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CHAPTER 3

Chapter 3

The Basis of Risk

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graph TD; A[Maximize firm value] --> B[Investment decision]; A --> C[Financing decision]; A --> D[dividend policy]; B --> E[↓]; E --> F[بدا متوفى شرطه assets لكي يوافق مستر نيا الشركة عنان تحقق طلبها];
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بوضو لنا نموذجاً جيداً للمخاطر والعائد أداء لقياس المخاطر في اي استثمار. ويستخدم مقياس المخاطر هذا في وصول الى العائد المتوقع المناسب على تلك الاستثمارات.

* A good model for risk and return provides us with a tool to measure risk in any investment and uses that risk measure to come up with the appropriated expected return on that investment.

(Stock)

* Risk in any equity investment has to be perceived through the eyes of investors in the firm. Investors have different perspectives and a result risk has to be measured from the perspective of the marginal investor

يجب النظر الى المخاطر في اي استثمار في الاسهم من خلال عينة المستثمرين في الشركة، حيث يكون للمستثمرين منظور مختلف وكذا مقياس مخاطر النتيجة من منظور المستثمر الهامشي.

المستثمر الهامشي ← المستثمر الذي من المرجح ان يتم
التشاور عليه لتداول في الاسهم في اي وقت محدد .

* marginal investor → the investor who is most likely to be found trading on the stock at any given point of time .

خصائص نموذج المخاطر والعائد الجيد
Characteristics of a good risk and return model

(1) It should come up with a risk measure that applies to all assets

يجب ان يأتي بمقياس من مخاطر ينطبق على جميع الاصول

CAPM

$$E(r) = R_f + b(E(r_m) - R_f)$$

Risk = Diversifiable risk + nondiversifiable risk
↓ risk ↓ risk
firm-specific risk market risk

(2) It should describe what types of risk that are rewarded and what are not

يجب ان يصف انواع المخاطر التي يجزى مكافئتها وما لا يجزى مكافئتها

(3) It should come up with standardised risk measure which enables the investor to draw conclusion about the asset whether its risk is above average or below average .

(4) It should translate the measure of risk into rate of return that the investor should demand as compensation for bearing the risk

3 - يجب ان تأتي بمقياس معيارى للمخاطر يمكن المستثمر من استخلاص استنتاج حول ما اذا كانت مخاطرة اقل من المتوسطة او اقل من المتوسط

4 - يجب ان ترجم مقياس المخاطرة الى معدل عائد يجب على المستثمر ان يطلبه باعتباره فهم تعويض يتصل بالمخاطرة .

(5)^{It} should ~~with~~ work well at explaining past returns and in predicting future expected returns.

يجب أن تعمل بشكل جيد على تفسير العائدات السابقة وفي ممارسة العوائد المتوقعة
الموتوقفة

Equity risk and expected return

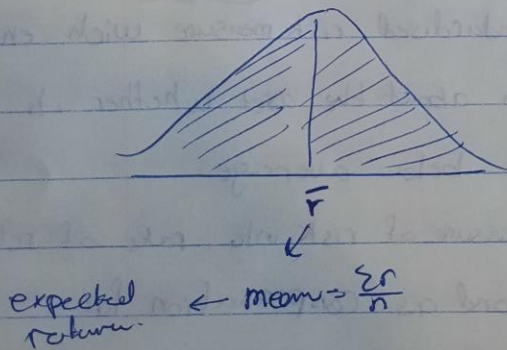
* Prices are observed in the market

* Returns cannot be observed.

$$r = \frac{P_t - P_{t-1} + CF}{P_{t-1}}$$

price at the end at the point \uparrow P_t
 \downarrow rate of return r
 P_{t-1} \rightarrow price at the beginning of the period.

