金融商品設計與評價
選擇權 III

壹、 (續)選擇權

四、各式各樣選擇權操作策略

（一）選擇權與標的物

1. **覆蓋性選擇權**

   買入現貨，放空買權，形成覆蓋性賣權，似賣賣權；買入現貨，放空賣權，形成覆蓋性賣權，似賣買權。

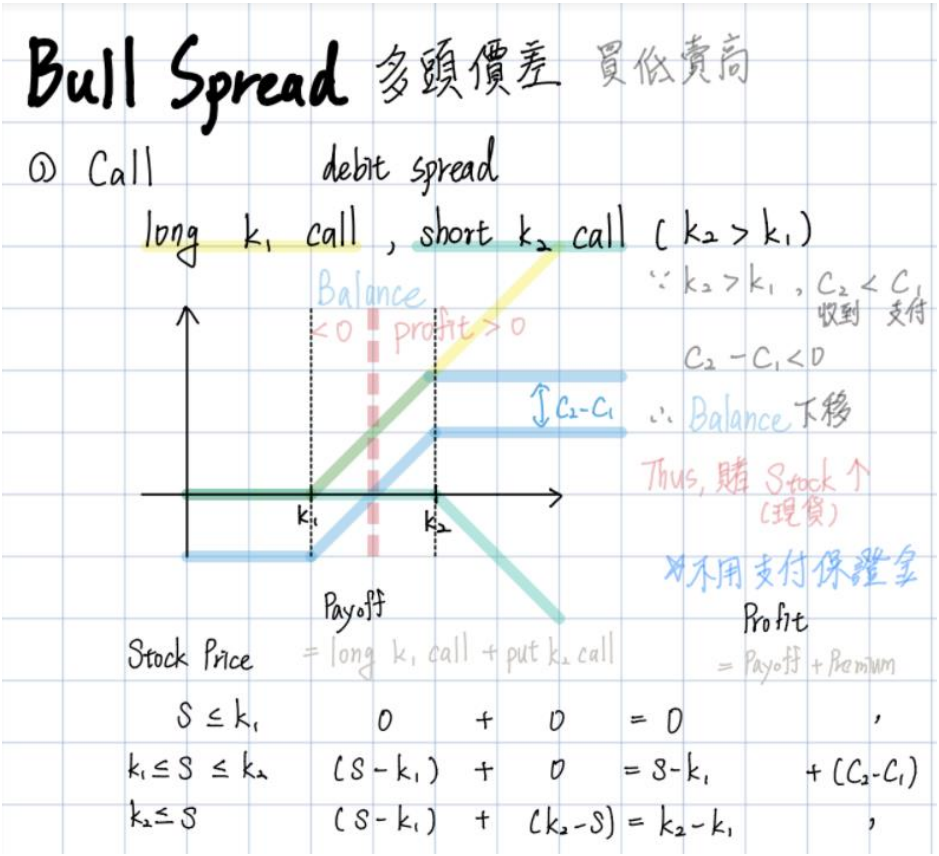
2. **保護性**

   買入現貨，買買權，形成保護性買權，似買賣權；買入現貨，買賣權，形成保護性賣權，似買買權。

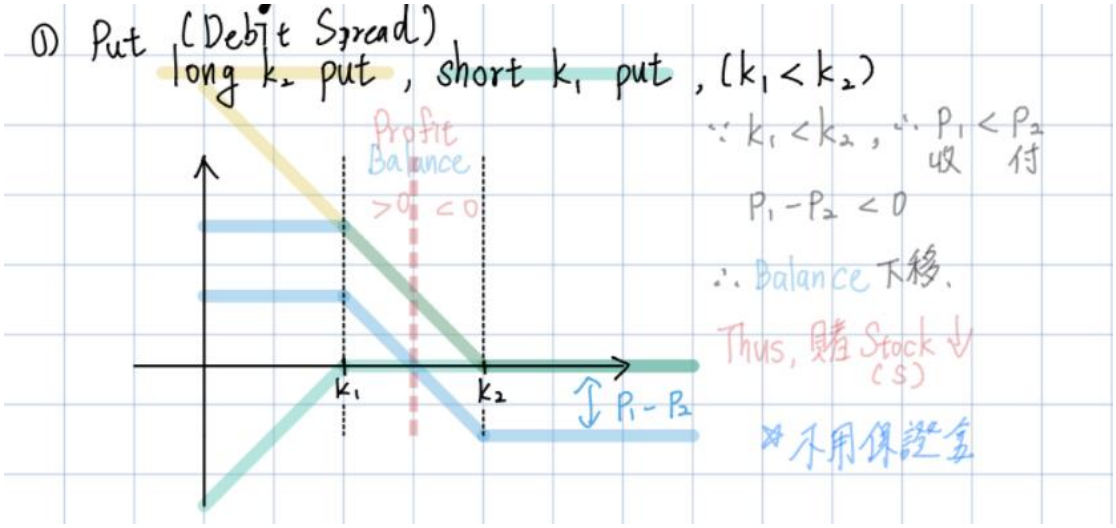
（二）價差交易：同 Class，一買一賣

1. **多頭、空頭（水平）**

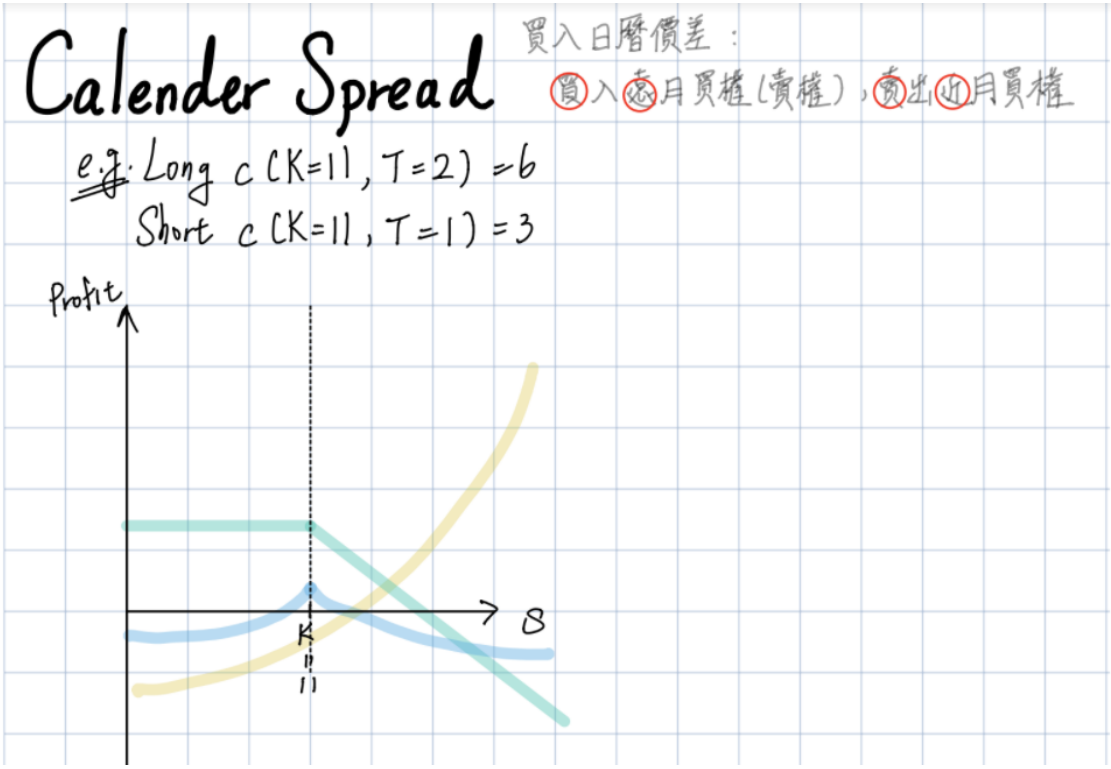
   (1) 多頭：買低賣高（履約價）



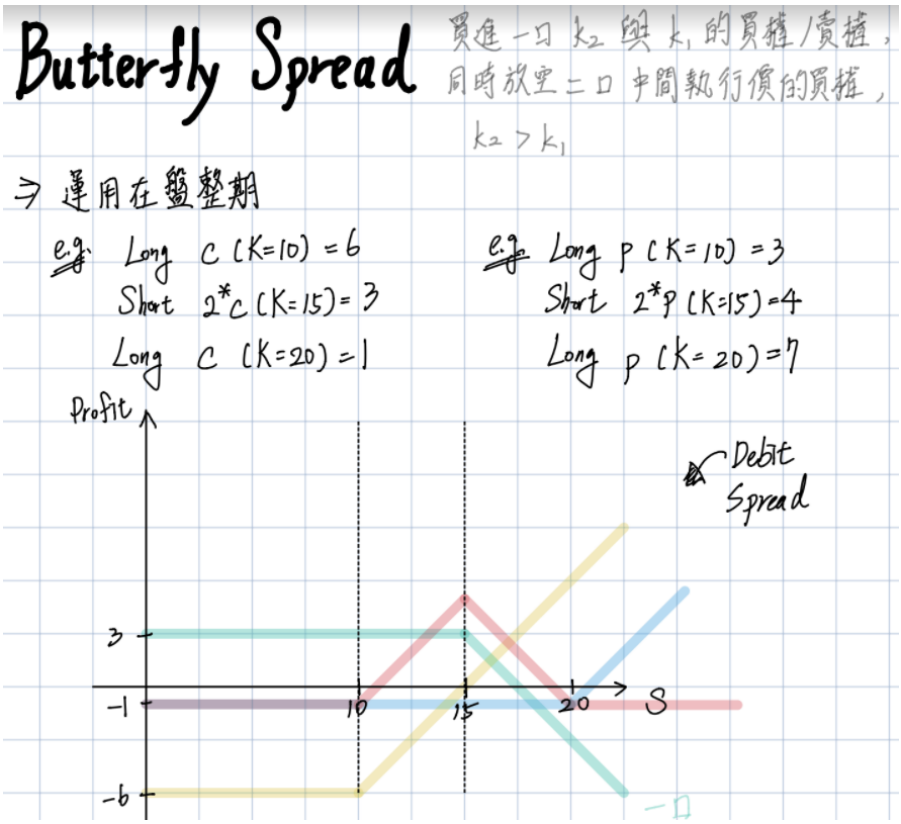
(2) 空頭：買高賣低



2. 日曆（垂直）：買遠賣近



