Section 7.2: Discounted Cash Flows Analysis

The cash flow of an investment can be analyzed in terms of withdrawals(returns) of the investment. R_t represents the **net return**(payment) to the investor at time t. (From the lender's perspective.)

view of the investor.

For $R_t > 0$, there is a cash inflow from the investment to the investor.

For $R_t < 0$,there is a cash outflow from the investor to the investment.

Let C_t be the Investment's point of view

Time yrs	0	3	7
contributions	5000	1000	0
returns	0	3000	4000
R_t	-5000	2000	4000
C_t	5000	-2000	-4000

lets find the present value from the Investor's viewpoint

when $i = 3\%$ (annual eff)

$$NPV = P(3\%) = -5000 + 2000(1.03)^{-3} + 4000(1.03)^{-7}$$

$$= 82.649$$

$$P(5\%) = -429.599$$

The profitability of investment projects can be compared by finding the net present value (NPV) of the project.

$$NPV = \text{PV cash inflows} - \text{PV cash outflows.}$$

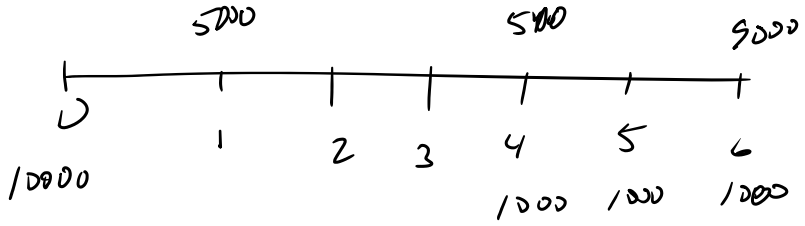
$$= \sum (\text{inflow})\, v^t - \sum \text{outflow}\, v^t$$

$$NPV = P(i) = \sum R_t\, v^t$$

The **internal rate of return**, IRR or yield rate, of an investment is that rate of interest at which the present value of cash inflows equals the present value of cash outflows.

$$NPV = 0$$

Example: A certain 6-year project requires an initial investment of \$10,000 and a maintenance fee of \$1000 at the end of each year for the last three years. The project is expected to provide a return of \$5000 at the end of the first year, \$500 at the end of the 4th year, and \$9000 at the end of the 6th year.
(A) Find the NPV of this investment assuming a cost of capital (effective interest rate) of 7%.



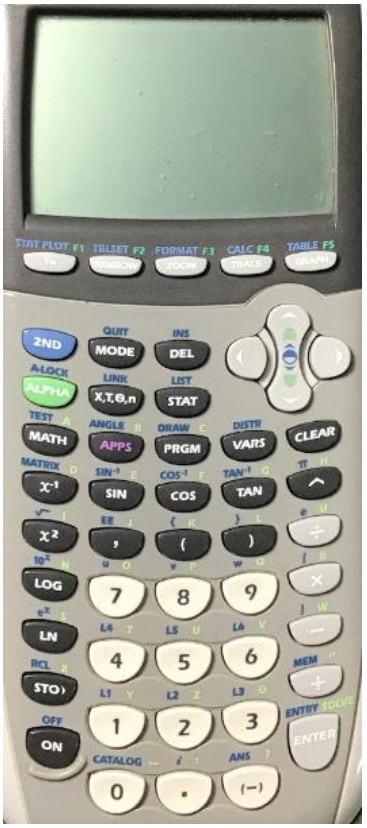
R_t -10000 5000 -500 -1000 8000

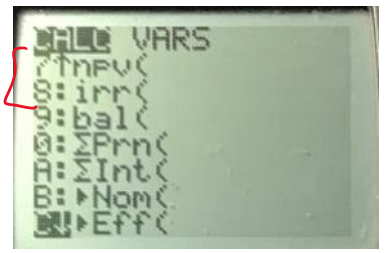
$$NPV = P(i) = -10000 + 5000v - 500v^4 - 1000v^5 + 8000v^6$$

