Technical Analysis (TA):

matplotlib.dates as mdates

```
data['MA 20'] = data ['Adj Close'].rolling(20).mean()
```

IPO
(initial public offering)

```
data['invested_SMA'] = np.where (data['SMA20'] > data['SMA120']
```

Tuesday
Assignment
Excel
Solve SI paper

Probability weighted Mean:

	MSFT probabilistic Model		AMZN
P_i	x_i	$P_i x_i$	
0.1	.01	0.001	
0.2	.05	0.01	
0.4	.15	0.06	
0.1	-.05	-0.005	
0.2	-.02	-0.004	

Exp Return → 0.0124% 0.0153%
S.D → 0.001% 0.011%

learn Standard deviation

Modern Portfolio Theory: 1952
-H. Markowitz (Nobel)

	TSLA	BAC
	↓ 0.7	↓ 0.3
E(R)	15%	9%
S.D	14%	10%

$$E(R_p) = W_A \cdot E(R_A) + W_B \cdot E(R_B)$$

$$\sigma_p^2 = W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2 W_A W_B Cov_{A,B}$$

- Covariance

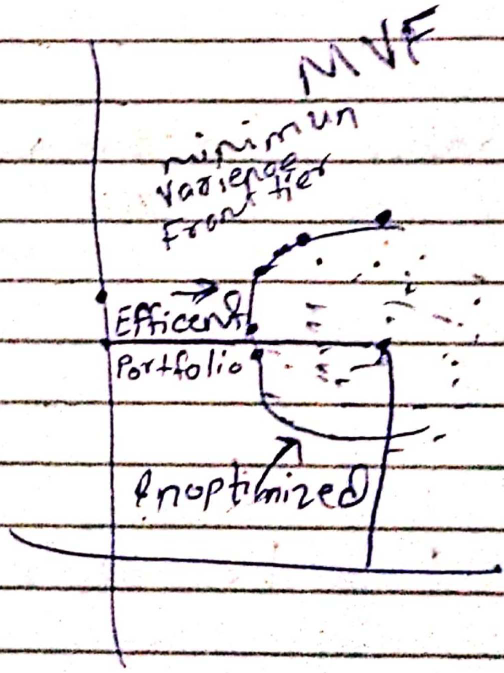
$$E(\sigma_p) = W_A \cdot E(R_A) + W_B E(R_B) + W_C \cdot E(R_C)$$

$$\sigma_p^2 = W_A^2 \cdot \sigma_A^2 + W_B^2 \cdot \sigma_B^2 + W_C^2 \sigma_C^2 + 2W_A W_B \, Cov_{A,B} + 2W_B W_C \, Cov_{B,C} + 2W_A W_C \, Cov_{A,C}$$

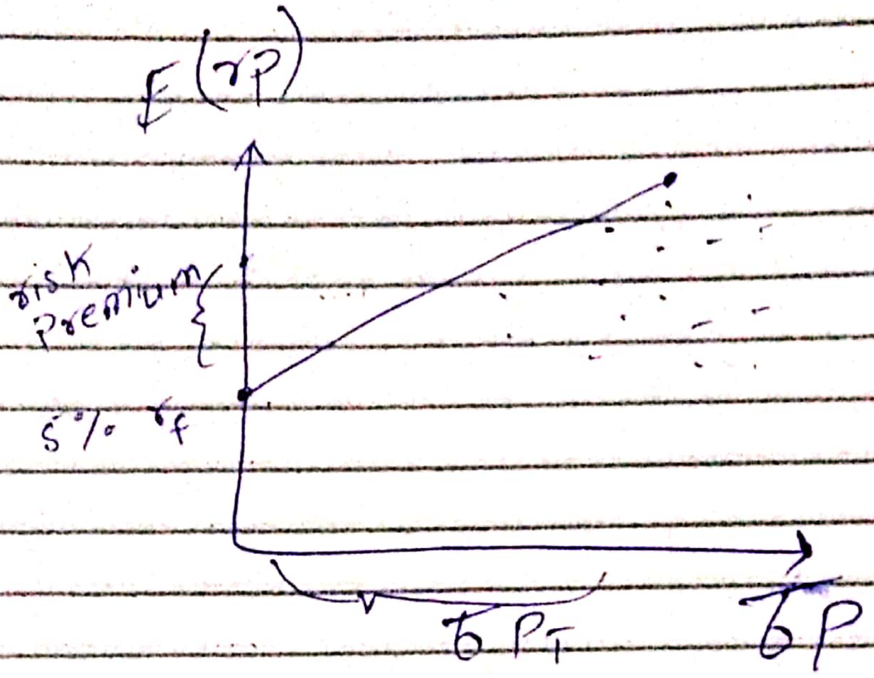
Sharp ratio:

$\overline{EV}$

$$\frac{E(r_p) - r_f}{\sigma_p}$$



Sharp ratio



$$\frac{A.R - r_f}{\sigma P} = \frac{15\% - 5\%}{10\%} = 1.5$$

per 1% unit risk
1.5 returns

Modren Portfolio theory:

(Expected Return) ② Portfolio

$$\underbrace{E(R_p)}_{\text{Expected return}} = \underbrace{W_A}_{\text{weight}} \cdot E(R_A) + W_B E(R_B)$$

(Risk) Portfolio

$$\sigma_p^2 = W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2 W_A W_B \, Cov_{A,B}$$

For ③ Portfolio

$$E(R_p) = W_A \cdot E(R_A) + W_B \cdot E(R_B) + W_C \cdot E(R_C)$$

$$\sigma^2_p = W_A^2 \sigma^2_A + W_B^2 \sigma_B^2 + 2 W_A W_B \, Cov_{A,B} + W_C^2 \sigma^2_C + 2 W_A W_C \, Cov_{A,C} + 2 W_B W_C \, Cov_{B,C}$$

	A	B	C
A			
B			
C			

variance

Co-orporate Finance

Balance sheet sample

ABC Co.
Balance sheet
Dec, 31, 2022

Assets

Current Assets
- cash
- A/R
- Inventory
- S-T Investments

Total current Assets

use for 1 year

Fixed Assets
- Equipment
- Building
- Land

Total Fixed Assets

Capital Budgeting Decisions

Total Assets

Liabilities and Equity

Liabilities

Current Liab
- A/Payable
- N/Payable

Total Current Liab.

Working Capital Decision

Paid within 1 year

Long-Term Liab.
- Bank loan

Total long term Liab.

Capital structure Decision

Total liab

share holders Equity
- Paid-up capital
- R/Eag

Total Equity

Assets = Liab. + Equity

Decisions:
- Capital budgeting Decisions
  Long term
- Capital structure Decisions
- Working capital Decisions

Capital Budget Decision

Time value of Money (TVM):

2018 $\neq$ 2020

100,000   100,000

→ 110,000

Risk

Consumption

- Fundamental Analysis: D.R = 10%

0   1   2   3

$\frac{\$5}{(1.1)^1}$ $\frac{\$8}{(1.1)^2}$ $\frac{\$3 + \$100}{(1.1)^3}$ sell price

$103

Assumption
$4
$6
$70 → fair value
$79

future 5 $ now it is 4 $

If current price is = 83 $

And if we estimate the true value is 79 $

Then This stock is over priced.

study, work
case study

Cash flow:

Time line

0 1 2 3 4 5 35

$-CF_0 \quad \frac{-CF_1}{(1+DR)^1} \quad \frac{-CF_2}{(1+DR)^2} \quad \frac{-CF_3}{(1+DR)^3} \quad \frac{CF_4}{(1+DR)^4} \quad \frac{CF_5}{} \quad \frac{CF_6}{} \quad \frac{CF_{35}}{(1+DR)^{35}}$

$-PV_1$

$-PV_2$

$-PV_3$

- sum of PV of all cost $\longrightarrow$ $-700,000$

$+PV_4$

$+PV_5$

$+PV_6$

$+ \;\vdots$

$+PV_{35}$

sum of P.V of all benefit $\longrightarrow$ 2,000,000

Good Project (Discount rate)

$D.R \propto$ Risk

uncertain

~~Find~~

$\boxed{\text{How to calculate Discount rate?}}$

In this case, outflows are certain. But inflows are uncertain.

comodities

Valuation of Long-term securities

- Long-term (meturity after 1 year)
- Securities
  - → Equity → shares (No maturity)
  - → Debt → Bonds

Timeline will be there all time (PSO)

Divident

0	1	2	3
?	$\frac{10}{(1.12)^1}$	$\frac{13}{(1.12)^2}$	$\frac{9 + 60 = 69}{(1.12)^3}$

8.92
10.4
49.3
68.6

D.R = 12%

Asset pricining model
↓
D.R

B (beta) is a measure of risk.