3. 蝴蝶（垂直）：可拆解為 Bull+Bear



五、選擇權價值間的關係

（一）買賣權平價關係

買賣權兩者雖屬不同 Class，價值卻有密切關係，當平價關係不完美，則存在套利空間。

（二）買權價值與履約價值

若履約價越低，代表能用更低的價格去行使標的物長部位，因此履約價越低，買權價值越高。

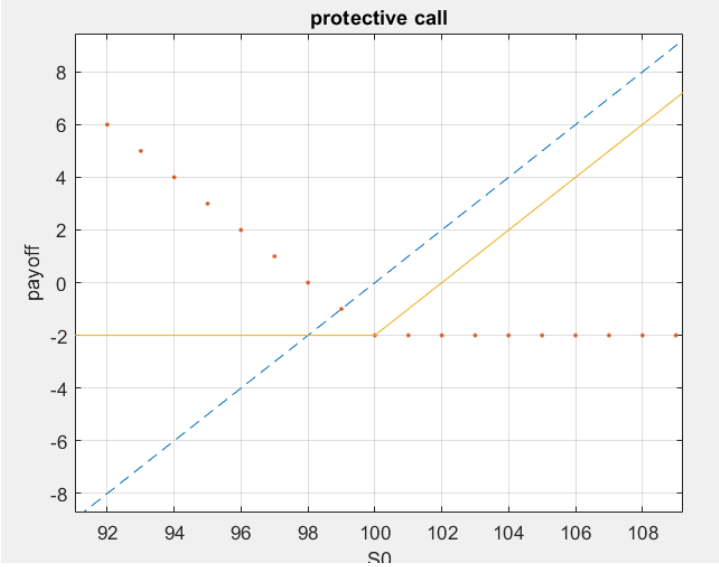
（三）賣權價值與履約價值

若履約價越高，代表能用更高的價格去行使標的物短部位，因此履約價越高，賣權價值越高。

貳、 問題

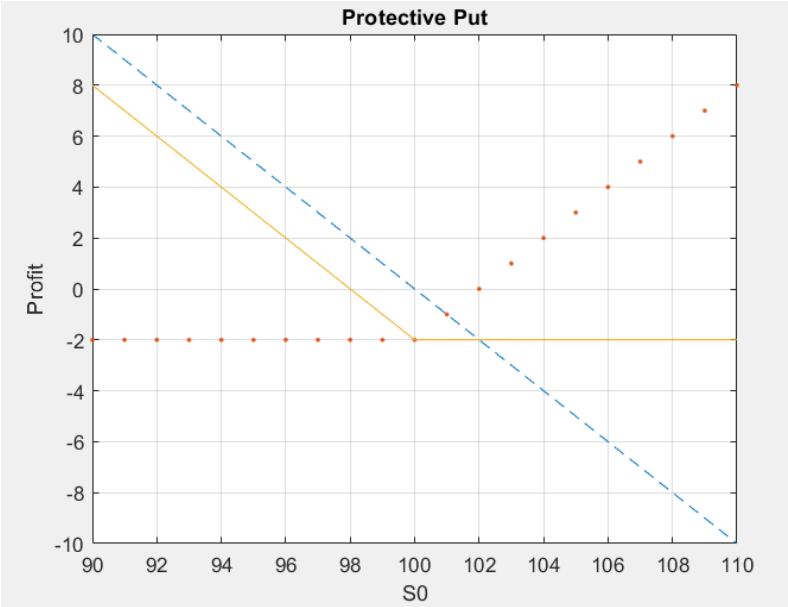
一、 若選擇權為美式，要怎麼去使用 BS Formula?

```
%Protective Call
%input
clear;
p = 2;
X = 100;
S0 = 90:1:110;
%plot
plot(S0,S0-100,'--');
