

1. Credit Derivatives. Credit Default Swap. Total Return Swap. Credit Forward. Credit Options.

Credit forward

Credit forward contracts provide symmetrical payoffs. The payoff at maturity of the forward contract may be determined by the following formula:

$$[\text{spread at maturity} - \text{contracted spread}] \times \text{notional capital} \times \text{risk factor}$$

Binary credit options

There are two types of binary options

- with predetermined payouts,
- based on credit rating.

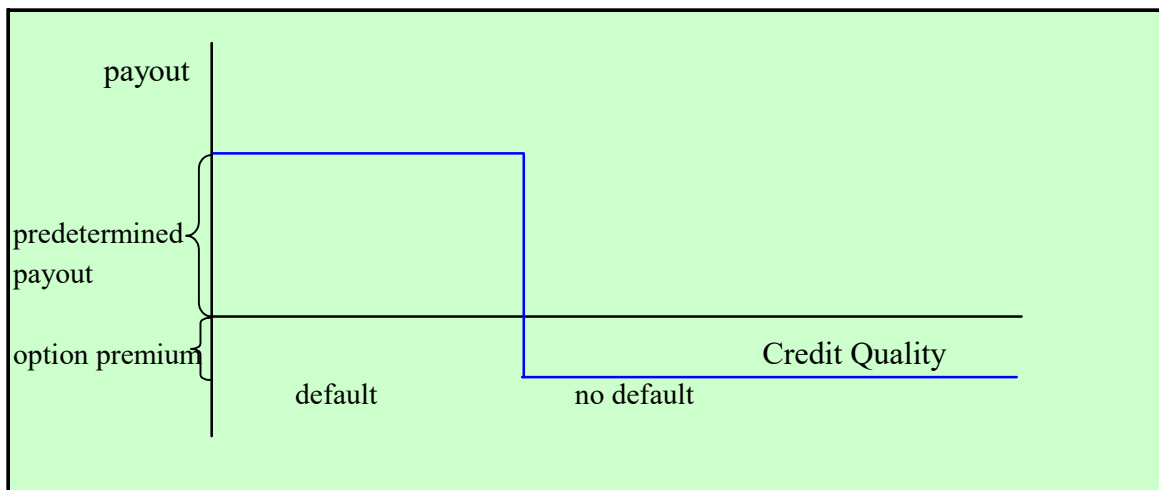


Figure 1. Binary option with predetermined payout

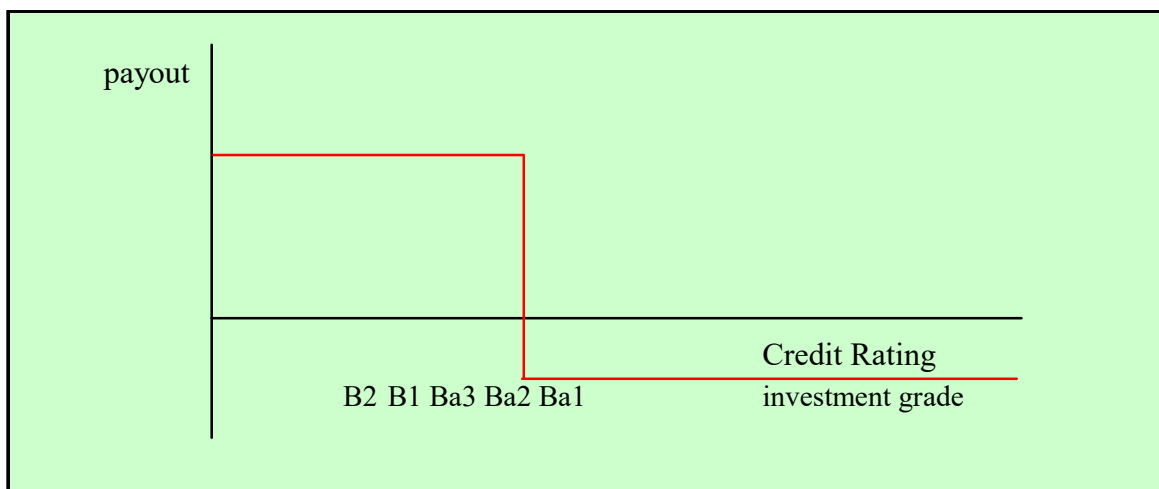


Figure 2. Binary option based on a credit rating

Credit Swaps

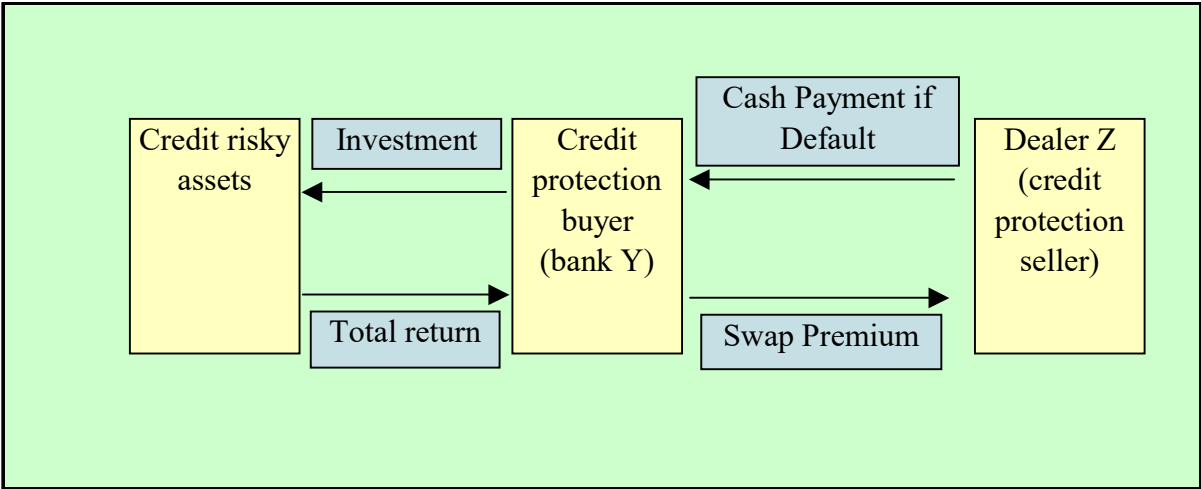