Bonds
↳ 1000 ← Face value
C.R = 10%
n = 5 year

Bond is debt instrument.

Timeline

0 Annuity in Advance	1	2	3	4	5
~~1000~~	$\frac{100}{1.1}$	$\frac{100}{(1.1)^2}$	$\frac{100}{(1.1)^3}$	$\frac{100}{(1.1)^4}$	100 1000 1100

f(D.R)

Intrest ~~payment~~ rate
coupan ~~payment~~ rate

~~9.7~~
~~8~~

1000	10%
927	12%
1079	8%

1 D.R = C.R → 1000
2 D.R > C.R → $\boxed{\text{less than 1000}}$ → Discount Bonds
3 D.R < C.R → More than 1000 → Premium Bonds

if market intrest rate is greater, than (2)

Present value table

Series of equal payments occurs at the end of year called Annuity due

0	1	2	3	4
-100,000	$\frac{30,000}{(1.15)^1}$	$\frac{30,000}{(1.15)^2}$	$\frac{30,000}{(1.15)^3}$	$\frac{30,000 + 15,000}{(1.15)^4}$

26,086
22,684
19,725
25,728

-100,000
+ $\boxed{94223}$ → sum of all receiving cash inflow Present value
-5,777 → Net Present value (NPV)

Don't buy

NPV → Capital budgeting technique
IRR →

we reject when NPV is negative.

Discount rate (Required rate of return): it is a function of risk.

if D.R is 15% and NPV is -ve then return is less than 15%

$NPV < 0$, Return $< 15\%$ reject
$NPV = 0$, Return $= 15\%$ accept
$NPV > 0$, Return $> 15\%$ accept

NPV:

$$\text{cost} \quad \frac{CF_1}{(1+DR)^1} + \frac{CF_2}{(1+DR)^2} + \frac{CF_3}{(1+DR)^3} \cdots \frac{CF_N}{(1+DR)^N}$$

$$PV_1 + PV_2 + PV_3 \ldots + PV_N$$

(sum of all present values of all cash inflows)

Discount ~~rate~~ rate — required rate of return

-cash = sum:

NPV = 0 → Accept, D.R or R.R.R = Rate of return

-cash ≠ sum

NPV > 0 → Accept, DR or R.R.R. < Rate of return

NPV < 0 → Reject, D.R or R.R.R > Rate of return

(IRR)

Internal Rate of return:

$$IRR = R_A + \frac{NPV_A}{NPV_A - NPV_B}(r_b - r_a) \qquad r_a = L \quad r_b = H$$

$r_a = L = 10\%$
$r_b = H = 15\%$
$NPV_a = 5340$
$NPV_b = -5777$

D.R = 10%

0	1	2	3	4
-100,000	$\frac{30{,}000}{(1.1)^1}$	$\frac{30{,}000}{(1.1)^2}$	$\frac{30{,}000}{(1.1)^3}$	30,000 15,000 $\frac{45{,}000}{(1.1)^4}$

5340

$$IRR = 0.1 + \frac{5340}{5340-(-5777)}(0.15-0.1)$$

$$IRR = 0.1 + \frac{5340}{11117}(0.5)$$

$$= 0.124$$

$$= 12.4$$

$$\begin{array}{r} 5340 \\ 5777 \\ \hline 11117 \end{array}$$

0	1	2	3	4
-100,000	$\frac{30,000}{(1.124)^1}$	$\frac{30,000}{(1.124)^2}$	$\frac{30,000}{(1.124)^3}$	30,000 15,000 $\frac{45,000}{(1.124)^4}$

-100,000
99,981
19

Lower(L) and Higher(H) is not more than 5%

NPV = 0 , R.R.R = IRR
NPV > 0 , 10% < 12.4%
NPV < 0 , 15% < 12.4%

1.124
1.124
4496
2248x
1124xx
1124xxx
1.263376

Hurdle Rate $\Rightarrow$ R.R.R
= 15%
IRR $\Rightarrow$

If hurdle rate given, then take orbatorery rate to calculate

If IRR > hurdle rate then reject the Project

capital Budgeting teqniques

Pay back Period