

Credit Derivatives

Credit derivatives

Payoff depends on the occurrence of a credit event:

- default: any non-compliance with the exact specification of a contract
- price or yield change of a bond
- credit rating downgrade

In the case of the default of a bond, any loss in value from the default date until the pricing date (a specified time period after the default date) becomes the value of the underlying.

Risk disaggregation

Credit derivatives are over-the-counter contracts which allow the isolation and management of credit risk from all other components of risk.

interest rate risk	credit risk
volatility risk	FX risk

Off-balance sheet financial instruments that allow end users to buy and sell credit risk.

Corporate Bonds

Bundles of risks embedded

- duration, convexity, callability, etc.
- credit risk
 - risk of default
 - risk of volatility in credit spreads

To manage duration, convexity and callability risk independent of the bond position.

Credit derivatives complete the process by allowing independent management of default or credit spread risk.

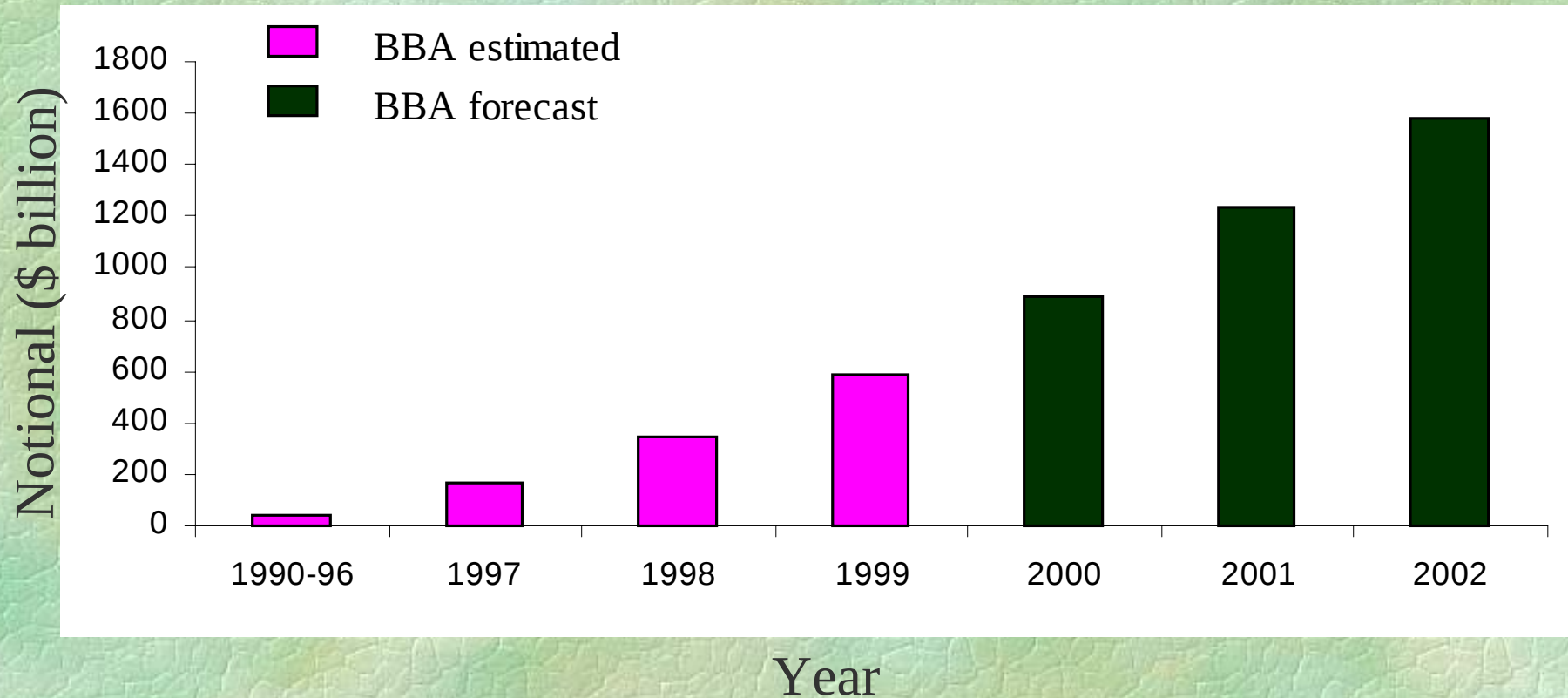
Uses of credit derivatives

To *hedge* against an increase in risk, or to gain *exposure* to a market with higher risk.

