



Current Report

Cooperative Extension Service • Division of Agriculture • Oklahoma State University

Programmable Calculator
DECISION MAKER SERIES

AGRICULTURAL LOAN ANALYSIS

Francis Epplin and John Ikerd
Agricultural Economists

Few businesses can operate in today's economy without borrowed capital. Farming and ranching are no exceptions. Borrowed capital is routinely used to finance production expenses as well as major purchases of farm equipment or land. Terms of agricultural loans are highly variable. Interest rates, length of repayment periods and frequency of payments are important credit factors. And, differences in these terms of credit can have a major impact on cash flow needs and financial risk or leverage of a farming or ranching operation.

Financing or loan decisions should be made following a logical decision making process. First it is important to determine that the loan can be practical from an economic standpoint. Is there a good chance that the operation being financed with the loan will repay more than the loan amount, plus interest, at the loan due date? Is adequate equity available to withstand an adverse outcome of the enterprise being financed with the loan? In other words is there a sound objective basis for borrowing the money in the first place?

Next, the borrower will need to evaluate alternative sources of credit and types of loans. A loan with the lowest interest rate is not necessarily the best loan. Timing and frequency of payments may be just as important as interest rates. Such considerations raise the questions of impact on length of repayment period on payment amounts, as well as the impact of frequency of payments and length of repayment period on total loan cost. Only after these factors have been analyzed is the borrower in a position to make a sound borrowing decision.

Lenders have used published tables in the past and use various types of computers and calculators at present to analyze loans and compute repayment schedules. Today, inexpensive calculators allow the borrower to have access to the same detailed information. Programmable

Calculators can provide farmers and ranchers instant analyses of prospective loan alternatives and provide an avenue to better loan decisions.

The following loan analysis program is designed for use on a Texas Instruments TI-59 calculator with printer. It will calculate the payment per period of an equal payment loan. It will also calculate the amount of principal and interest of a payment and the principal remaining after each payment.

Input required

	STORAGE REGISTER	LABELS
1. annual rate of interest (%+100)	01	APR
2. payments per year (number)	02	PD/Y
3. years of loan (\$)	03	YRS
4. amount of loan (\$)	04	LOAN

Output

Option A of the program will print the inputs with labels. It will compute and print the total number of payment periods (PRDS) and the total payment per period (PAY).

Option B will compute and print a payment schedule. The schedule includes the payment number (PYMT), amount of principal included in the payment (PRIN), amount of interest included in the payment (INT), and the balance of the loan after the payment is made (RBAL).

Example

Input		Keys Pressed
interest rate (%+100)	APR	.15 STO 01
payments per year (no.)	PD/Y	2 STO 02
years of loan (no.)	YRS	3 STO 03
amount of loan (\$)	LOAN	50000 STO 04

Output A: Press A

			5.00	PYMT
LOAN?			9217.73	PRIN
			1434.51	INT
			9909.06	RBAL
0.15	APR			
2.	PD/Y			
3.	YRS			
6.	PRDS		6.00	PYMT
50000.	LOAN		9909.06	PRIN
10652.24	PAY		743.18	INT
			0.00	RBAL

Output B: Press B

1.00	PYMT
6902.24	PRIN
3750.00	INT
43097.76	RBAL
2.00	PYMT
7419.91	PRIN
3232.33	INT
35677.84	RBAL
3.00	PYMT
7976.41	PRIN
2675.84	INT
27701.44	RBAL
4.00	PYMT
8574.64	PRIN
2077.61	INT
19126.80	RBAL

Equations

$$PRDS = PD/Y \times YRS$$

$$i = \text{interest rate/period} = APR \div PD/Y$$

$$PAY = (i \times LOAN) \div (1 - (1 + i)^{-PRDS})$$

$$PRIN = PAY \times \frac{1 - (1 + i)^{-PRDS}}{i}$$

$$INT = PAY - PRIN$$

$$RBAL = LOAN - PRIN$$

Worksheet

Enter program and labels. Program may be stored in BANK 1, on card 1, side 1.
 Labels may be stored in BANK 3, on card 1, side 2. Only one card is needed.

Item	Units	Keys Pressed	Display	Your Values		
Annual Rate of Interest	%/100	.15 STO 01	0.15			
Payments per year	no.	2 STO 02	2.			
Years of Loan	Years	3 STO 03	3.			
Amount of Loan	\$	50000 STO 04	50000.			
Compute outputs						
Payment per period.	\$	A	10652.24			
Loan Schedule		B	1.			

Summary

The worksheet illustrates only one loan situation. Programmable calculators provide the decision maker with the analytical power to quickly analyze numerous alternatives. Thus, worksheet space is provided suggesting alternative loan arrangements. This allows borrowers to quickly evaluate repayment schedules with respect to time and frequency of payments and to evaluate the impact of alternative interests rates and loan amounts. It is necessary to enter numbers which represent realistic loan

alternatives. But the calculator does all the "pencil pushing" once the appropriate numbers have been entered.

