

Financial Viability of Projects

Version 0.1.20

User Guide

November 10, 2009

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Introduction

The program Financial Viability of Projects (Finance software) works in all Windows Operating System and has no special requirements.

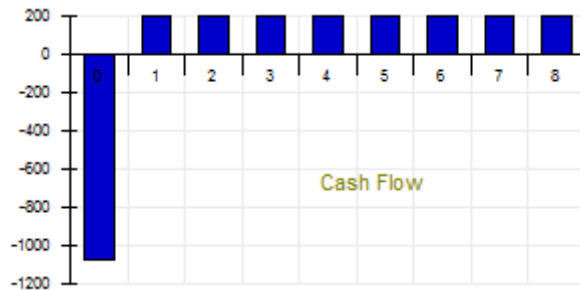
Please contact technical support if you encounter problems or have suggestions for improvement.

Finance uses compound interest at the end of the period and is able to analyze and calculate the following applications:

- a. Financial viability of individual projects,
- b. Mutually exclusive projects,
- c. Incremental cash flows,
- d. Time value of money and
- e. Amortization schedule for financing.

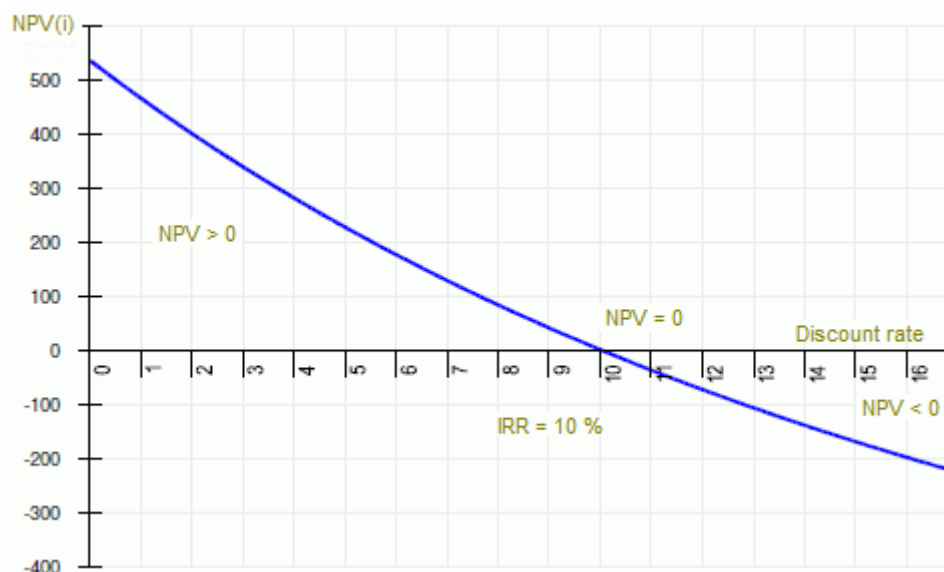
Basic Principles

Cash Flow → the cash flow (CF) is a representation for the investment (negative values for cash outflow) and revenues (positive values for cash inflow).



NPV → the net present value is the difference between the present value (PV) of the future cash flows and the initial investment of a project. NPV is an absolute measure of an investment's value.

IRR → the project's internal rate of return (IRR) is the discount rate (DR) that makes the net present value (NPV) of the project equal to zero.



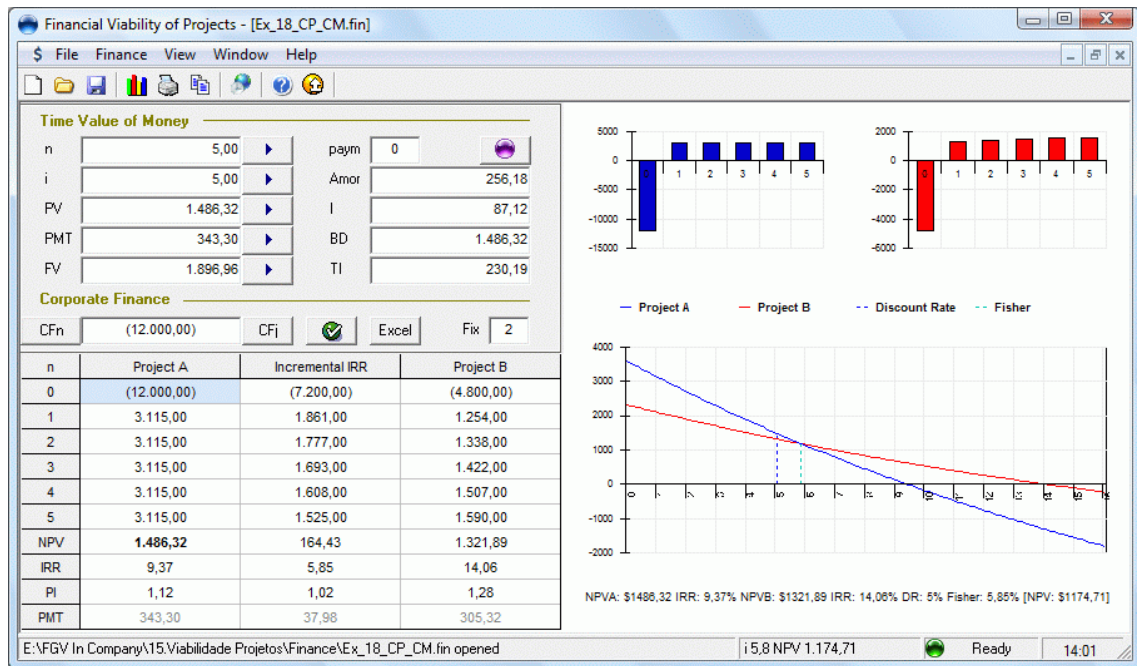
The discount rate (DR) is the cost of capital or minimal attractive rate of return (MARR).