- Creating customized exposure; e.g. gain exposure to Russian debts (rated below the manager's criteria per her investment mandate).
- Leveraging credit views - restructuring the risk/return profiles of credits.
- Allow investors to eliminate credit risk from other risks in the investment instruments.

Credit derivatives allow investors to take advantage of relative value opportunities by exploiting inefficiencies in the credit markets.

Size of the credit derivative market



Source: British Bankers Association

Credit event

- bankruptcy, insolvency or payment default;
- stipulated price decline for the reference asset;
- rating downgrade for the reference asset.

Reference asset

- actively-traded corporate or sovereign bond or a portfolio of these bonds;
- portfolio of loans

Reference rate

An agreed fixed or floating interest rate e.g. 3-month LIBOR

Default payment

- post default price of the reference asset or determined by a dealer pool;
- fixed percentage of the notional amount of the transaction
- payment of par by the seller in exchange for physical delivery of the defaulted reference asset.

*Credit derivatives can take the form of **swaps** or **options***

1. In a credit swap, one party pays a fixed cashflow stream and the other party pays only if a credit event occurs (or payment based on yield spread).
2. A credit option would require the upfront premium and would pay off based on the occurrence of a credit event (or on a yield spread).

Remarks

- Pricing a credit derivative is not straightforward since modeling the stochastic process driving the party's credit risk is challenging.
- The determination of the occurrence of a credit event must be clearly specified in the contract.

Credit event

- Occurs when the calculation agent is aware of publicly available information as to the existence of a credit condition.
- Credit condition means either a payment default or a bankruptcy event in respect of the issuer.
- Payment default means, subject to a dispute in good faith by the issuer, either the issuer fails to pay any amount due of the reference asset, or pay any amount due of the reference asset, or any other present or future indebtedness of the issuer for or in respect of moneys borrowed or raised or guaranteed.

Bankruptcy

- Bankruptcy event means the declaration by the issuer of a general moratorium in or rescheduling of payments on any external indebtedness.
- Publicly available information means information that has been published in any two or more internationally recognized published or electronically displayed financial news sources.