hold on; %wait
plot(S0,max(X-S0,0)-p,'.');
plot(S0,S0-100+max(X-S0,0)-p);
grid on;
title('protective put');
xlabel('S0');
ylabel('payoff');
```



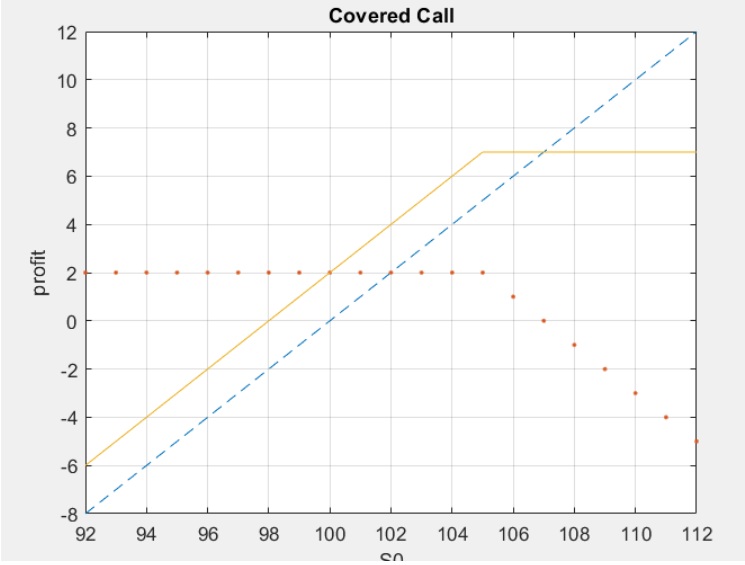

```
%Protective call

%input
clear;
c = 2;
```

```
X = 100;
S0 = 90:1:110;

%plot
plot(S0,100-S0,'--');
hold on; %wait
plot(S0,max(S0-X,0)-c,'.');
plot(S0,100-S0+max(S0-X,0)-c);

grid on;
title('Protective Put');
xlabel('S0');
ylabel('Profit');
```