PI → the profitability index is a benefit-to-cost ratio equal to the ratio of the present value (PV) of a project to its initial investment. PI is a relative measure of an investment's value and presents a project's benefits per dollar of investment.

PMT → is the equivalent uniform net benefit calculated in time value of money when the present value (PV) is equal to net present value (NPV).

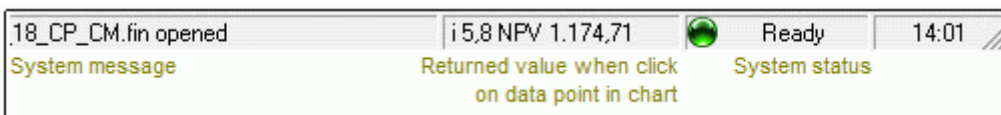
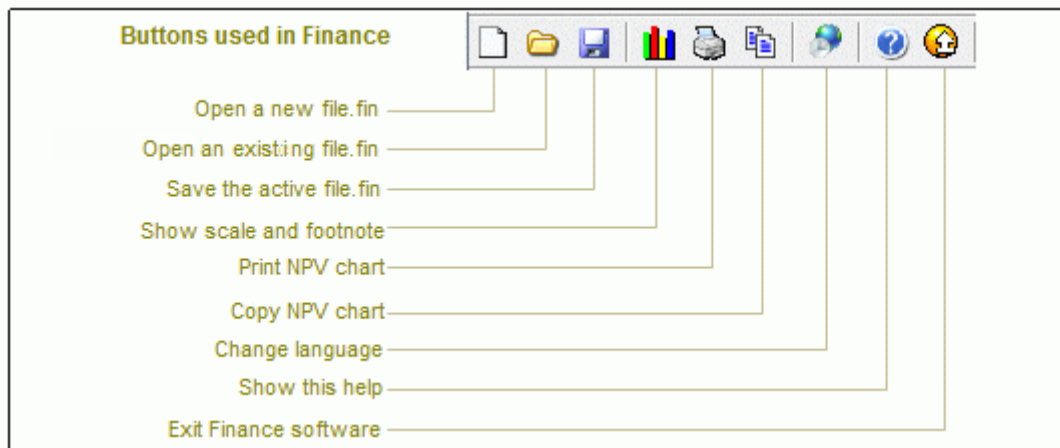
Overview

Financial Viability of Projects - Finance software



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The following illustrations identify features of Finance.



Panel of input data and other buttons

Time Value of Money

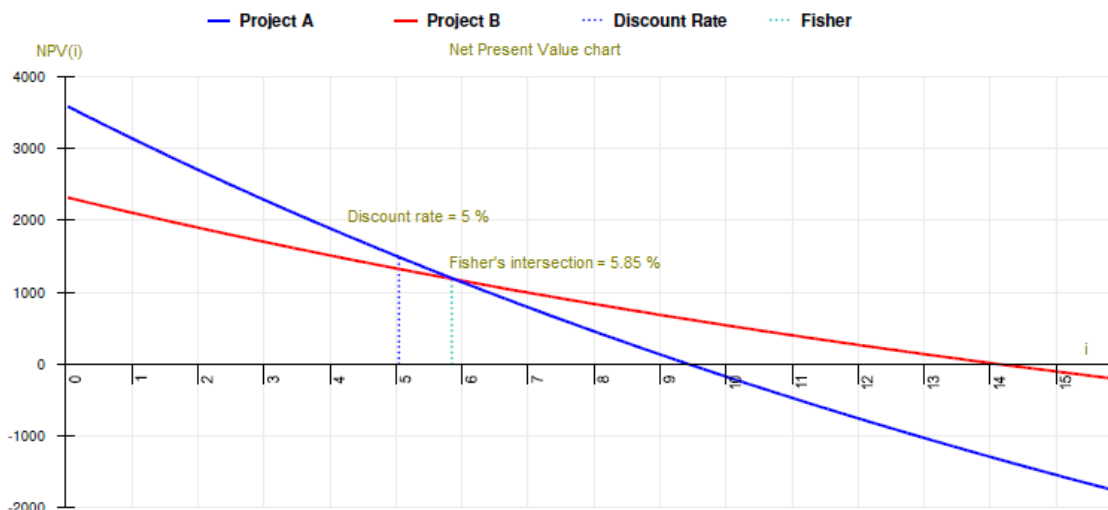
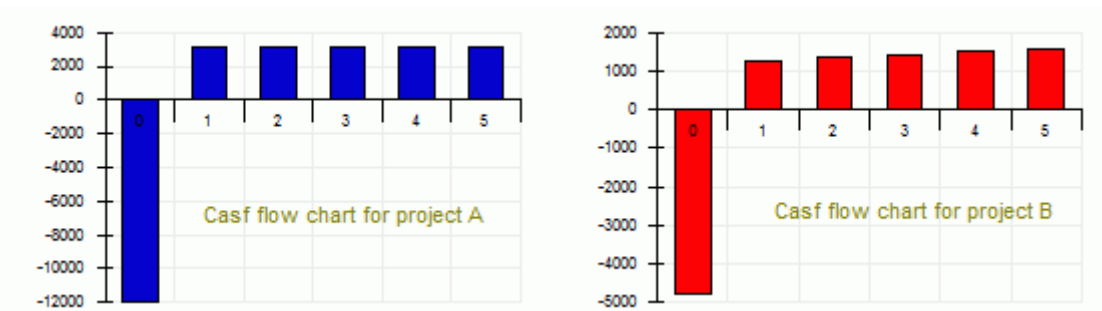
n	Number of periods	0,00	▶	paym	0	Paym number	⊗
i	Interest rate	0,00	▶	Amor	Amortization	0,00	
PV	Present value	0,00	▶	I	Interest	0,00	
PMT	Payment	0,00	▶	BD	Balance due	0,00	
FV	Future value	0,00	▶	TI	Total interest	0,00	