Common credit derivatives

1. Credit default swaps

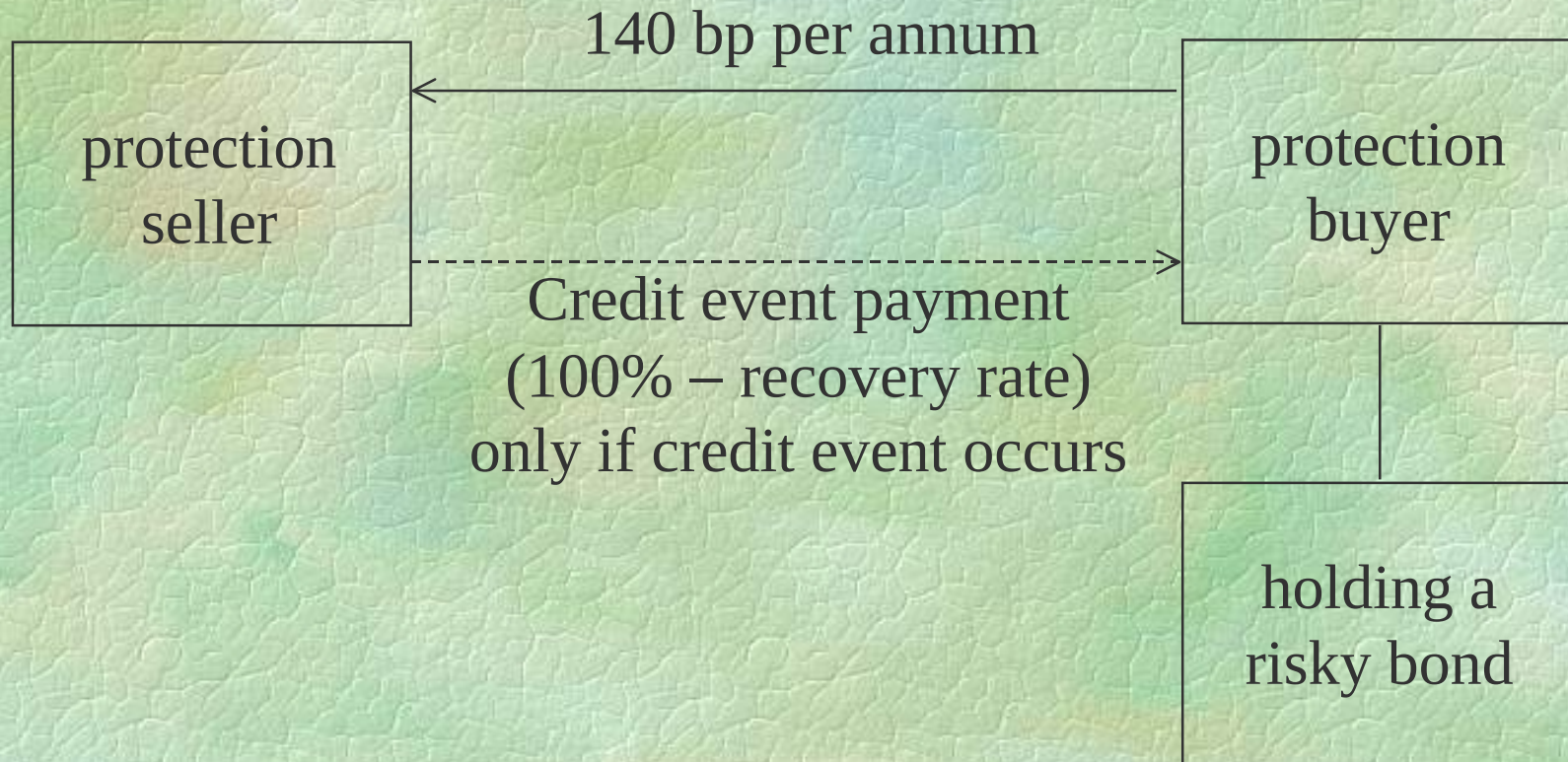
- Total return swaps

3. Credit spread options

4. Credit linked notes

Credit default swaps

The protection seller receives fixed periodic payments from the protection buyer in return for making a single contingent payment covering losses on a reference asset following a default.



Protection seller

- earns investment income with no funding cost
- gains customized, synthetic access to the risky bond

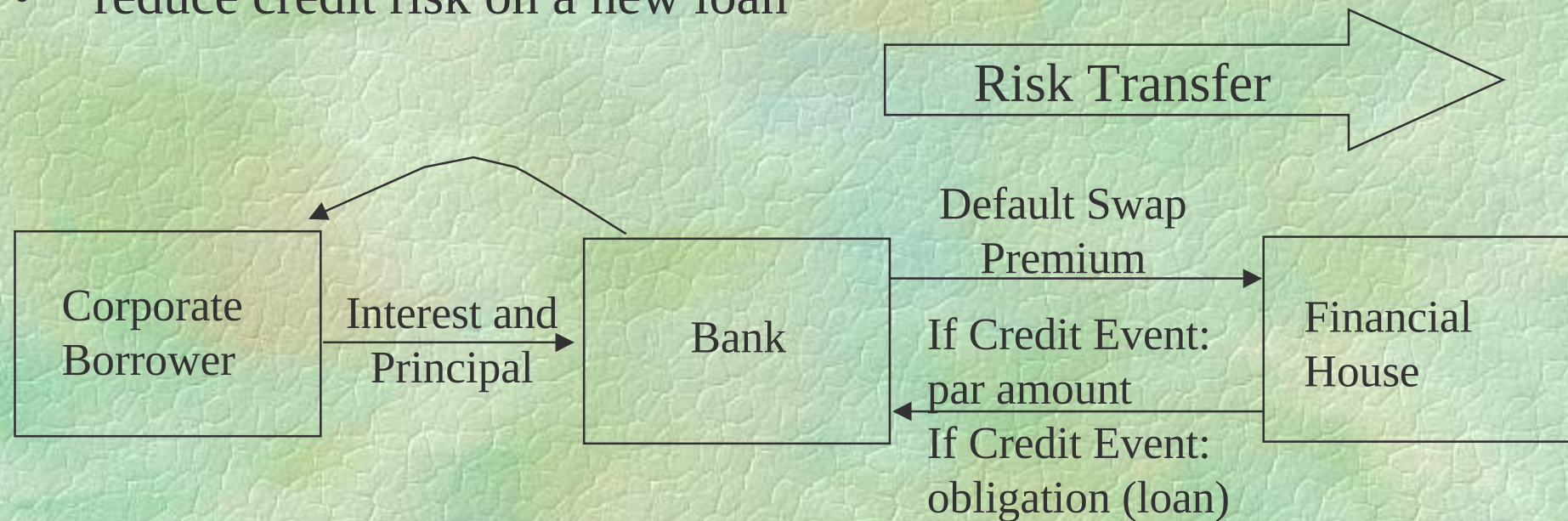
Protection buyer

- hedges the default risk on the reference asset
1. Very often, the bond tenor is longer than the swap tenor. In this way, the protection seller does not have exposure to the full market risk of the bond.
 2. *Basket default swap* – gain additional yield by selling default protection on several assets.