* Returns are normal distributed



Any statistical distribution has 4 moments

- ① means
- ② variance
- ③ skewness
- ④ kurtosis

0 = 0.5 / 1 upper tail & lower tail

A normal distribution can be characterized by:

- ① mean
- ② variance

Normal distribution

- skewness = 0

- kurtosis = 3 (how fat the tails are)

excess kurtosis = kurtosis coefficient - 3

$$= 3 - 3 = 0$$

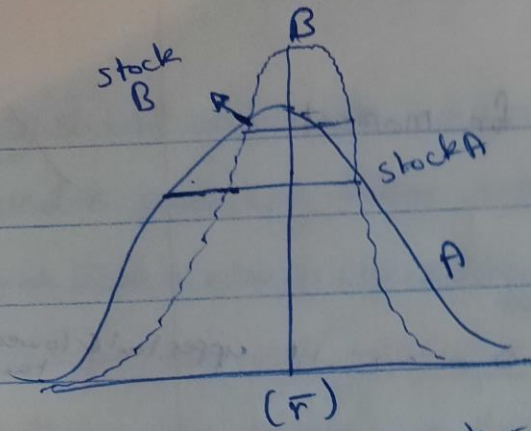
Variance → measure of ^{total} risk

$$SD = \sqrt{\text{Variance}}$$

$$\text{Variance} = \frac{\sum (r - \bar{r})^2}{n-1}$$

$$SD = \sqrt{\frac{\sum (r - \bar{r})^2}{n-1}}$$





A higher variance \Rightarrow higher risk

B should be chosen

monthly prices

xyz adjusted closing price

<u>Date</u>	<u>price</u>	<u>r</u>	<u>monthly</u>
June, 2020	\$20	7.5%	
Feb, 2020	\$21.5	7.5%	
March, 2020	\$22	2.33%	
April, 2020			

April, 2022

$$\text{average monthly return} = \frac{\sum r}{n}$$



of 12 = 12 months

$$\text{annualized average return} = \left(1 + \text{average monthly return} \right)^{12} - 1$$

$$SD = 6 \cdot \sqrt{6^2}$$

↳ annualized 6 = monthly SD $\sqrt{12}$

* If returns were not normally distribution, then Semivariance is a better measure of risk.

Semivariance considers downside risk

$$\text{Semivariance} = \sum_{r < \bar{r}} (r - \bar{r})^2$$

← returns that are below the average return

← average of returns

← number of returns (observations) that are below the average return

* لتوضيح العوائد التي أقل من المتوسط

r	r - \bar{r}	(r - \bar{r}) ²	$\bar{r} = 6.2\%$
2%	-4.2	17.64	
3%	-3.2	10.24	
4%	-2.2	4.84	
10%			
12%			
		32.72	

← 10%
← 12%
← ما يتبقى

$$\text{Semivariance} = \frac{32.72}{3} = \boxed{10.9\%}$$

Semivariance ← Return التي أقل من المتوسط و
عكسها

Reward and unreward risk:

$$\text{Risk} = \text{diversifiable risk} + \text{nondiversifiable risk}$$

↓ ↓
firm specific risk market Risk

* Firm specific risks:

(a) project risk: an individual project may have higher or lower cash flows than expected because of

misestimation → This risk can be diversified away if the firm invests in a number of projects.

قد يكون لمشروع فردي تدفقات نقدية أعلى أو أقل من المتوقع بسبب

الخطأ التقديري ← يمكن تنويع هذه المخاطر إذا استثمرت الشركة في

(b) Competitive risk: where by earnings and cash flows on

a project are affected positively or negatively by the competitor's actions → This risk can be diversified away

if the firm buys its competitor or if the stockholder of the firm hold stocks in the competitor's firms.

حيث تتأثر الأرباح والتدفقات النقدية للمشروع إيجاباً أو سلباً بإجراءات

المنافسة ← يمكن تنويع هذه المخاطر أيضاً إذا كانت الشركة باستثمار منافسها

أو يمكن تنويعها إذا كان المستثمر في الشركة يمتلك أسهم

في المنافس

تُشكل المخاطر القانونية والتكنولوجية والبيع ، يمكن تنويع هذه المخاطر بعيداً
إذا تمكنت الشركة عبر المبيعات أو إذا كانت المساهمون يتمكنون التهرب من
صناديق قتلقة

(c) Industry specific risk : includes technological and legal risk and commodity risk.