Corporate Finance Decimal places

CFn Cash flow input value CFj Excel Fix

n	Project A	Incremental IRR	Project B
0	-1200	Cash flow input value with Enter	
1	450		
2	450	Cash flow input value with Enter and fill repeat for selected cells	
3	450		
4			
NPV	Net present value		
IRR	Internal rate of return		
PI	Profitability index		
PMT	Uniform net benefit		

▶	--- Solve buttons
⊗	--- Amortization button
CFn	--- Cash flow number of periods button
CFj	--- Cash flow input button
⊗	--- Cash Analysis
Excel	--- Export values to Excel



NPVA: \$1486,32 IRR: 9,37% NPVB: \$1321,89 IRR: 14,06% DR: 5% Fisher: 5,85% (NPV: \$1174,71)

1. Financial viability of individual projects

Start Finance and type in these values

Time Value of Money

n	4	▶	paym	0	🎯
i	12	▶	Amor	0,00	
FV	0,00	▶	I	0,00	
PMT	0,00	▶	BD	0,00	
FV	0,00	▶	TI	0,00	

Corporate Finance

CFn CFj Excel Fix 2

n	Project A	Incremental IRR	Project B
0	(1.000,00)		
1	396,85		
2	200,00		
3	500,00		
4	500,00		
NPV			
IRR			
PI			
PMT			

n 4
i 12
CFn
-1000 Enter
396.85 Enter
200 Enter
Shift ↓
500 Enter

Then click on cash analysis button to obtain the results.

Time Value of Money

n	4,00	▶	paym	0	🎯
i	12,00	▶	Amor	35,01	
FV	187,42	▶	I	26,69	
PMT	61,70	▶	BD	187,42	
FV	294,91	▶	TI	59,40	

Corporate Finance

CFn (1.000,00) CFj Excel Fix 2

n	Project A	Incremental IRR	Project B
0	(1.000,00)	(1.000,00)	
1	396,85	396,85	
2	200,00	200,00	
3	500,00	500,00	
4	500,00	500,00	
NPV	187,42	187,42	
IRR	20,00	20,00	
PI	1,19	1,19	
PMT	61,70	61,70	

NPVA: \$187.42 IRR: 20% DR: 12% Fisher: 20% [NPV: \$0]

Hints:

1. Change **n** and press Enter is equivalent to click the button
2. Change **i** and press Enter is equivalent to click the button
3. Change **values** in grid and press Enter is equivalent to click the button

2. Investments with some negative cash flows

When negative cash flows occur, a project may have multiple IRRs or none at all. Open a new file and enter with these values:

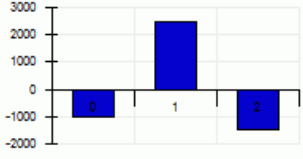
Time Value of Money

n	2	paym	0
i	40	Amor	0,00
FV	0,00	I	0,00
PMT	0,00	BD	0,00
FV	0,00	TI	0,00


Corporate Finance

CFn CFj Excel Fix

n	Project A	Incremental IRR	Project B
0	(1.000,00)		
1	2.450,00		
2	(1.470,00)		
NPV			
IRR			
PI			
PMT			



n 2
i 40
CFn
-1000 Enter
2450 Enter
-1470 Enter

Then click on cash analysis button 


Time Value of Money

n	2,00	paym	0
i	40,00	Amor	0,00
FV	0,00	I	0,00
PMT	0,00	BD	0,00
FV	0,00	TI	0,00

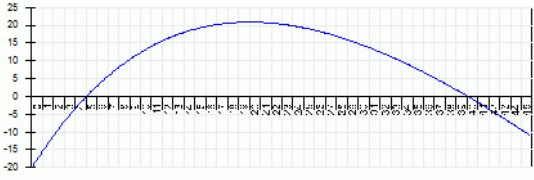
Corporate Finance

CFn CFj Excel Fix

n	Project A	Incremental IRR	Project B
0	(1.000,00)	(1.000,00)	
1	2.450,00	2.450,00	
2	(1.470,00)	(1.470,00)	
NPV	0,00	0,00	
IRR	5,00	5,00	
PI	1,00	1,00	
PMT	0,00	0,00	

