



Credit Default Swaps

- Introduction
- Pricing
- Hedging



Credit Default Swaps

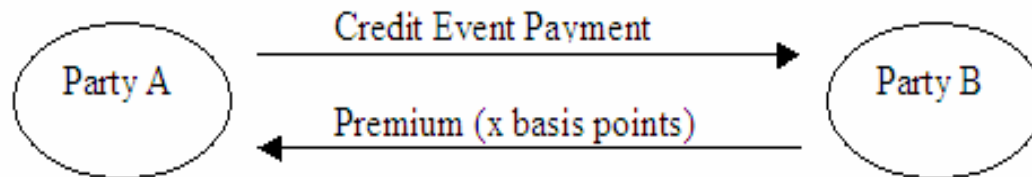
Introduction

- **swap** - an agreement between two parties, in which they agree to make periodic payments to each other according to two different indices
- **credit swap** - one party of the contract pays fixed fee and, in case of default, the party will receive a contingent claim.
- **Credit Default Swap**
 - used to transfer credit risk from one company to another
 - a contract where party A has the right to sell a bond, issued by a company C, for its face value to company B, when default occurs
 - at the same time company A makes periodic payment to company B

Credit Default Swaps

Introduction

- Party A owns a security that pays an annual of 10%
- buys a credit guarantee from party B
- pays a regular payment to B to transfer the risk of default





Credit Default Swaps

Pricing

- Maturity T : usually from 1 to 10 years
- Credit event: default, bankruptcy, downgrade
- $c(T)$: fixed coupon that the protection buyer pays
- In case of default, protection seller pays the difference between the notional amount of the bond and the recovery value $1 - \delta$
- Contract value is zero at the beginning

Credit Default Swaps Pricing

$$(1 - \delta)E^*(e^{-r\tau} |_{\tau \leq T}) - c(T) \sum_{i=1}^n e^{-ri} P^*(|_{\tau > i}) = 0$$

$$c(T) = \frac{(1 - \delta)E^*(e^{-r\tau} |_{\tau \leq T})}{\sum_{i=1}^n e^{-ri} P^*(|_{\tau > i})}$$

- where τ is the time of default
- assume constant interest rate
- both $E^*(e^{-r\tau} |_{\tau \leq T})$ and $P^*(|_{\tau > i})$ are readily available from market data



