Number of Periods Before Next Adjustment** Refers to the number of payment periods before the first interest rate adjustment is made.

**Number of Periods Between Adjustments** Gives the number of payment periods between interest rate adjustments.

**Maximum Adjustment per Period** If applicable, gives the maximum interest rate change that can occur in an adjustment period.

**Lifetime Rate Caps** Gives the minimum and maximum interest rates for a particular loan, if applicable. These rates serve as boundaries for the interest rate scale used with that particular loan. For example, a borrower may be charged between 4% and 13% interest for a particular loan. The rates will not go above or below this range.

**Future Interest Rate Environment** Allows two loans to be compared in an increasing or decreasing interest rate environment as entered in “Per-Period Interest Rate Change.” For example, if 0.01 is input, the interest rate for each variable-rate loan will increase by 1% at each adjustment period until the maximum or minimum cap is reached.

### Loan Terms

In this menu section, the user will identify the loans being compared (“Loan Name”) as well as enter the “Loan Amount,” “Interest Rate,” “Years to Maturity,” and “Payments Per Year.” The “Payments Per Year” drop-down box allows the user to select how many payments are due each year: 1, 2, 3, 4, 6, or 12 payments per year.

As inputs are entered, the “Payment/Period” for each loan is calculated. This comparison shows how each loan will affect the user’s cash flows.

	Loan 1	Loan 2
Loan 1 Name	Farmers State Bank	
Loan 2 Name	Farmers National Bank	
Loan Amount	382500	382500
Interest Rate	0.075	0.0725
Years to Maturity	15	15
Payments Per Year	1	4
Payment/period	43332.37	10509.94
First Period Interest	Red: Indicates entry is different from default value	
	default	default

The program calculates “First Period Interest” for each loan as a *default*. However, no interest may be due in the first period, or the user may choose to make an additional payment on the interest section of the loan at this time. To

change the amount of first period interest (different from default), enter the new amount of first period interest.

### Fees & Costs

For each loan, the “Deductible First Year,” “Deductible Amortized,” and “Nondeductible” points and fees are required.

#### Deductible First Year

The points and fees considered tax-deductible in year 1 including interest and real estate taxes.

#### Deductible Amortized

These fees and costs are partially deductible in each period of the investment life. The amount deductible each year is the total cost of the loan’s fees or points is

equally divided among the numbers of years in the loan’s life. For example, a deductible fee of \$1,000 amortized over a 5-year loan would allow a \$200 deduction each year for 5 years, rather than a \$1,000 deduction in year 1. Amortized fees and costs may include: attorney fees for obtaining a mortgage, closing costs, loan origination fees and points, and a loan processing fee.

#### Nondeductible

Points and fees that are *not* tax-deductible but may increase the basis of the

Variable Rate Terms   Loan Terms   Fees & Costs			
Fees & Costs Loan 1			
Deductible	Points	\$ Fees	Total Fees
First Year	0	1000	1000
Amortized	0.125	0	478.125
<b>Nondeductible</b>			
	0	200	200

Fees & Costs Loan 2			
Deductible	Points	\$ Fees	Total Fees
First Year	0	2500	2500
Amortized	0.5	0	1912.5
<b>Nondeductible</b>			
	0	500	500

asset being purchased. Nondeductible fees may include: attorney’s fees incurred when obtaining property, commissions, and tax-related fees such as state stamp tax, transfer taxes, and tax service fees.

After entering all information for the two loans, click .

**Evaluate Refinancing** This section helps the user decide if an existing loan should be refinanced. Enter information about the current loan in the “Current Loan” menu.

Variable Rate Terms	
Current Loan	Fees & Costs
<p><b>Enter known terms</b>  <b>Click Solve to calculate unknown term</b></p>	
Current Loan Balance	<input type="text" value="315000"/> <input type="button" value="Solve"/>
Interest Rate	<input type="text" value="0.075"/> <input type="button" value="Solve"/>
Payments Per Year	<input type="text" value="1"/> <input type="button" value="Solve"/>
Years Remaining	<input type="text" value="15"/> <input type="button" value="Solve"/>
Payment/Period	<input type="text" value="35685.48"/> <input type="button" value="Solve"/>

For the current loan, enter three of the following four items: “Current Loan Balance,” “Interest Rate,” number of “Years Remaining” on the loan, and the “Payment Per Period.” Select the number of “Payments Per Year” from the drop-down menu.