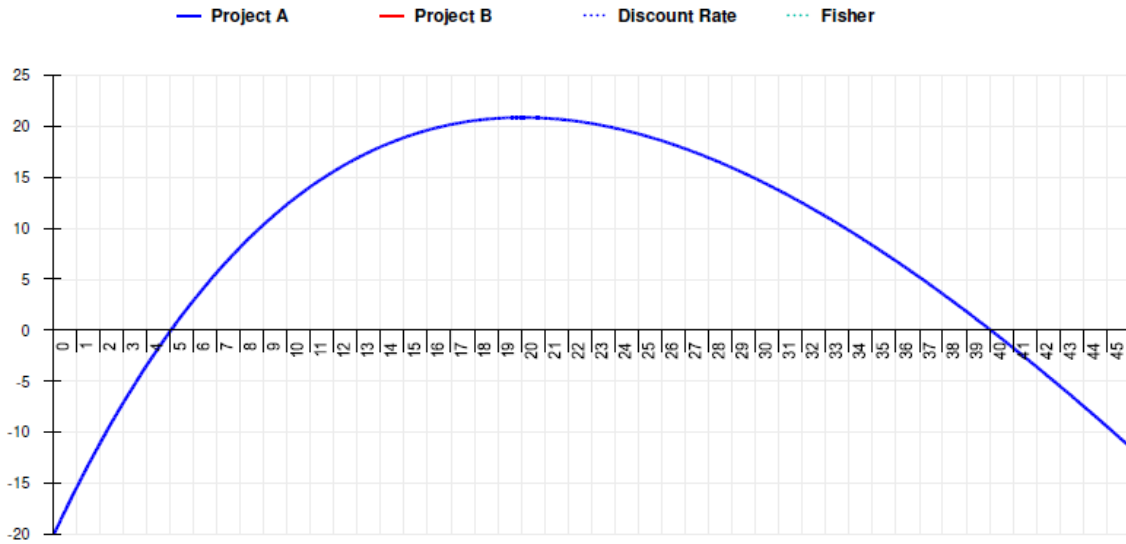


— Project A — Project B — Discount Rate — Fisher



NPVA: \$0 IRR: 5% DR: 40% Fisher: 5% [NPV: \$0]

The reason to use a high value for discount rate is to force Finance searches the other IRR of 40 %.



NPVA: \$0 IRR: 5% DR: 40% Fisher: 5% (NPV: \$0)

3. Mutually exclusive projects

Mutually exclusive projects means the acceptance of one excludes the acceptance of the other alternative project. This example uses different sized projects.

Time Value of Money

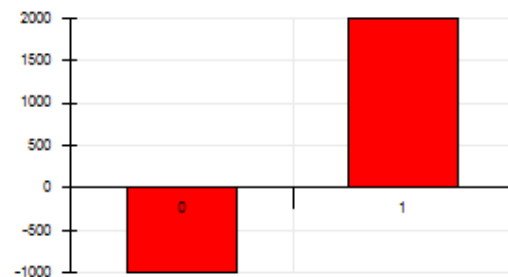
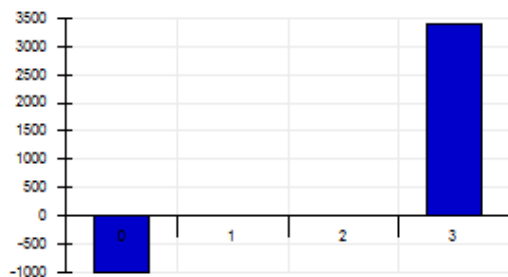
n	3,00	paym	0
i	10,00	Amor	421,78
PV	1.535,69	I	195,75
PMT	617,52	BD	1.535,69
FV	2.044,00	TI	316,88

Corporate Finance

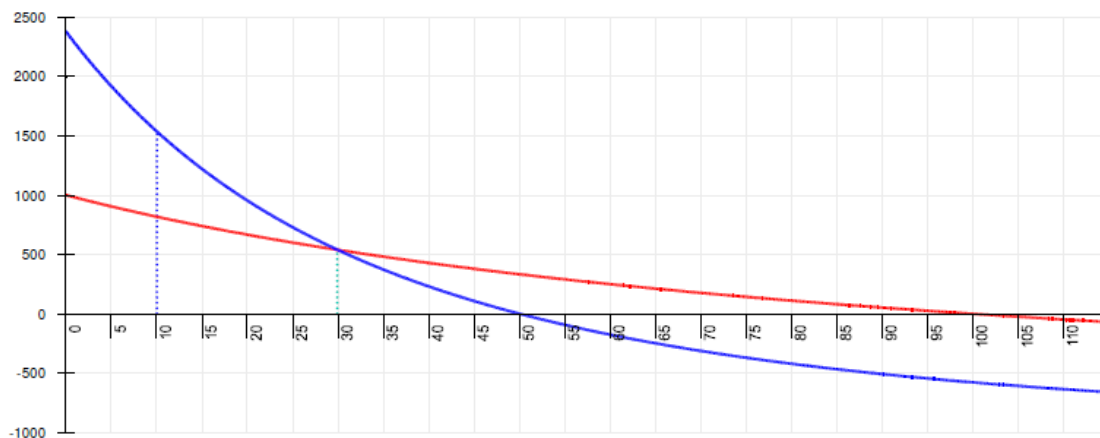
CFn (1.000,00) CFj Excel Fix 2

n	Project A	Incremental IRR	Project B
0	(1.000,00)	0,00	(1.000,00)
1	0,00	(2.000,00)	2.000,00
2	0,00	0,00	
3	3.375,00	3.375,00	
NPV	1.535,69	717,51	818,18
IRR	50,00	29,90	100,00
PI	2,54	1,82	1,82
PMT	617,52	288,52	900,00