Credit Default Swaps

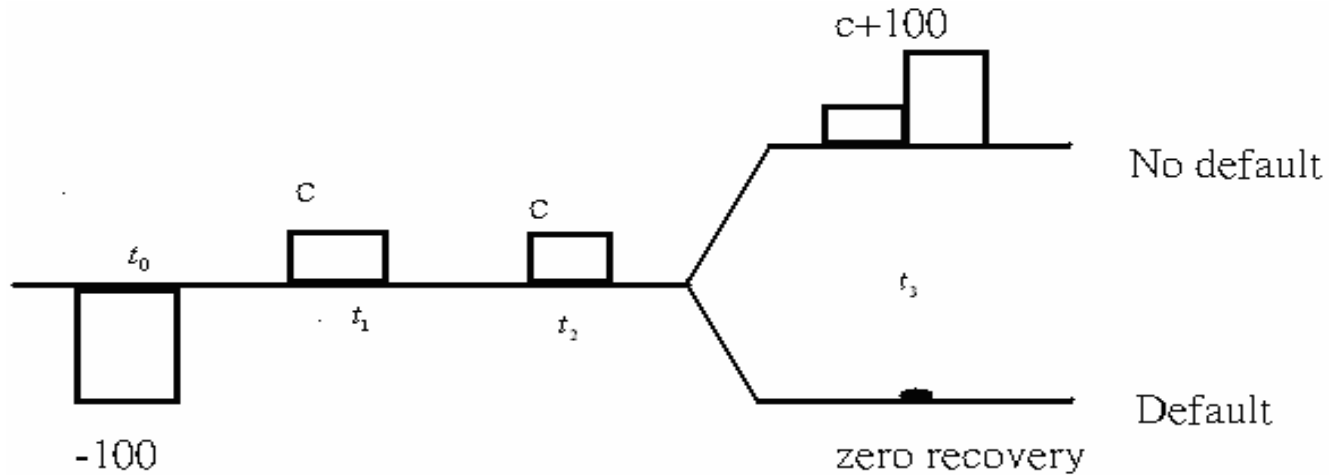
Hedging

- CDS like insurance against certain credit event
- Seller will have to pay if the credit event happens
- From the seller point of view, he or she would like to hedge the risky role by adopting some possible procedures
- First we have to know how to construct the CDS in the market