Use the **Solve** buttons next to the inputs to calculate for one unknown variable. Of the five variables, four must be filled in.

**Variable-Rate Terms/Loan Terms/Fees & Costs**

This input is the same as that in **Compare Two Loans**. Refer to those sections if menu questions exist. In some instances, a user will not need to input all of the information for his/her current loan. For example, there are no closing fees for a current loan since those costs already have been paid.

**Alternative 1/Alternative 2**

The Alternative 1 and Alternative 2 reports summarize the inputs and cash-flow reports for the loan.

The top of these two pages shows details the loan data entered in either the Compare Two Loans or Evaluate Refinancing menus. The following report includes a break down of each loan payment:

<b>Print Table</b>		<b>Loan: Farmers State Bank</b>											
<b>Return to Main</b>		Initial principal balance \$ 382,500				Annual interest rate 7.50%				Minimum Rate 0.04			
		Payments per year (1,2,3,4,6, or 12) 1				Years to maturity (1 to 30) 15				Maximum Rate 0.13			
		Loan Cost & Fees Amortized Year 1				Deductible \$ 478.13 \$ 1,000.00				Next adjustment period 1			
		Nondeductible ***** \$ 200.00				First period interest 28,687.50				Periods between adjustments 2			
										Maximum adjustment per period 0.005			
										Interest change per period 0.01			
		<b>Lifetime Interest Paid 302,732.26</b>											
Annual Interest Rate	Change Period	Period	Year	Initial Balance	Total Payment	Interest	Principal	Ending Balance	Deductible Costs	First Year Nondeductible Costs	After Tax Cash Out Flow	Present Value	
7.50%	0	0	0	382,500.00	\$43,332.37	28,687.50	\$14,644.87	367,855.13	\$ 1,000.00	\$ 678.13	\$ 1,368.13	\$ 1,368.13	
7.50%	1	1	1	367,855.13	43,332.37	27,589.13	15,743.24	352,111.89	31.88		34,429.36	32,328.04	
8.00%	1	3	3	352,111.89	44,687.30	28,168.95	16,518.35	335,593.55	31.88		35,945.04	29,757.07	
8.00%	1	4	4	335,593.55	44,687.30	26,847.48	17,839.82	317,753.73	31.88		36,354.70	28,259.35	
8.50%	1	5	5	317,753.73	46,060.83	27,009.07	19,051.76	298,701.97	31.88		37,678.14	27,500.55	
8.50%	1	6	6	298,701.97	46,060.83	25,389.67	20,671.16	278,030.80	31.88		38,180.15	26,166.16	
9.00%	1	7	7	278,030.80	47,452.52	25,022.77	22,429.75	255,601.06	31.88		39,685.58	25,537.92	
9.00%	1	8	8	255,601.06	47,452.52	23,004.10	24,448.42	231,152.63	31.88		40,311.37	24,357.39	
9.50%	1	9	9	231,152.63	48,861.96	21,959.50	26,902.46	204,250.17	31.88		42,044.63	23,854.16	
9.50%	1	10	10	204,250.17	48,861.96	19,403.77	29,458.19	174,791.98	31.88		42,836.91	22,820.34	
10.00%	1	11	11	174,791.98	50,288.72	17,479.20	32,809.52	141,982.46	31.88		44,860.29	22,439.66	
10.00%	1	12	12	141,982.46	50,288.72	14,198.25	36,090.47	105,891.98	31.88		45,877.38	21,547.82	
10.50%	1	13	13	105,891.98	51,732.36	11,118.66	40,613.70	65,278.28	31.88		48,275.69	21,290.39	
10.50%	1	14	14	65,278.28	51,732.36	6,854.22	44,878.14	20,400.14	31.88		49,597.67	20,538.41	
11.00%	1	15	15	20,400.14	22,644.15	2,244.02	20,400.14		31.88		21,938.63	8,530.32	

The last column on the right displays the value in today’s dollars of the total cash outflow for each loan payment. This includes the principal repayment, interest expense, income tax reductions, and closing costs.