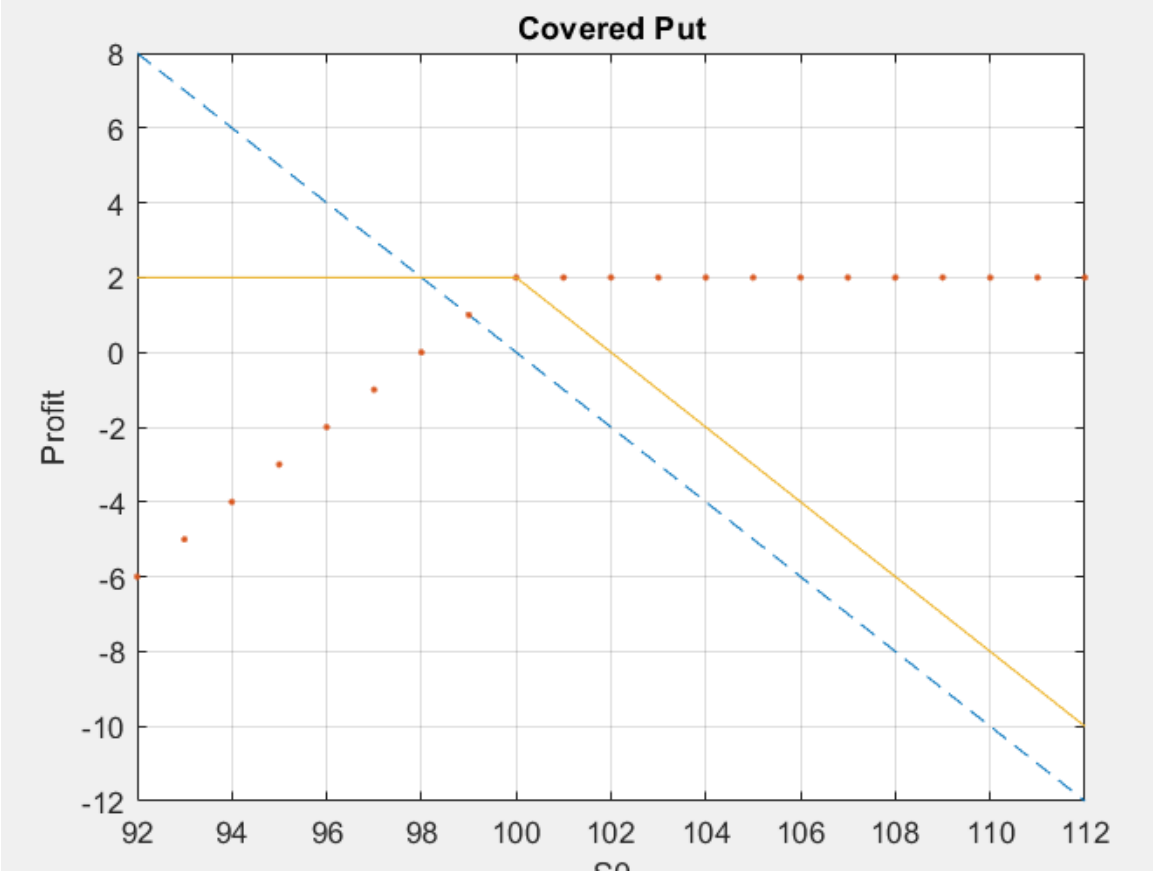

```
%CoveredCall
clear;
c = 2;
X = 105;
S0 = 92:1:112;
```

```
plot(S0,S0-100,'--');
hold on;
plot(S0,-(max(S0-X,0)-c),'.');
plot(S0,S0-100-(max(S0-X,0)-c));
grid on;
title('Covered Call');
xlabel('S0');
ylabel('profit');
```