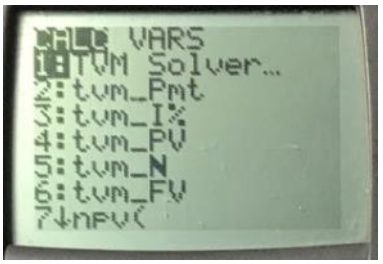
$$P(7\%) = -1090.80$$

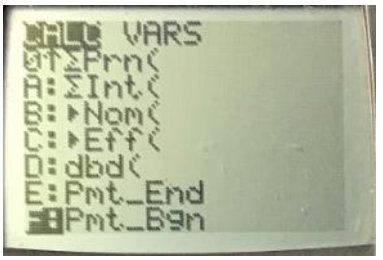
IRR is when NPV = 0 $\longrightarrow$ use calc IRR = 3.67%

Finance Menu









NPV (rate , Initial , { cash flows } , { freq })

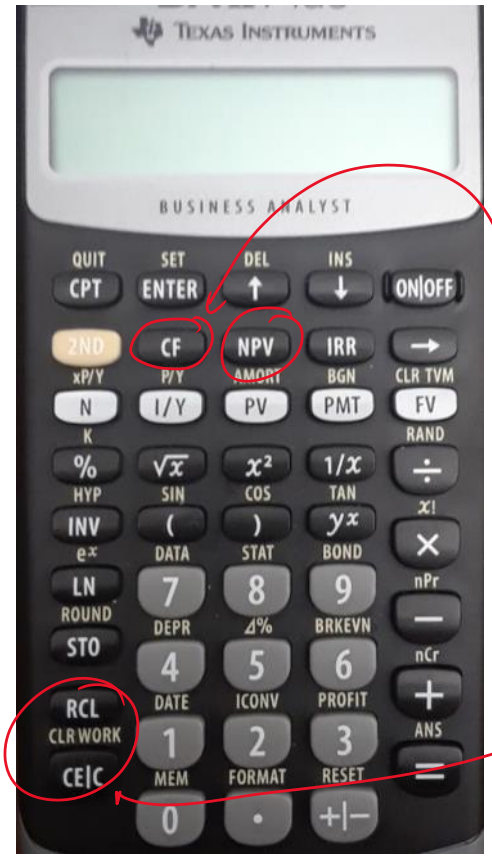
IRR (Initial , { cash flows } , { freq })

NPV (7.00 , -10 000 , { 5000 , 0 , 0 , -500 , -1000 , 8000 })

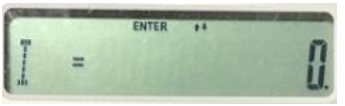
NPV (7.00 , -10 000 , { 5000 , 0 , -500 , -1000 , 8000 } , { 1 , 2 , 1 , 1 , 1 })

freq..

Cash flow



Net Present value



(B) Find the internal rate of return (IRR) for this investment.