## Summary

The Input Summary Comparison and Output Summary Comparison on the left side of this section provide a side-by-side summary of each loan's inputs and outputs.

### Input Summary Comparison

	Farmers State Bank	Farmers National Bank
Loan principal	382500	382500
Annual interest rate	7.50%	7.25%
Payments per year	1	4
Years to maturity	15	15
Marginal tax rate		0.31
Annual discount rate		0.065
Evaluation horizon (years)		15
<b>Deductible Loan Fees</b>		
First year	1000	2500
Amortized	478,125	1912.5
Nondeductible fees	200	500
Fixed/Variable	Variable	Fixed
<b>Variable Rate Parameters</b>		
Minimum rate	4.00%	NA
Maximum rate	13.00%	NA
Next adjustment period	1	NA
Periods between adjustments	2	NA
Maximum adjustment per period	0.50%	NA

### Output Summary Comparison

	Farmers State Bank	Farmers National Bank
Net present value outflows	366,951	353,043
Difference		13,908
Before Tax Effective Rate	8.46%	7.67%
After Tax Effective Rate	5.88%	5.25%

### Input Summary Comparison

Displays the inputs for each loan. The "Annual Interest Rate," "Payments Per Year," "Deductible Loan Fees," and "Variable-Rate Parameters" differ for each loan as shown in the table above.

## **Output Summary Comparison**

Provides the four measures explained below:

**Net Present Value Outflows** The value, in today's dollar, of the sum of cash outflows over the length of the loan. When the principal repayment and interest payments made over time are adjusted for the time value of money, the Farmers State Bank loan (Loan 1) costs \$366,951. However, the Farmers National Bank loan (Loan 2) costs only \$353,043 in today's dollars. It is the preferred loan.

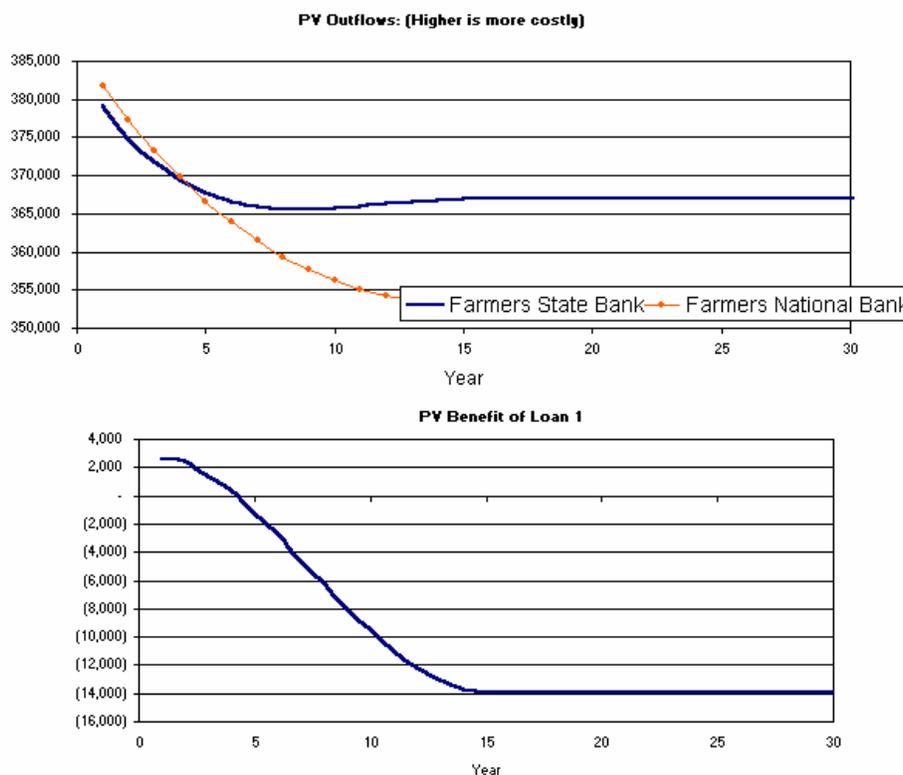
**Difference** The difference in net present value (NPV) between the two loans. It appears under the loan with the lowest, and hence preferred, NPV. The difference is \$13,908, and the preferred loan is from Farmers National Bank.