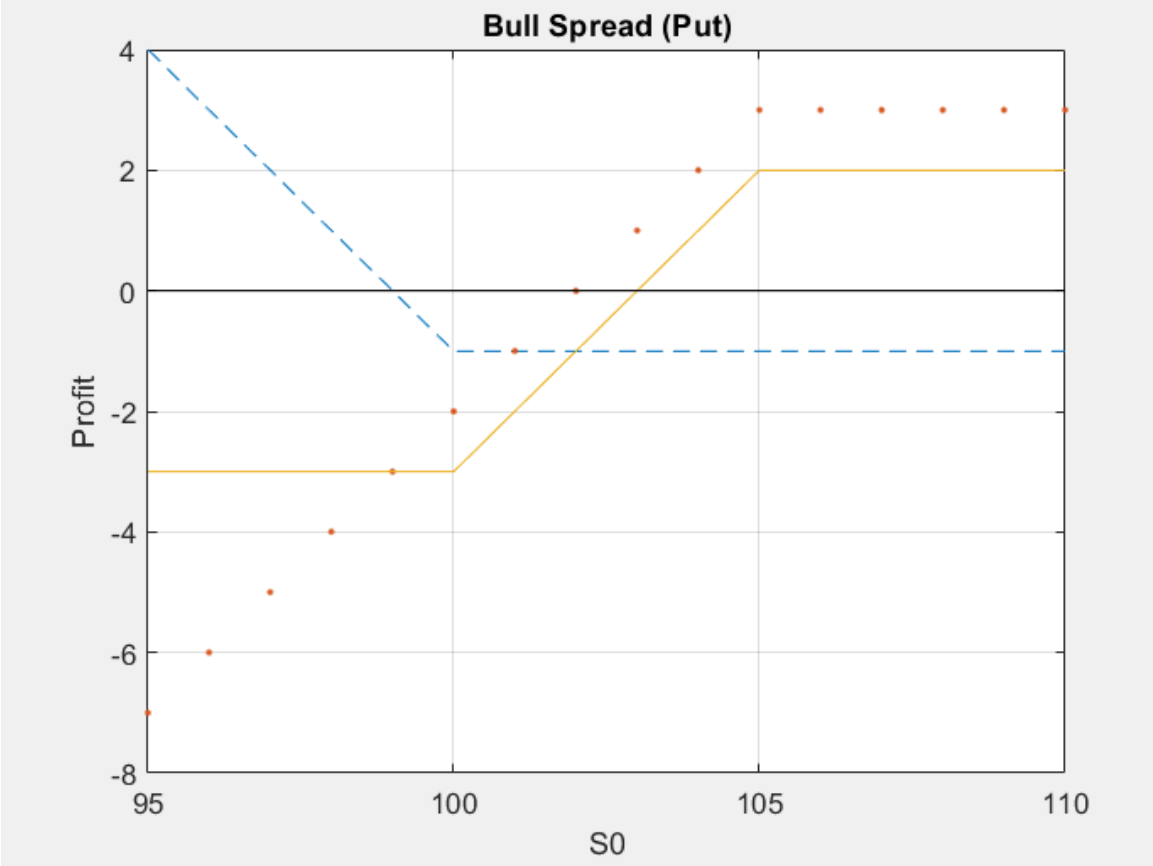

```
%CoveredPut
clear;
p = 2;
X = 100;
S0 = 92:1:112;
```

```
plot(S0,100-S0,'--');
hold on;
plot(S0,-(max(X-S0,0)-p),'.');
plot(S0,100-S0-(max(X-S0,0)-p));
grid on;
title('Covered Put');
xlabel('S0');
ylabel('Profit');
```



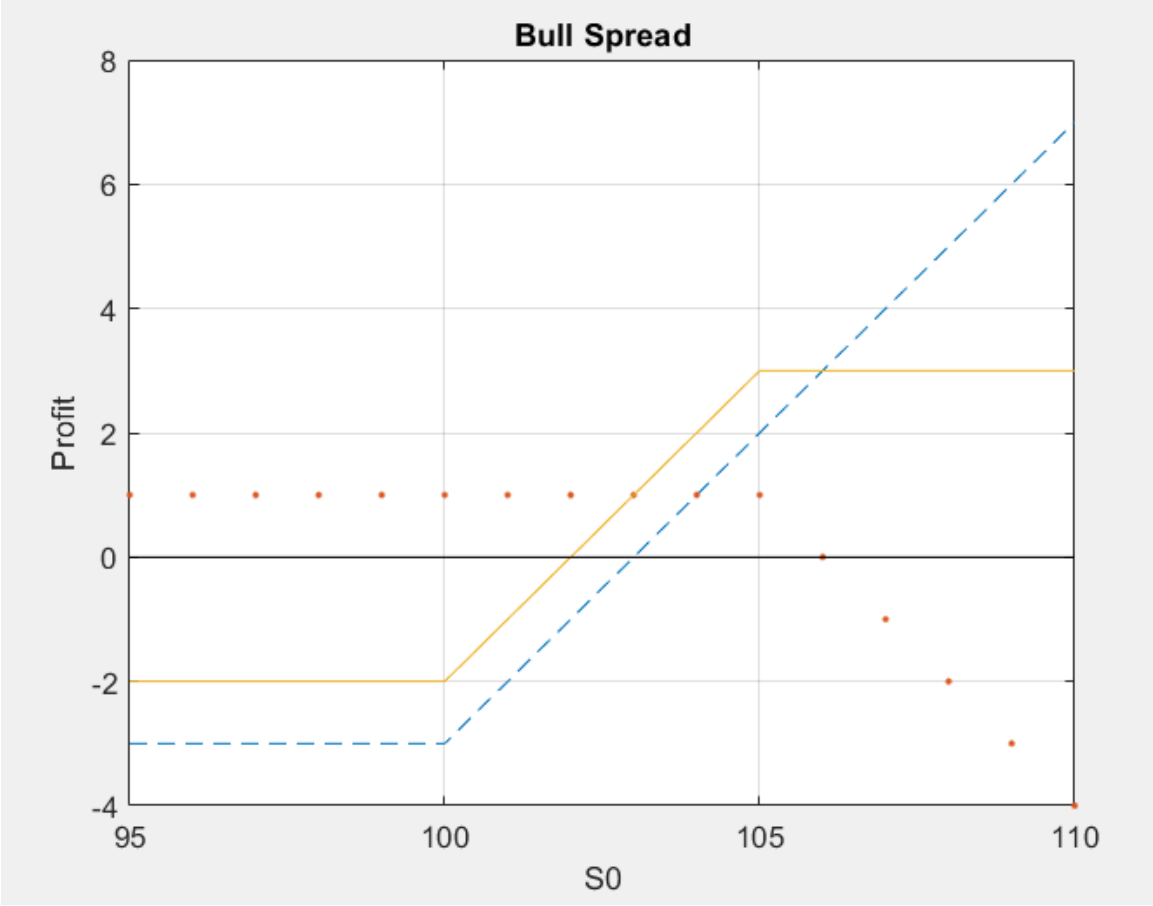

```
%Bull Spread(Put)
clear;
p1 = 1; %long
p2 = 3; %short
X1 = 100;
```

```
X2 = 105;
S0 = 95:1:110;
plot(S0,max(X1-S0,0)-p1,'--');
hold on;
plot(S0,-(max(X2-S0,0)-p2),'.');
plot(S0,max(X1-S0,0)-p1-(max(X2-S0,0)-p2));
grid on;
title('Bull Spread (Put)');
xlabel('S0');
ylabel('Profit');
plot(S0,zeros(1,16),'black');
```