Figure 3. Credit Default Swap with a Cash Payment Upon Default

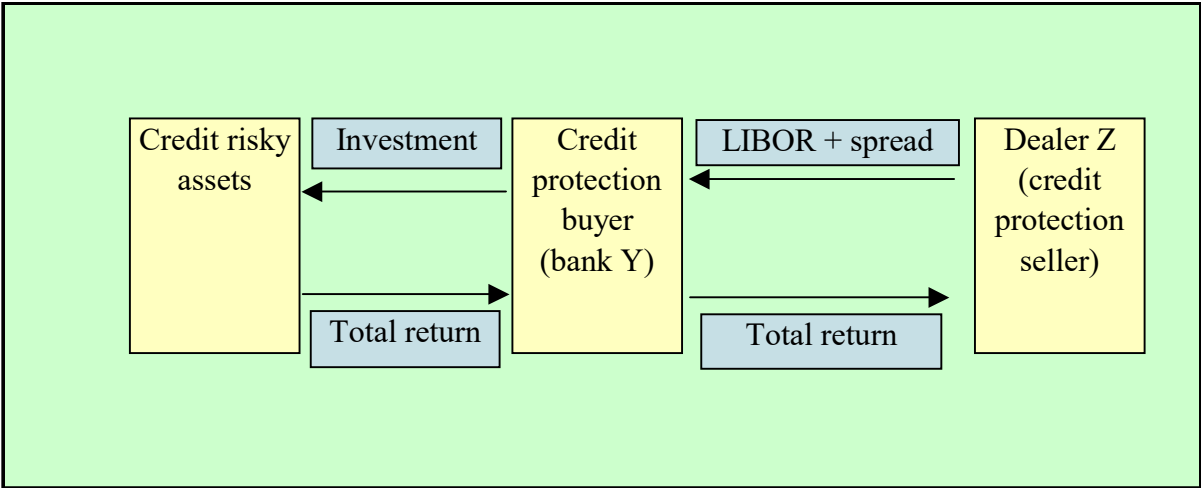


Figure 4. Credit Default Swap with a Periodic Payment

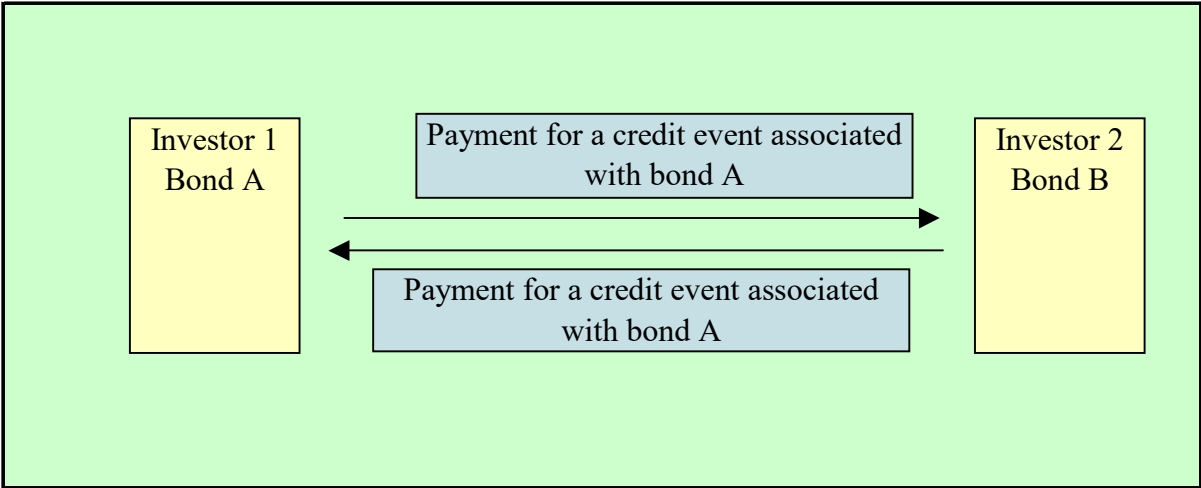


Figure 5. Reciprocal Credit Default Swap

Total Return Swap

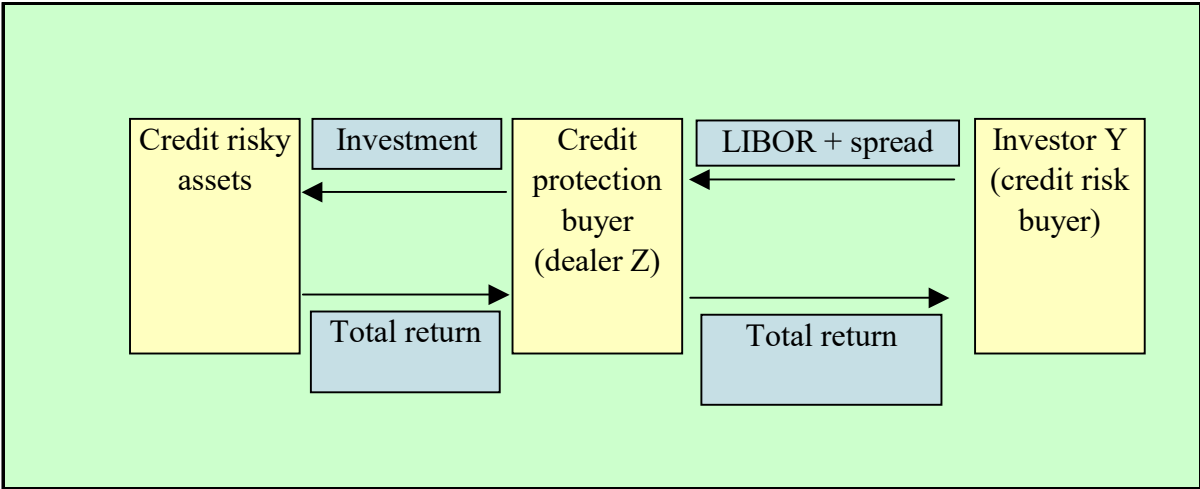


Figure 6. Total Return Credit Swap

Problem 1. Credit Forward

Bank Y buys a credit spread forward.