**Before-Tax Effective Rate** and **After-Tax Effective Rate** The costs of the loans after accounting for all fees, costs, and taxes. "Before-Tax Effective Rate" represents the interest rate paid after including fees and costs. The "After-Tax Effective Rate" represents the actual interest rate paid after taxes are included. This rate is lower because the interest paid offsets taxable income. In the example, the banks have a difference of 0.79% in the before-tax effective rates and 0.63% difference in the after-tax effective rate.

The two graphs in this section (as shown on the next page) are similar to the graphs in the **Main Loan Compare** report. The top graph shows the present value of the outflows for each loan. The higher a line, the higher the cost of the loan. The preferred loan is represented by the lower of the two lines. The bottom graph shows the present value of "Loan 1" versus "Loan 2." When the line is above zero, "Loan 1" is the preferred loan. When the line falls below zero, "Loan 2" is preferred.

In the example on the next page, the Farmers National Bank ("Loan 2") is the preferred loan by a net present value difference of \$13,908.08.

The preferred loan for the 15 year evaluation horizon is Farmers National Bank. The difference in net present values between the loans over the horizon is \$13,908.08.



The loan from Farmers State Bank (“Loan 1”) is preferred for the first 5 years, while the loan from Farmers National Bank (“Loan 2”) is preferred from 5 years on. If the user plans to repay the loan in 4.5 years, the Farmers State Bank loan is the better choice. However, if the user plans to repay the loan in 8 years, the Farmer’s National Bank loan is preferable.

The bottom graph shows the “Present Value Benefit of Loan 1.” The line represents the Farmers State Bank (“Loan 1”) NPV with respect to the Farmers National Bank (“Loan 2”) NPV. When the line is above zero, “Loan 1” is preferred. However, when the line falls below zero, “Loan 2” is preferred. “Loan 1” is preferred in years 1 to 5; however, from year 5 to year 30, “Loan 2” is preferred. This is represented by Loan 1’s present value benefit turning negative. If you plan to pay the loan back in year 5, either loan can be chosen.

**Example**

John Smith is considering refinancing his current real estate loan. The loan balance is \$152,687.45. Its interest rate is fixed at 8.5%. Annual payments of \$19,542.00 are due January 15.

**Question 1:** What is the remaining length on the loan?

**Answer:** Enter inputs at the right in the “Current Loan” tab under the **Evaluate Refinancing** menu.

Press **Solve** next to the “Years Remaining” input box and the program calculates that 13.374 years remain on the existing loan.

**Question 2:** John is considering refinancing the loan with a new loan for \$153,000 has a 10-year term and amortization. The interest rate is fixed at 7% for the length of the loan. John also must pay a 1% closing fee in the first period and a ½% amortized closing fee. **What is the amount of the new loans’ semi-annual payments?**

**Answer:** Enter information in the menus below as shown. The program calculates a semi-annual payment of \$10,765.24.

Fees & Costs Loan 2				
	Deductible	Points	\$ Fees	Total Fees
First Year	1		0	1530
Amortized	0.5		0	765
<b>Nondeductible</b>				
	0			0

**Question 3:** Should John refinance if his evaluation horizon is 12 years, his discount rate is 6% and his marginal tax rate is 29%? What is the after-tax effective rate for the preferred loan?

**Answer:** John should refinance if he plans to continue the loan longer than two years. If he plans to pay the loan off within two years, he should continue with the current loan (“Loan 1”). The new loan proposal (“Loan 2”) will save \$5,940.20 during the life of the loan. The “Effective Before-Tax Rate” for the new loan is 7.47%. The graphs below show that the current loan has a higher present value of cash outflows after the second year.

Evaluate Refinancing		
Effective Rate	Loan 1	Loan 2
Before Tax	0.085	0.0747
After Tax	0.0629	0.05492
Net Present Value Preference		
New proposal		5940.2

**The preferred loan for the 14 year evaluation horizon is New proposal. The difference in net present values between the loans over the horizon is \$5,940.22.**

Prior to 2 years, Current is the preferred loan. New proposal is preferred when the evaluation horizon is greater than or equal to 2 years