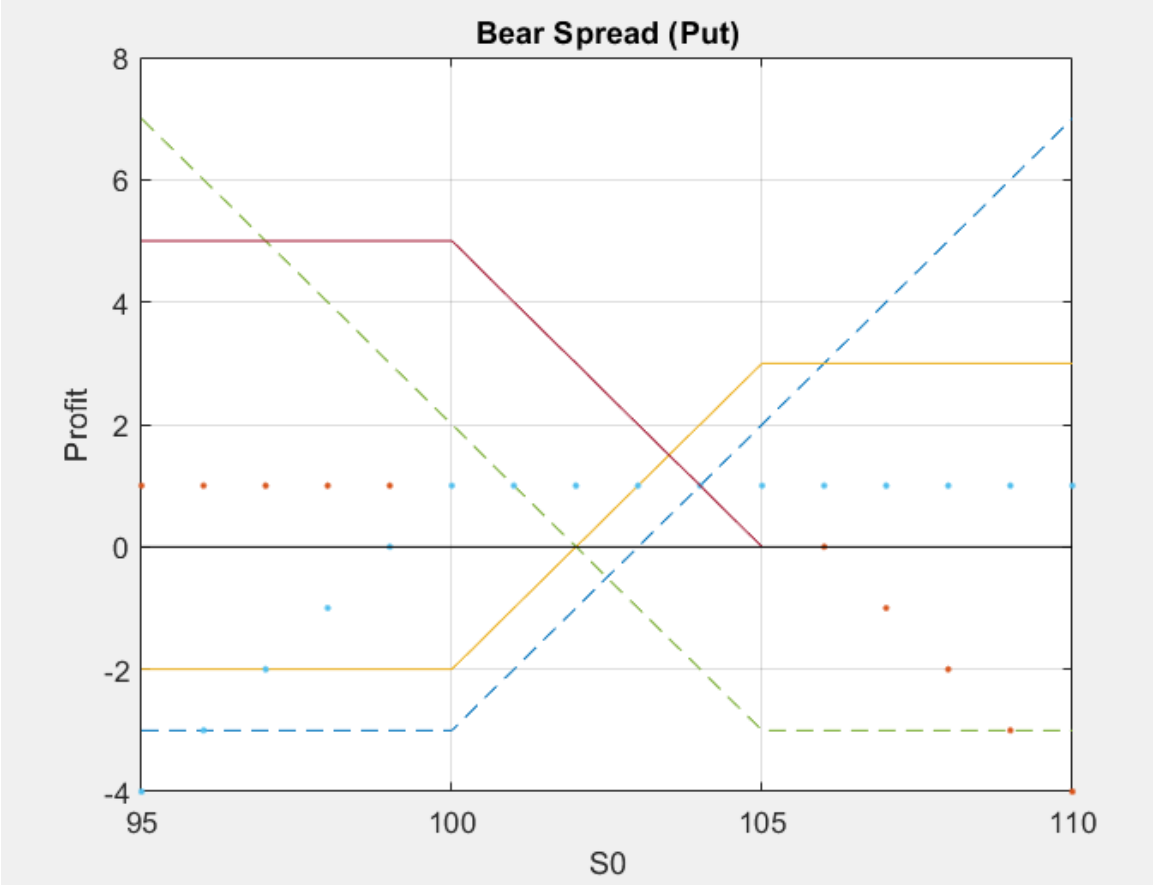

```
%Bull Spread(Call)
clear;
c1 = 3;
c2 = 1;
X1 = 100;
```

```
X2 = 105;
S0 = 95:1:110;
plot(S0,max(S0-X1,0)-c1,'--');
hold on;
plot(S0,-(max(S0-X2,0)-c2),'.');
plot(S0,max(S0-X1,0)-c1-(max(S0-X2,0)-c2));
grid on;
title('Bull Spread');
xlabel('S0');
ylabel('Profit');
plot(S0,zeros(1,16),'black');
```