This risk can be diversified away if the firm diversifies across industries or if the stockholders hold stocks in different industries.

(d) International risk

- Currency exchange rate risk
خطار تغير سعر الصرف
- Political risk.
خطار سياسية

يمكن للمستثمرين تقليص
الخيار الدولية من خلال

- Investors can reduce political risk by investing across countries

(political risk is sometimes correlated across countries and can not be diversified away)

- Currency exchange rate risk can be reduced if borrowings used to fund projects were in the local currency.

يمكن للمستثمرين تقليل الخطر السياسي عن طريق الاستثمار في دول مختلفة

* market risk :

الخطورة لتقليل المخاطر

Changes in macroeconomic variables that affect the companies such as :

(1) interest rate (2) inflation rate (3) economic growth

Market can not be diversified away.

Identifying the marginal investors:

Begin by breaking down the percent of firm's stock held by individuals, institutions and insiders.

Percent of stock held by institutions

Percent of stock held by insiders

Marginal investor

- high

low

institutional investor

- high

high

institutional investor with insider influence

- low

high

tough to tell, could

(held by the founder/managers) be insider but only if they trade

- low

High (held by wealthy individual investor)

wealthy individual investors, fairly diversified

- low

low

Small individual investor with restricted diversification.

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problem 28 UniCom

<u>year</u>	<u>price</u>	<u>Div</u>	<u>r</u>
1989	\$36.1	\$3	
1990	\$33.6	3	1.38%
1991	\$37.8	3	21.4%
1992	\$30.9	2.3	-12.1%
1993	\$26.8	1.6	-8%
1994	\$24.8	1.6	-1.4%
1995	\$31.6	1.6	33.8%
1996	\$28.5	1.6	-4.7%
1997	\$24.25	1.6	-9.2%
1998	\$35.6	1.6	53.4%

a. $\bar{r} = ?$

$$r = \frac{P_t - P_{t-1} + \text{Div}}{P_{t-1}}$$

$$r_{1990} = \frac{33.6 - 36.1 + 3}{36.1} = 1.38\%$$

$$r_{1991} = \frac{37.8 - 33.6 + 3}{33.6} = 21.4\%$$

$$r_{1992} = \frac{30.9 - 37.8 + 2.3}{37.8} = -12.1\%$$

$$r_{1993} = \frac{26.8 - 30.9 + 1.6}{30.9} = -8\%$$

$$r_{1994} = \frac{24.8 - 26.8 + 1.6}{26.8} = -1.4\%$$

$$r_{1995} = \frac{31.6 - 24.8 + 1.6}{24.8} = 33.8\%$$

$$r_{1996} = \frac{28.5 - 31.6 + 1.6}{31.6} = -4.7\%$$

$$r_{1997} = \frac{24.25 - 28.5 + 1.6}{28.5} = -9.2\%$$

$$r_{1998} = \frac{35.6 - 24.25 + 1.6}{24.25} = 53.4\%$$

$$F = \frac{1.38 + 21.4 - 12.1 - 8 - 1.4 + 33.8 - 4.7 - 9.2 + 53.4}{9} = 8.28\%$$

⇒

$(r - \bar{r})$	$(r - \bar{r})^2$	$\frac{\sum (r - \bar{r})^2}{n-1}$
-6.9	47.61	$= \frac{4154.91}{8} = 519.36$ $6 = 22.78\%$
13.12	172.13	
-20.38	415.34	
-16.28	265.03	
-9.68	93.7	
25.52	651.27	
-12.98	168.48	
-17.48	305.55	
45.12	2035.8	

Semi Variance

r	$(r - \bar{r})$	$(r - \bar{r})^2$
1.38%	-6.9	47.61
-12.1%	-20.38	415.34
-8%	-16.28	265.03
-1.4%	-9.68	93.7
-4.7%	-12.98	168.48
-9.2%	-17.48	305.55

$$\text{Semi Variance} = \frac{1295.71}{6} = 215.95$$