The best project is shown in bold for the best evaluation criterion



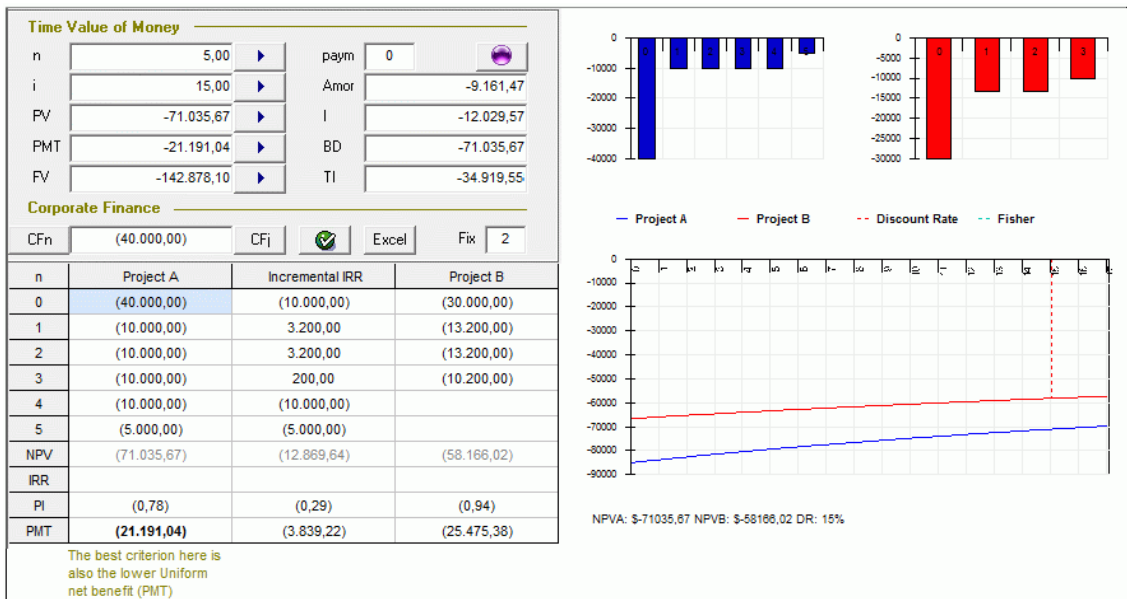
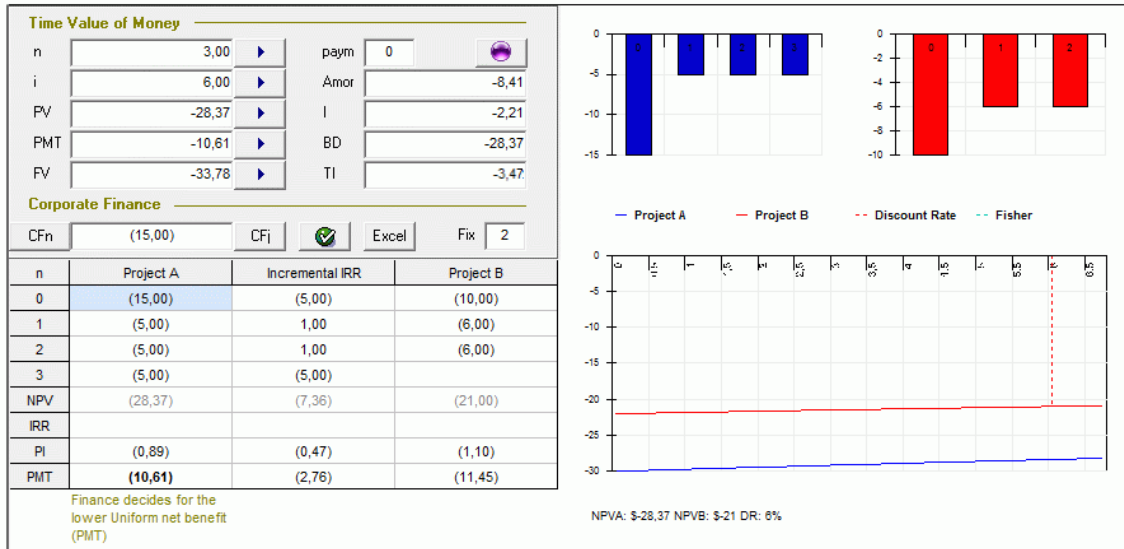
— Project A — Project B - - - Discount Rate - - - Fisher



NPVA: \$1535,69 IRR: 50% NPVB: \$818,18 IRR: 100% DR: 10% Fisher: 29,9% (NPV: \$539,6)

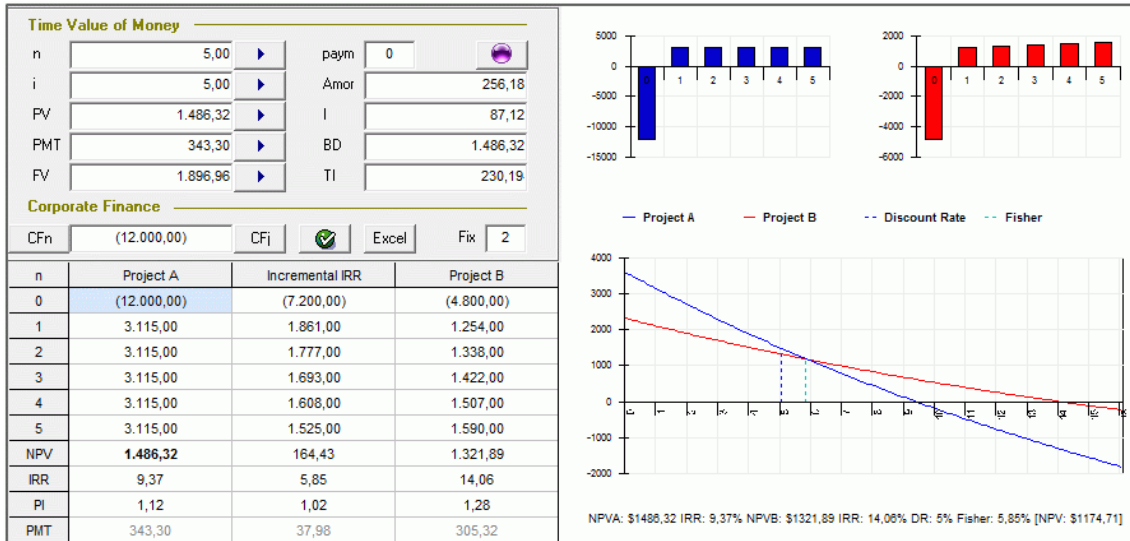
4. Decision for the best machine

The next 2 examples show a decision between a long-lived (A) and a short-lived (B) investment.