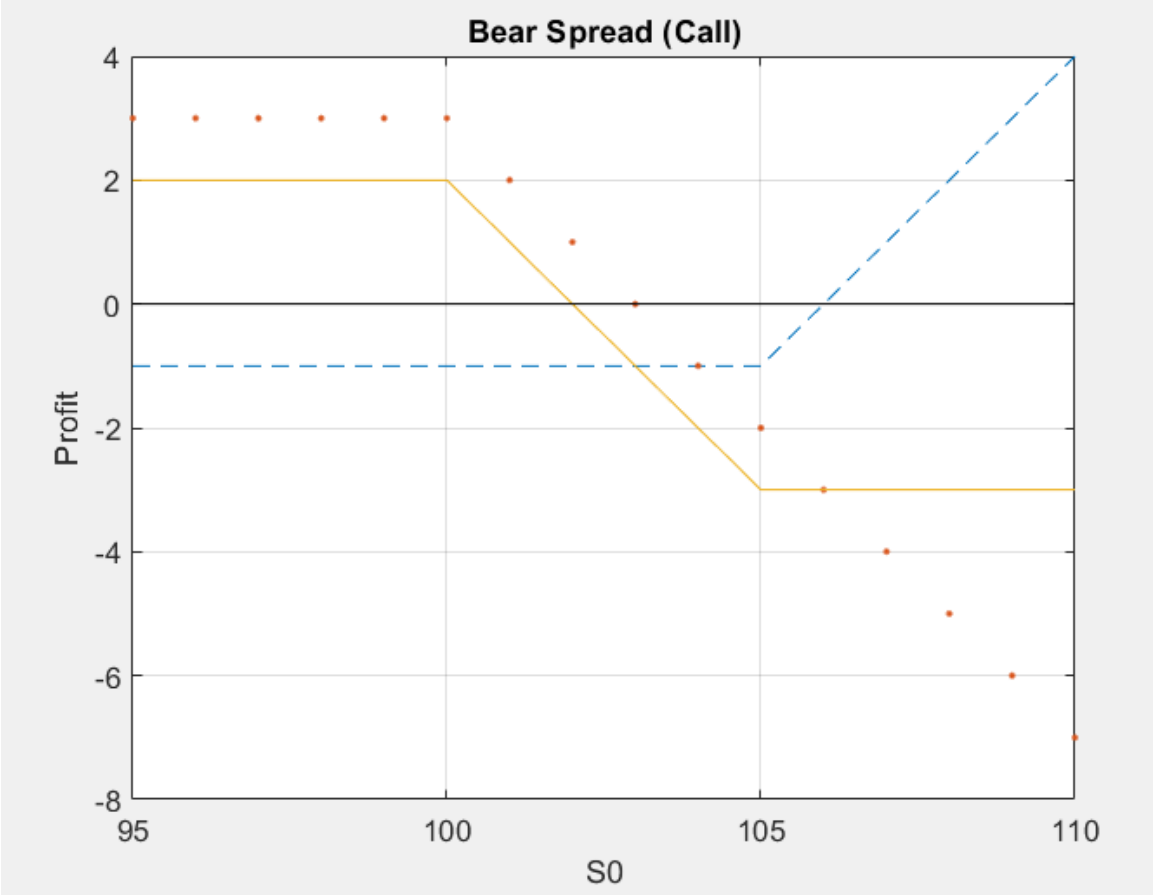

```
%Bear Spread(Put)
clear;
p1 = 1; %short
p2 = 3; %long
X1 = 100;
```

```
X2 = 105;
S0 = 95:1:110;
plot(S0,max(X2-S0,0)-p2,'--');
hold on;
plot(S0,-(max(X1-S0,0)-p1),'.');
plot(S0,max(X2-S0,0)-p1-(max(X1-S0,0)-p1));
grid on;
title('Bear Spread (Put)');
xlabel('S0');
ylabel('Profit');
plot(S0,zeros(1,16),'black');
```



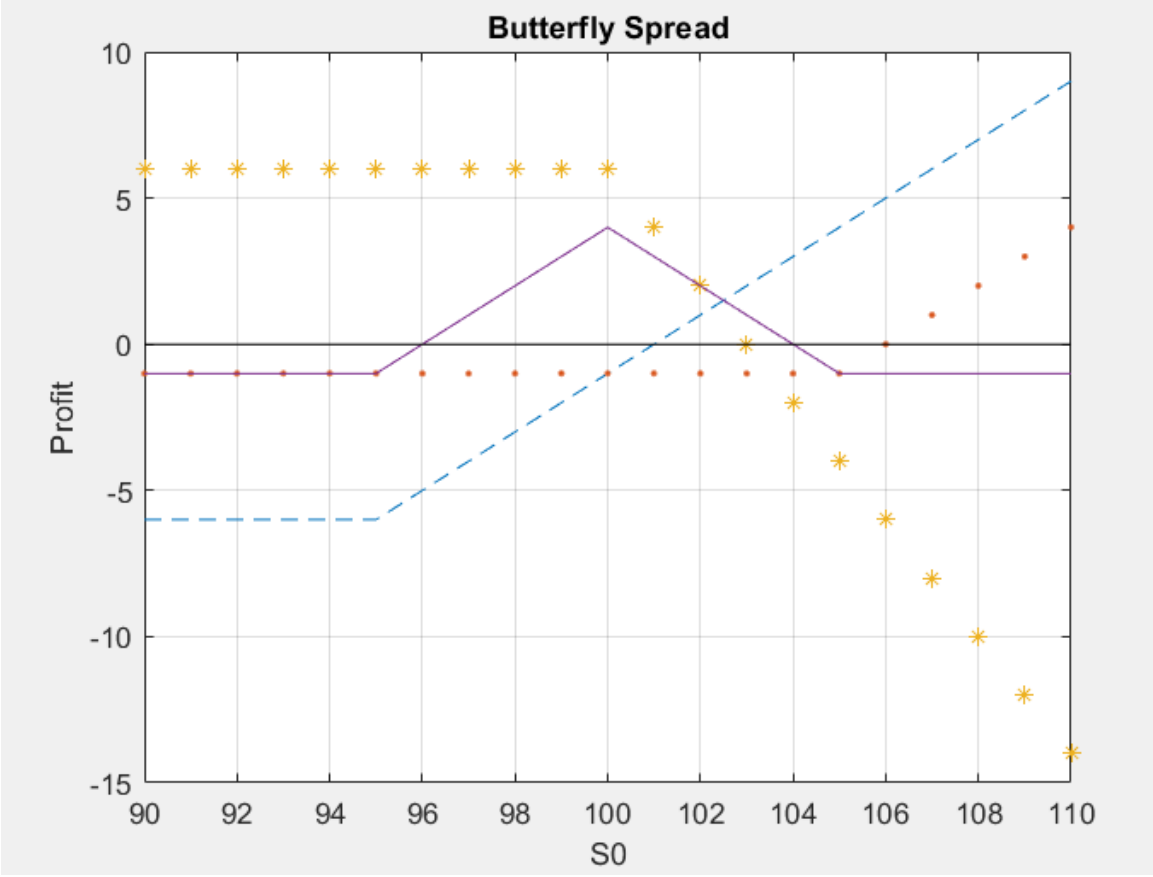

```
%Bear Spread(Call)
clear;
c1 = 3; %short
c2 = 1; %long
X1 = 100;
```

```
X2 = 105;
S0 = 95:1:110;
plot(S0,max(S0-X2,0)-c2,'--');
hold on;
plot(S0,-(max(S0-X1,0)-c1),'.');
plot(S0,max(S0-X2,0)-c2-(max(S0-X1,0)-c1));
grid on;
title('Bear Spread (Call)');
xlabel('S0');
ylabel('Profit');
plot(S0,zeros(1,16),'black');
```