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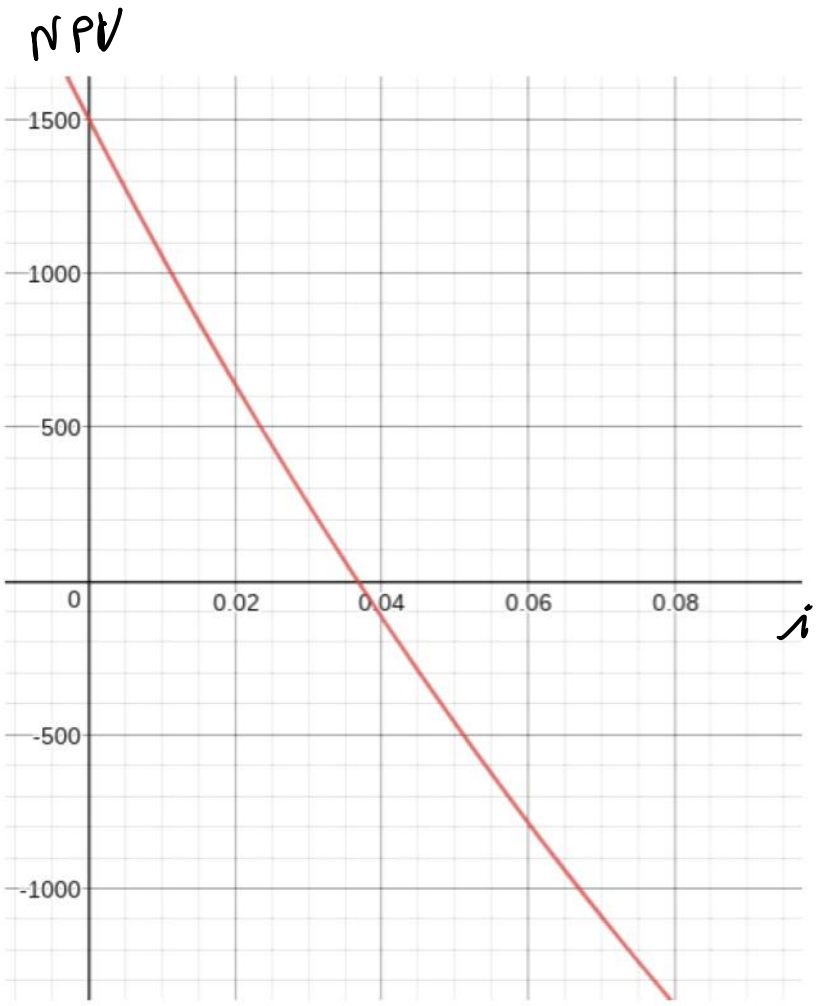
IRR = 3.67 %



In general, the higher the yield rate, the better for the investor. The lower the yield rate, the better for the borrower.

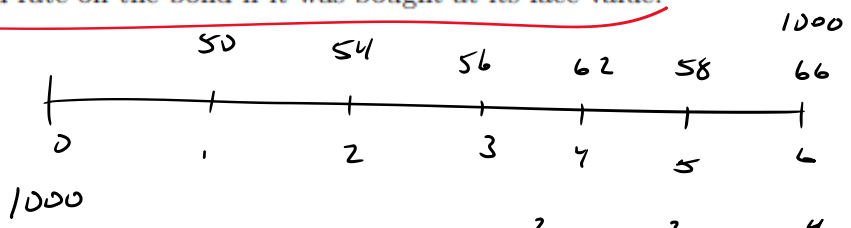
Yield rates can be negative, indicating that the investor lost money on the investment.

It is valid to use yield rates to compare alternative investments only if the period of investment is the same for all investments.

Example: Option A credits 7% effective for 5 years. Option B credits 6% effective for ten years. When would option A be a better choice of an investment?

Example: A six-year \$1,000 par value floating-rate bond with annual coupons had annual coupon rates of 5%, 5.4%, 5.6%, 6.2%, 5.8%, and 6.6% successively.

A) Find the annual yield rate on the bond if it was bought at its face value.



find IRR

$$1000 = 50v + 54v^2 + 56v^3 + 62v^4 + 58v^5 + 1066v^6$$

$$0 = -1000 + 50v + 54v^2 + 56v^3 + 62v^4 + 58v^5 + 1066v^6$$

B) Find the price of the bond at an effective rate of 7%.

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IRR
5.7212%

$CF_0 = -1000$
$CO1 = 50$
$CO2 = 54$
$CO3 = 56$
$CO4 = 62$
$CO5 = 58$
$CO6 = 1066$

Set $CF_0 = 0$
and then
$CO1 = 50$
$CO2 = 54$
$CO3 = 56$
$CO4 = 62$
$CO5 = 58$
$CO6 = 1066$

now price = NPV at 7%

price = \$938.58