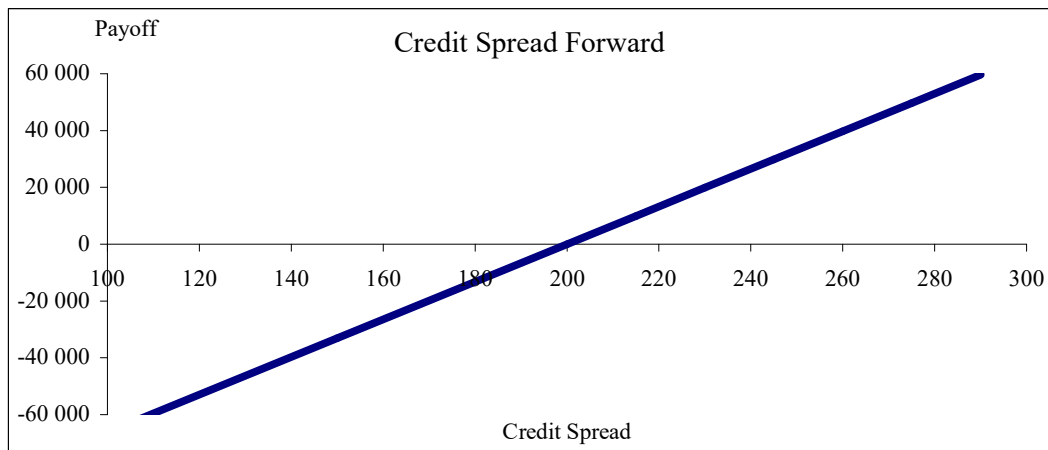
contracted credit spread	200
notional amount	1 000 000
risk factor	6,62

Required:
 Draw the payoff diagram for a long position in credit spread forward.

Solution

$[\text{spreadit spread} - \text{contracted credit spread}] \times \text{notional amount} \times \text{risk factor}$

100	-66 247
150	-33 123
200	0
215	9 937
230	19 874
245	29 811
260	39 748
275	49 685
290	59 622



Problem 2. Credit Spread Call Option

A dealer writes a credit spread call option.
 Origination date: 16-12-2005
 Maturity date: 16-3-2006
 Premium: 1,25% 125 basis points
 Notional principal: 1000000 zł
 Strike credit spread 2,00% Risk factor 6,62

Underlying asset: bonds issued by a company XYZ.
 Maturity: 16 grudzień 2015
 Coupon: 8,00% (semiannual payments)

The interest rates on the origination date and expiration date are following:

	16-12	16-03
Risk-free rate	5,00%	4,90%
Credit spread	2,00%	2,15%

Required
 (a) Calculate the payoff of a short call option on bonds on the origination and the expiration dates.
 (b) What is the net payoff for a long position in credit spread call at maturity ?
 (c) Show the payoff's sensitivity on spread for a long position in credit spread call option.

Solution

(a)

Price	Date	Yield T	Credit spread	YTM	Price of a bond	Total value	Payoff	Duration
spot	16-12-2005	5,00%	2,00%	7,00%	107,11	1071062,02		6,93
strike	16-12-2005	5,00%	2,00%	7,00%	107,11	1071062,02	0,00	6,93
spot	16-3-2006	4,90%	2,15%	7,05%	106,60	1066005,69		6,69
strike	16-3-2006	4,90%	2,00%	6,90%	107,70	1076969,82	-10964,13	6,71
Premium			12500	Net payoff		1535,87		

(b)

$$[\text{spread} - \text{contracted}] \times \text{notional amount} \times \text{risk factor} - \text{premium}$$

$$0,0015 \quad \times \quad 1000000 \quad \times \quad 6,62 \quad = \quad 9937,04$$

$$\underline{\underline{-12500,00}}$$

$$\underline{\underline{-2562,96}}$$

(c)

Spread	Price	Payoff
100	115,39	-12500,00
150	111,46	-12500,00
200	107,70	-12500,00
250	104,10	20623,48
300	100,65	53746,95
350	97,35	86870,43
400	94,19	119993,91
450	91,17	153117,38
500	88,26	186240,86

