I

EAEBA DCBAC

CBDCB EBCDA

II

1.

1. Mu= (-0.10+0.23-0.24+0.39+0.29)/5=11.4%

var= ((-0.10-0.114)^2+(0.23-0.114)^2+(-0.24-0.114)^2+(0.39-0.114)^2+(0.29-0.114)^2)/4=0.07293

std=var^0.5=27%

1. 小李的期望收益率高于该沪深300ETF的期望收益率，他必须融资买入。假设小李买入ETF的权重为y，则

0.114\*y+0.08\*(1-y)=0.135🡪 y=(0.135-0.08)/(0.114-0.08)=162%

另外根据均值方差公式 y= (rp-rf) /std/A 🡪A=(rp-rf)/var/y=(0.114-0.08)/0.07293/1.62=0.29

老王的期望收益率处入银行存款利率与该沪深300ETF的期望收益率之间，他可以部分存款部分买入ETF 产品。假设老王买入ETF的权重为y1，

则

0.114\*y+0.02\*(1-y)=0.05🡪 y=(0.05-0.0175)/(0.114-0.0175)=31.91%

另外根据均值方差公式

y= (rp-rf) /std/A 🡪A=(rp-rf)/var/y=(0.114-0.02)/0.07293/0.3191=4.04

2. a.

rf = 0.02; rm = 0.12; beta = 1.2;

k = rf + beta\*(rm - rf)=14%

d0 = 1;g0 = 0.2;

d1 = d0\*(1 + g0)=1.2

d2 = d1\*(1 + g0)=1.44

g1 = 0.1;

d3 = d2\*(1 + g1)=1.584

v2= d3/(k - g1)= 1.584/(0.14-0.1)=39.6

v0 = d1/(1 + k) + d2/(1 + k)^2 +v2/(1 + k)^2

= 1.2/1.14 + 1.44/1.14^2 +39.6 /1.14^2

= 32.63> 30 元

值得买入

b.

p1=v1 = d2/(1 + k) + v2/(1 + k)= 1.44/1.14 +39.6 /1.14=36

p2=v2=39.6

p0 = 30;

r1 = (d1 + p1)/p0 – 1=(1.2+36)/30-1=24%>k (因为买入价低于其内在价值)

r2 = (d2 + p2)/p1 – 1=(1.44+39.6)/36-1=14%=k (因为市场估价等于其内在价值)

c.

g1’ = 0.08;

d3’= d2\*(1 + g1’)=1.44\*1.08=1.5552

p2’=v2’= d3’/(k - g1’)= 1.5552/(0.14-0.08)=25.92

r2’ = (d2 + p2’)/p1 – 1=(1.44+25.92) /36-1=-24% (因为股利增长率下降)

3. a.

wm\*0.135+(1-wm)\*0.17=0.15🡺 wm=(0.17-0.15)/(0.17-0.135)=57.14%

wx=1-wm=42.86%

covar= beta\*sigm^2=1.2\*0.2^2=0.048

varx= beta^2\*sigm^2+sigres^2=1.2^2\*0.2^2+0.1^2=0.676

var= wx^2\*varx + wm^2\*sigm^2 + 2\*wx\*wm\*covar=0.049

sig=var^0.5=22.13%

夏普比率为

(0.15-0.03)/0.2213=0.54

b.

最大夏普比率组合T

vx = (Rx\*sigm^2 - Rm\*covar);

vm = (Rm\*sigx^2 - Rx\*covar);

wxT = vx/(vx + vm)= 0.597

wmT=1-wxT=0.403

rT=wxT\*rx+wmT\*rm=0.597\*0.17+0.403\*0.135=15.59%

varT=wxT^2\*varx + wmT^2\*sigm^2 + 2\*wxT\*wmT\*covar=0.05369

sigT=varT^0.5=0.2317

考虑最大夏普组合T和无风险国债F的组合

wf\*0.03+(1-wf)\*0.1559=0.15🡺 wf=(0.1559-0.15)/(0.1559-0.03)=4.7%

wT=1-wf=95.3%

wx=wT\*wxT=0.953\*0.597=56.9%

wm=wT\*wmT=0.953\*0.403=38.4%

该投资组合夏普比率与T相同，为

（rT-rf）/sigT=(0.1559-0.03)/0.2317=0.54

c. 考虑最大夏普组合T和无风险国债F的组合

wf\*0.03+(1-wf)\*0.1559=0.20🡺 wf=(0.1559-0.20)/(0.1559-0.03)=-35%<0

需要借钱

借钱利率4.5%对应的最大夏普比率组合

Rx=rx-0.045=0.17-0.045=0.125

Rm=rm-0.045=0.135-0.045=0.09

vx = (Rx\*sigm^2 - Rm\*covar);

vm = (Rm\*sigx^2 - Rx\*covar);

wxT = vx/(vx + vm)= 89%

wmT=1-wxT=11%

rT=wxT\*rx+wmT\*rm=16.62%

varT=wxT^2\*varx + wmT^2\*sigm^2 + 2\*wxT\*wmT\*covar=0.06343

sigT=varT^0.5=0.2519

考虑最大夏普组合T和无风险国债F的组合

wf\*0.045+(1-wf)\*0.1662=0.20🡺 wf=(0.1662-0.20)/(0.1662-0.045)= -27.9%

wT=1-wf=127.9%

wx=wT\*wxT=1.279\*0.89=113.8%

wm=wT\*wmT=1.279\*0.11=14.1%

该投资组合夏普比率与新的T相同，为

（rT-rf）/sigT=(0.1662-0.045)/0.2519=0.48