5. Incremental cash flows

Finance always calculates the incremental cash flow in order to determine the Fisher's IRR intersection, where both investments produce the same net present value, and to show the difference of net present value between the projects for the given discount rate.



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Click on [Excel](#) button to export all values of the grid to Excel including the fixed column and row.

	A	B	C	D	E
1	n	Project A	Incremental IRR	Project B	
2	0	-12.000,00	-7.200,00	-4.800,00	
3	1	3.115,00	1.861,00	1.254,00	
4	2	3.115,00	1.777,00	1.338,00	
5	3	3.115,00	1.693,00	1.422,00	
6	4	3.115,00	1.608,00	1.507,00	
7	5	3.115,00	1.525,00	1.590,00	
8	NPV	1.486,32	164,43	1.321,89	
9	IRR	9,37	5,85	14,06	
10	PI	1,12	1,02	1,28	
11	PMT	343,3	37,98	305,32	
12					

6. Time value of money

a. A domestic device that costs \$ 1,000.00 can be acquired with a rebate of 20% for payment in cash or in 5 monthly installments without accretion. The first installment must be paid at the purchase. What is the monthly interest rate inserted in the operation?

The PV is \$ 600.00 ($\$ 1,000.00 \times 80\% - \$ 200.00$) that must be paid in 4 installments of \$ 200.00. Open a new file and type in as following.

Time Value of Money					
n	4	▶	paym	0	
i	0,00	▶	Amor	0,00	
PV	600	▶	I	0,00	
PMT	200	▶	BD	0,00	
FV	0,00	▶	TI	0,00	

Then click on button solve for i

Time Value of Money					
n	4,00	▶	paym	0	
i	12,59	▶	Amor	0,00	
PV	600,00	▶	I	0,00	
PMT	200,00	▶	BD	0,00	
FV	0,00	▶	TI	0,00	

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Answer: The interest rate inserted in the operation is 12.59% per month.

Time Value of Money					
n	4	▶	paym	0	
i	12,5898324962991	▶	Amor	0	
PV	600	▶	I	0	
PMT	200	▶	BD	0	
FV	0	▶	TI	0	

Corporate Finance						
CFn		CFi		Excel	Fix	7

To see the answer with all decimal places available use 7 for fix.

b. A company must pay 5 and successive monthly installments of \$ 5,700.00, \$ 8,300.00, \$ 10,200.00, \$ 12,400.00 and \$ 15,900.00 maturing at the end of the next 5 months. This debt was against paying an interest rate of 2.5% per month. The company is seeking the bank to refinance this debt in 24 monthly installments, equal and successive. The bank accepts refinance charging an interest rate of 4% per month. Calculate the benefit of refinancing. Open a new file and type in as following.

Time Value of Money

n	5	▶	paym	0	▶
i	2,5	▶	Amor	0,00	▶
PV	0,00	▶	I	0,00	▶
PMT	0,00	▶	BD	0,00	▶
FV	0,00	▶	TI	0,00	▶

Corporate Finance

CFn CFj Excel Fix 2

n	Project A	Incremental IRR	Project B
0	0,00		
1	5.700,00		
2	8.300,00		
3	10.200,00		
4	12.400,00		
5	15.900,00		
NPV			
IRR			
PI			
PMT			

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Click on button cash analysis to calculate PV

Time Value of Money


n	5,00	▶	paym	0	▶
i	2,50	▶	Amor	8.949,92	▶
PV	48.219,82	▶	I	1.429,24	▶
PMT	10.379,16	▶	BD	48.219,82	▶
FV	54.556,30	▶	TI	3.676,00	▶

Corporate Finance

CFn 0,00 CFj Excel Fix 2


n	Project A	Incremental IRR	Project B
0	0,00	0,00	
1	5.700,00	5.700,00	
2	8.300,00	8.300,00	
3	10.200,00	10.200,00	
4	12.400,00	12.400,00	
5	15.900,00	15.900,00	
NPV	48.219,82	48.219,82	
IRR			
PI	0,00	0,00	
PMT	10.379,16	10.379,16	

Type in the new values for the refinancing as following

Time Value of Money					
n	24	▶	paym	0	
i	4	▶	Amor	8.949,92	
PV	48.219,82	▶	I	1.429,24	
PMT	0	▶	BD	48.219,82	
FV	0	▶	TI	3.676,00	

And click on button solve for PMT



Time Value of Money					
n	24,00	▶	paym	0	
i	4,00	▶	Amor	1.186,34	
PV	48.219,82	▶	I	1.976,25	
PMT	3.162,59	▶	BD	48.219,82	
FV	0,00	▶	TI	27.682,22	

Answer: The installment of refinancing is \$ 3,162.59

Now compare the equivalence without and with refinancing.

Before: 5 x \$ 10,379.16 @ 2.5% p.m. and total interest of \$ 3,676.00

Now: 24 x \$ 3,162.59 @ 4.0% p.m. and total interest of \$ 27,682.22

7. Amortization schedule for financing

Suppose a financing of a car with a loan of \$12000 at a monthly interest rate of 1% for two years, and make equal payments monthly. How much will payments have to be?

Here the parameters are $PV = \$12000$, interest rate $i = 1\%$, number of periods $n = 24$

Time Value of Money

n	24	▶	paym	0	▶
i	1	▶	Amor	0,00	▶
PV	12000	▶	I	0,00	▶
PMT	0,00	▶	BD	0,00	▶
FV	0,00	▶	TI	0,00	▶

Click on button  to see the amortization schedule for the loan.