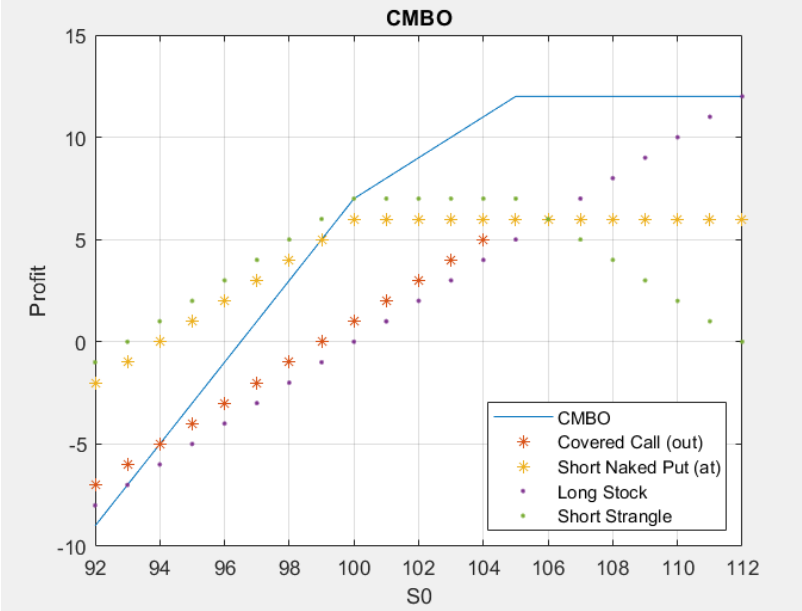

```
%Butterfly
clear;
c1 = 6;
c2 = 3;
c3 = 1;
```

```
X1 = 95; %long
X2 = 100; %short
X3 = 105; %long
S0 = 90:1:110;
plot(S0,max(S0-X1,0)-c1,'--');
hold on;
plot(S0,(max(S0-X3,0)-c3),'.');
plot(S0,-2*(max(S0-X2,0)-c2),'*');
plot(S0,max(S0-X1,0)-c1+(max(S0-X3,0)-c3)+-2*(max(S0-
X2,0)-c2));
grid on;
title('Butterfly Spread');
xlabel('S0');
ylabel('Profit');
plot(S0,zeros(1,21),'black');
```




```
%CMBO
clear;
c = 1;
p = 6;
```

```
X = 105; %K:out-of the money call
X1 = 100; %K:at-the money put

S0 = 92:1:112;
%plot(S0,S0-100,'.');
plot(S0,S0-100-(max(S0-X,0)-c)-(max(X1-S0,0)-p));
hold on;

plot(S0,S0-100-(max(S0-X,0)-c),'*');
plot(S0,-(max(X1-S0,0)-p),'*');

plot(S0,S0-100,'.');
plot(S0,-(max(S0-X,0)-c)-(max(X1-S0,0)-p),'.')


grid on;
title('CMBO');
xlabel('S0');
ylabel('Profit');
legend({'CMBO','Covered Call (out)','Short Naked Put
(at)','Long Stock','Short
Strangle'},'Location','SouthEast');
```




```
%Condor
clear;
p1 = 3; %long
p2 = 5; %short
c1 = 5; %short
```

```
c2 = 3; %long

X1 = 95;
X2 = 100;
X3 = 105;
X4 = 110;

S0 = 90:1:120;

plot(S0,max(X1-S0,0)-p1,'--');
hold on;
plot(S0,-(max(X2-S0,0)-p2),'.');
plot(S0,-(max(S0-X3,0)-c1),'*');
plot(S0,max(S0-X4,0)-c2,'.');

plot(S0,(max(X1-S0,0)-p1)-(max(X2-S0,0)-p2)-(max(S0-
X3,0)-c1)+(max(S0-X4,0)-c2));

grid on;
title('Condor');
xlabel('S0');
ylabel('Profit');
plot(S0,zeros(1,31),'black');
```