Credit Default Swaps Hedging

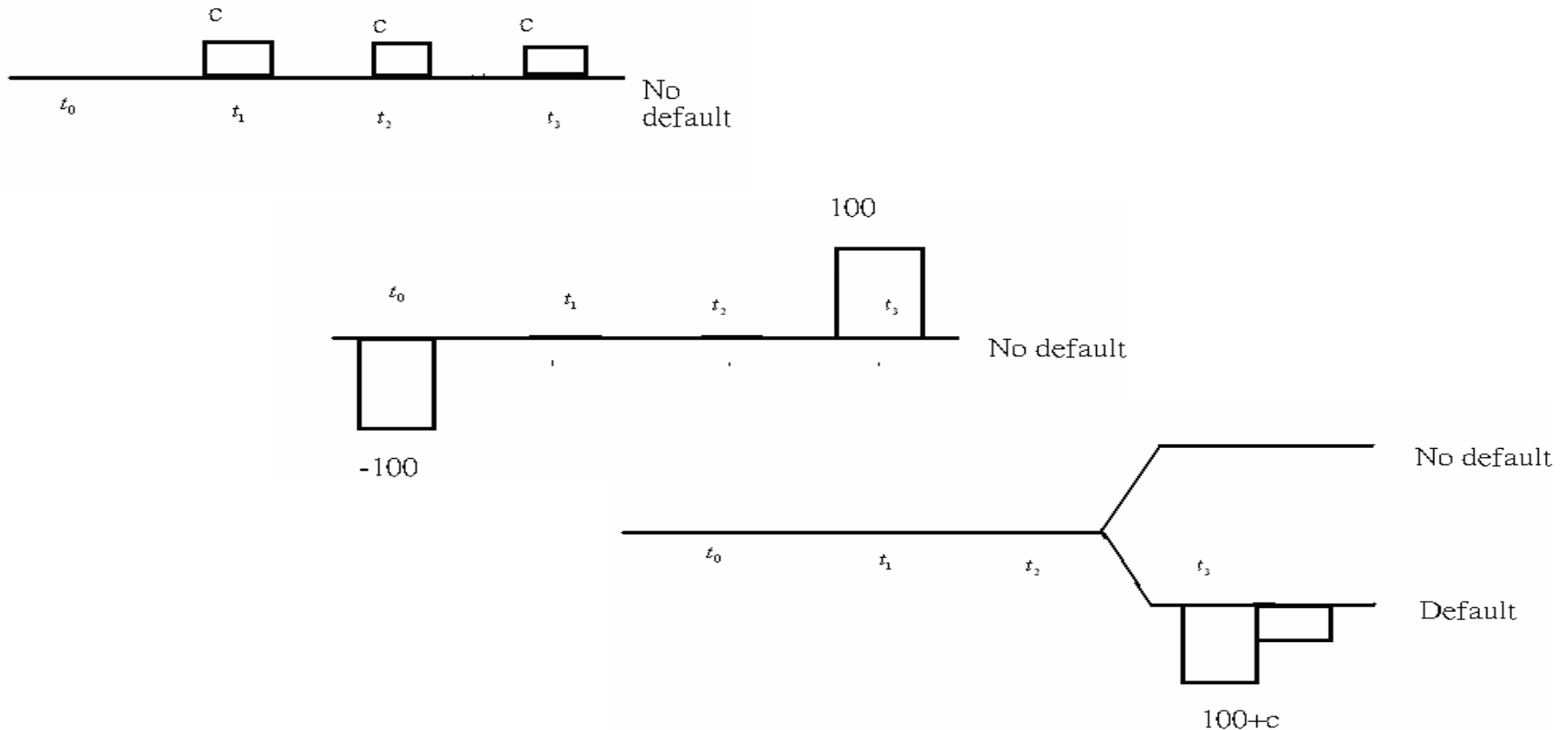
How to create the CDS contract

- Consider a risky bond that pays coupons annually over 3 years
- Assume that the default occurs only in period t_3



Credit Default Swaps Hedging

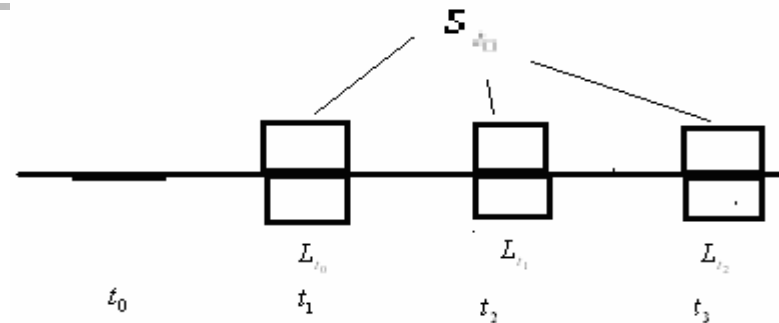
- Decompose to some familiar contract



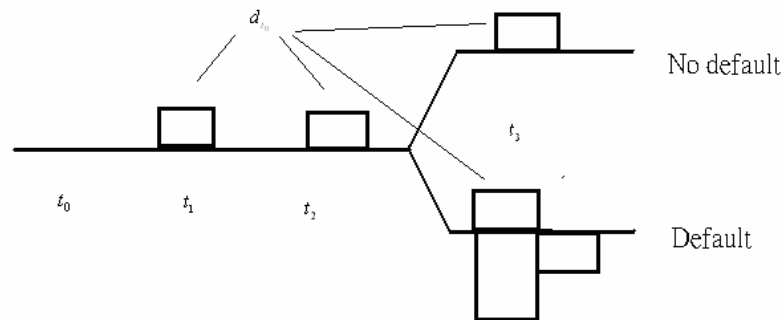
Add back together should equal to original risky bond

Credit Default Swaps Hedging

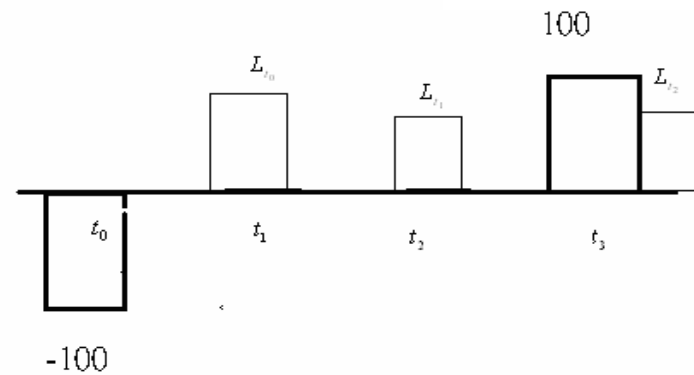
Fixed receiver interest rate swap:



CDS for a seller:



Default free money market deposit:





Credit Default Swaps

Hedging

- Defaultable bond on the credit = receiver swap + default-free deposit + CDS on the credit

REWRITE AS

- **CDS on the credit = Risky bond on the credit + payer swap + default-free loan**
 - Seller needs to take the opposite position on the right hand side of this equation.
 - That is, first short the risky bond, deposit the received 100 in a default-free deposit account, and contract a receiver swap.
 - These procedures and the long CDS position will then ‘cancel’ out.