Answer: The payment is \$ 564.88

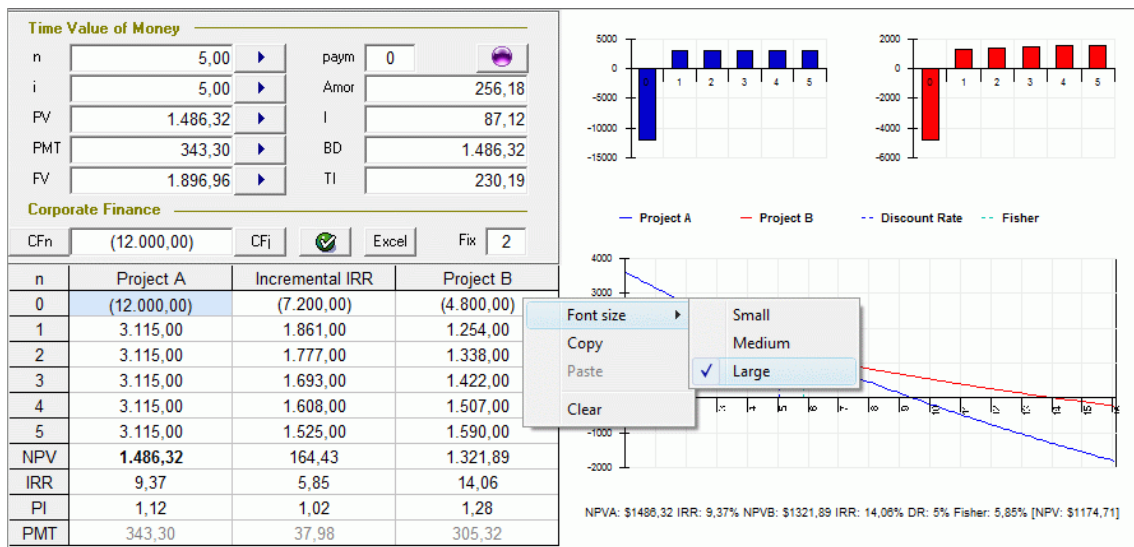
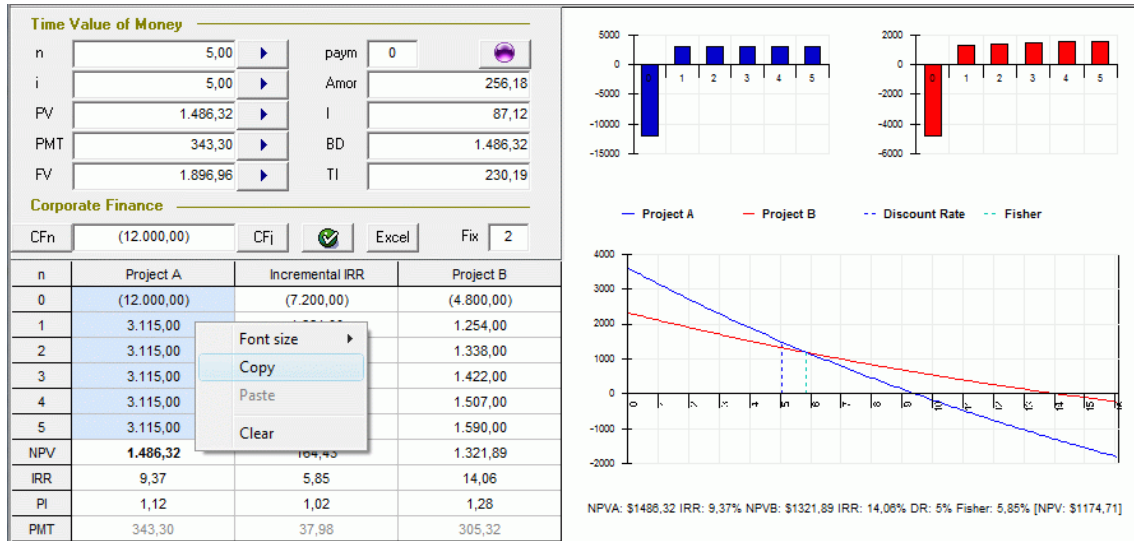
Time Value of Money				Paym	Amortization	Interest	Cum Amort	Cum Interest	Cum Payment	Balance Due	Excel	X
n	24,00	▶	paym	0								
i	1,00	▶	Amor	440,48								
PV	12.000,00	▶	I	124,40								
PMT	564,88	▶	BD	12.000,00								
FV	0,00	▶	TI	1.557,16								
Corporate Finance												
CFn		CFi	<input checked="" type="checkbox"/>	Excel								
				Fix	2							
n	Project A	Incremental IRR	Project B									
0												
NPV												
IRR												
PI												
PMT												
01				444,88	120,00	444,88	120,00	564,88	11.555,12			
02				449,33	115,55	894,21	235,55	1.129,76	11.105,79			
03				453,82	111,06	1.348,04	346,61	1.694,85	10.651,96			
04				458,36	106,52	1.806,40	453,13	2.259,53	10.193,60			
05				462,95	101,94	2.269,34	555,06	2.824,41	9.730,66			
06				467,58	97,31	2.736,92	652,37	3.389,29	9.263,08			
07				472,25	92,63	3.209,17	745,00	3.954,17	8.790,83			
08				476,97	87,91	3.686,14	832,91	4.519,05	8.313,86			
09				481,74	83,14	4.167,89	916,05	5.083,94	7.832,11			
10				486,56	78,32	4.654,45	994,37	5.648,82	7.345,55			
11				491,43	73,46	5.145,87	1.067,83	6.213,70	6.854,13			
12				496,34	68,54	5.642,21	1.136,37	6.778,58	6.357,79			
13				501,30	63,58	6.143,52	1.199,94	7.343,46	5.856,48			
14				506,32	58,56	6.649,83	1.258,51	7.908,34	5.350,17			
15				511,38	53,50	7.161,21	1.312,01	8.473,23	4.838,79			
16				516,49	48,39	7.677,71	1.360,40	9.038,11	4.322,29			
17				521,66	43,22	8.199,37	1.403,62	9.602,99	3.800,63			
18				526,88	38,01	8.726,24	1.441,63	10.167,87	3.273,76			
19				532,14	32,74	9.258,39	1.474,37	10.732,75	2.741,61			
20				537,47	27,42	9.795,85	1.501,78	11.297,63	2.204,15			
21				542,84	22,04	10.338,69	1.523,82	11.862,52	1.661,31			
22				548,27	16,61	10.886,96	1.540,44	12.427,40	1.113,04			
23				553,75	11,13	11.440,71	1.551,57	12.992,28	559,29			
24				559,29	5,59	12.000,00	1.557,16	13.557,16	0,00			