There are no guarantees of the "best" decision. The borrower may not be aware of all possible alternatives or better terms may become available after a loan commitment has been made. But, the odds of a good decision may be greatly improved by evaluating all known logical alternatives at a given time. Programmable calculators make such evaluations practical and simple.

For general information on hand-held computers see OSU Fact Sheet 306 "Farm and Ranch Decisions Aided by Hand-Held Computers."

Program Listing

Store in BANK 1, on card 1, side 1.

000	76	LBL	054	06	06	108	11	11	162	69	DP	189	58	FIX
001	15	E	055	43	RCL	109	95	=	163	04	04	190	02	2
002	53	(	056	58	58	110	69	DP	164	43	RCL	191	69	DP
003	43	RCL	057	69	DP	111	06	06	165	03	03	192	06	06
004	14	14	058	04	04	112	43	RCL	166	69	DP	193	98	ADV
005	65	*	059	43	RCL	113	56	56	167	06	06	194	22	INV
006	43	RCL	060	19	19	114	69	DP	168	43	RCL	195	58	FIX
007	04	04	061	43	RCL	115	04	04	169	49	49	196	91	R/S
008	54	)	062	10	10	116	43	RCL	170	69	DP	197	76	LBL
009	55	+	063	65	*	117	12	12	171	04	04	198	14	D
010	53	(	064	53	(	118	69	DP	172	43	RCL	199	43	RCL
011	01	1	065	53	(	119	06	06	173	15	15	200	01	01
012	75	-	066	01	1	120	98	ADV	174	69	DP	201	55	+
013	53	(	067	85	+	121	01	1	175	06	06	202	43	RCL
014	01	1	068	43	RCL	122	44	SUM	176	43	RCL	203	02	02
015	85	+	069	14	14	123	19	19	177	55	55	204	95	=
016	43	RCL	070	54	)	124	97	DSZ	178	69	DP	205	42	STD
017	14	14	071	45	YX	125	09	9	179	04	04	206	14	14
018	54	)	072	43	RCL	126	17	B'	180	43	RCL	207	43	RCL
019	45	YX	073	15	15	127	22	INV	181	04	04	208	02	02
020	43	RCL	074	94	+/-	128	58	FIX	182	69	DP	209	65	*
021	15	15	075	54	)	129	91	R/S	183	06	06	210	43	RCL
022	94	+/-	076	45	YX	130	76	LBL	184	43	RCL	211	03	03
023	54	)	077	53	(	131	11	A	185	50	50	212	95	=
024	95	=	078	01	1	132	98	ADV	186	69	DP	213	42	STD
025	92	INV SBR	079	85	+	133	14	D	187	04	04	214	15	15
026	76	LBL	080	53	(	134	69	DP	188	15	E	215	92	INV SBR
027	12	B	081	53	(	135	00	00						
028	14	D	082	01	1	136	43	RCL						
029	15	E	083	75	-	137	51	51						
030	42	STD	084	43	RCL	138	69	DP						
031	10	10	085	19	19	139	01	01						
032	43	RCL	086	54	)	140	69	DP						
033	04	04	087	55	+	141	05	05						
034	42	STD	088	43	RCL	142	22	INV						
035	12	12	089	15	15	143	58	FIX						
036	43	RCL	090	54	)	144	43	RCL						
037	15	15	091	54	)	145	52	52						
038	42	STD	092	95	=	146	69	DP						
039	09	09	093	69	DP	147	04	04						
040	01	1	094	06	06	148	43	RCL						
041	42	STD	095	42	STD	149	01	01						
042	19	19	096	11	11	150	69	DP						
043	76	LBL	097	22	INV	151	06	06						
044	17	B'	098	44	SUM	152	43	RCL				33351636.		49
045	43	RCL	099	12	12	153	53	53				33134500.		50
046	59	59	100	43	RCL	154	69	DP				2732133171.		51
047	69	DP	101	57	57	155	04	04				13333500.		52
048	04	04	102	69	DP	156	43	RCL				33166345.		53
049	58	FIX	103	04	04	157	02	02				45353600.		54
050	02	2	104	43	RCL	158	69	DP				27321331.		55
051	43	RCL	105	10	10	159	06	06				1135141327.		56
052	19	19	106	75	-	160	43	RCL				1124313700.		57
053	69	DP	107	43	RCL	161	54	54				1133352431.		58
												1133453037.		59

Label Codes

Store in BANK 3,
on card 1, side 2.

<u>Code</u>	<u>Storage Register</u>
33351636.	49
33134500.	50
2732133171.	51
13333500.	52
33166345.	53
45353600.	54
27321331.	55
1135141327.	56
1124313700.	57
1133352431.	58
1133453037.	59

Oklahoma State Cooperative Extension Service does not discriminate because of race, color, or national origin in its programs and activities, and is an equal opportunity employer. Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Charles B. Browning, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agriculture and has been prepared and distributed at a cost of \$264.00 for 5,100 copies. 028375