Click on column  to see the amortization schedule in Excel.

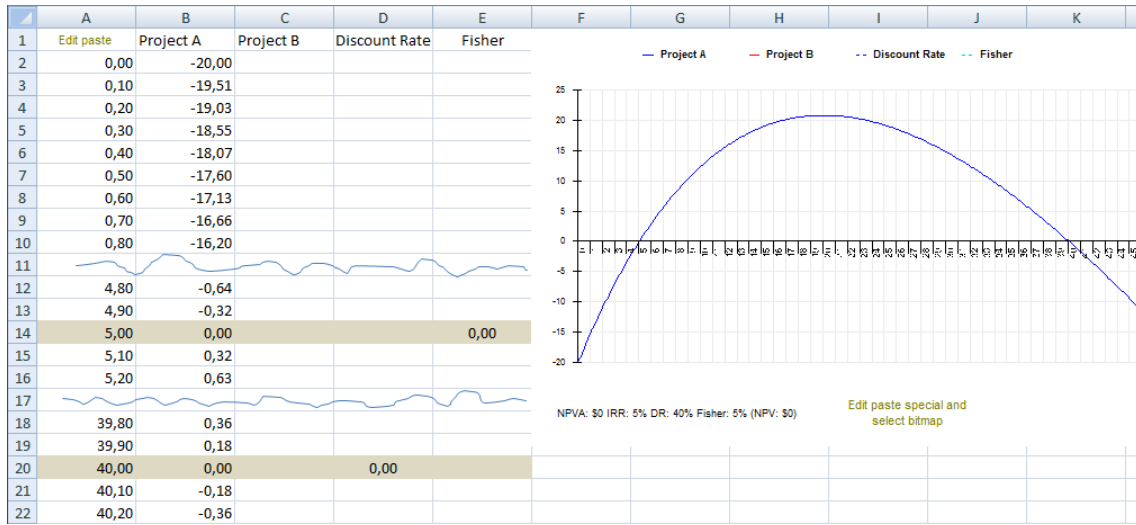
	A	B	C	D	E	F	G	H
1	Principal:	12.000,00						
2	Payments:	24						
3	Payment:	564,88						
4	Interest rate:	1%						
5	Total Repaid:	13.557,16						
6	Total Interest:	1.557,16						
7	Interest %:	12,98%						
8	Paym	Amortization	Interest	Cum Amort	Cum Interest	Cum Payment	Balance Due	
9	1	444,88	120,00	444,88	120,00	564,88	11555,12	
10	2	449,33	115,55	894,21	235,55	1129,76	11105,79	
11	3	453,82	111,06	1348,04	346,61	1694,65	10651,96	
12	4	458,36	106,52	1806,40	453,13	2259,53	10193,60	
13	5	462,95	101,94	2269,34	555,06	2824,41	9730,66	
14	6	467,58	97,31	2736,92	652,37	3389,29	9263,08	
15	7	472,25	92,63	3209,17	745,00	3954,17	8790,83	
16	8	476,97	87,91	3686,14	832,91	4519,05	8313,86	
17	9	481,74	83,14	4167,89	916,05	5083,94	7832,11	
18	10	486,56	78,32	4654,45	994,37	5648,82	7345,55	
19	11	491,43	73,46	5145,87	1067,83	6213,70	6854,13	
20	12	496,34	68,54	5642,21	1136,37	6778,58	6357,79	
21	13	501,30	63,58	6143,52	1199,94	7343,46	5856,48	
22	14	506,32	58,56	6649,83	1258,51	7908,34	5350,17	
23	15	511,38	53,50	7161,21	1312,01	8473,23	4838,79	
24	16	516,49	48,39	7677,71	1360,40	9038,11	4322,29	
25	17	521,66	43,22	8199,37	1403,62	9602,99	3800,63	
26	18	526,88	38,01	8726,24	1441,63	10167,87	3273,76	
27	19	532,14	32,74	9258,39	1474,37	10732,75	2741,61	
28	20	537,47	27,42	9795,85	1501,78	11297,63	2204,15	
29	21	542,84	22,04	10338,69	1523,82	11862,52	1661,31	
30	22	548,27	16,61	10886,96	1540,44	12427,40	1113,04	
31	23	553,75	11,13	11440,71	1551,57	12992,28	559,29	
32	24	559,29	5,59	12000,00	1557,16	13557,16	0,00	
33								

8. Other features of Finance

The right click on the mouse on grid is used to access some edit functions like Copy, Paste and Clear or also to change the font size of the values of Finance. The Paste function uses the clipboard values that were copied from grid or of other application.



The copy chart button  is used to copy all plotted values and the chart itself. You can then paste to Excel or any other Windows application.



Un-Installation

The program Finance can be un-installed from the Windows Control Panel (Install and Remove Programs...).

Technical Support

For contact information please go to <http://www.mpsHP.com>