A bank lends 10mm to a corporate client at $L + 65\text{bps}$. The bank also buys 10mm default protection on the corporate client for 50bps.

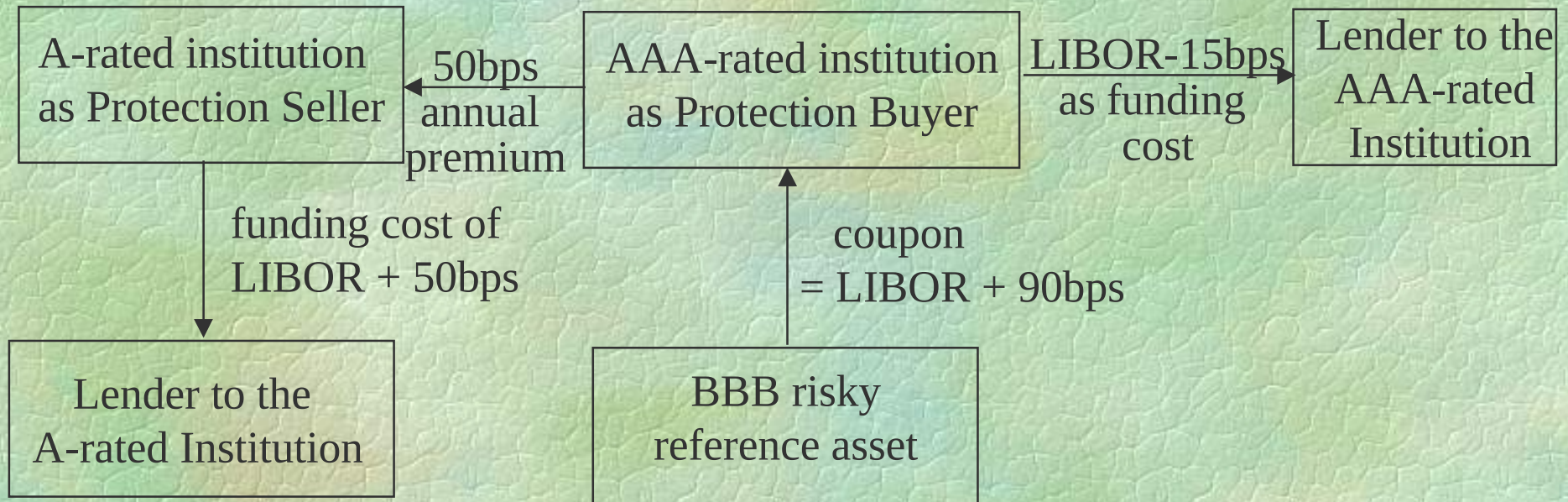
Objective achieved

- maintain relationship
- reduce credit risk on a new loan



Default Swap Settlement following Credit Event of Corporate Borrower

Funding cost arbitrage – Credit default swap



The combined risk faced by the Protection Buyer:

- default of the BBB-rated bond
- default of the Protection Seller on the contingent payment

The AAA-rated Protection Buyer creates a synthetic AA-asset with a coupon rate of $\text{LIBOR} + 90\text{bps} - 50\text{bps} = \text{LIBOR} + 40\text{bps}$.

This is better than $\text{LIBOR} + 30\text{bps}$, which is the coupon rate of a AA-asset (net gains of 10bps).

For the A-rated Protection Seller, it gains synthetic access to a BBB-rated asset with earning of net spread of

$$50\text{bps} - \underbrace{[(\text{LIBOR} + 90\text{bps}) - (\text{LIBOR} + 50\text{bps})]} = 10\text{bps}$$

the A-rated Protection Seller earns
40bps if it owns the BB asset directly

In order that the credit arbitrage works, the funding cost of the default protection seller must be *higher* than that of the default protection buyer.

Example

Suppose the A-rated institution is the Protection buyer, and assume that it has to pay 60bps for the credit default swap premium (higher premium since the AAA-rated institution has lower counterparty risk).

The net loss of spread = $(60 - 40) = 20\text{bps}$.

Supply and demand drive the price

Credit Default Protection Referencing a 5-year
Brazilian Eurobond (May 1997)

Chase Manhattan Bank	240bps
Broker Market	285bps
JP Morgan	325bps

- * It may be that Chase had better advantage to hedge the credit default protection sold, so they were willing to offer a good price.

One year Brazil credit default swap

Early Termination Date: With three business days' following a credit event with a terminal payment being made.

Calculation Amount: USD 25 million

Payments of the Default Protection Buyer: Default protection buyer

Payment Amount and Dates: **XXX** basis points on a semiannual A/360 day basis calculated from the effective date to the earlier of

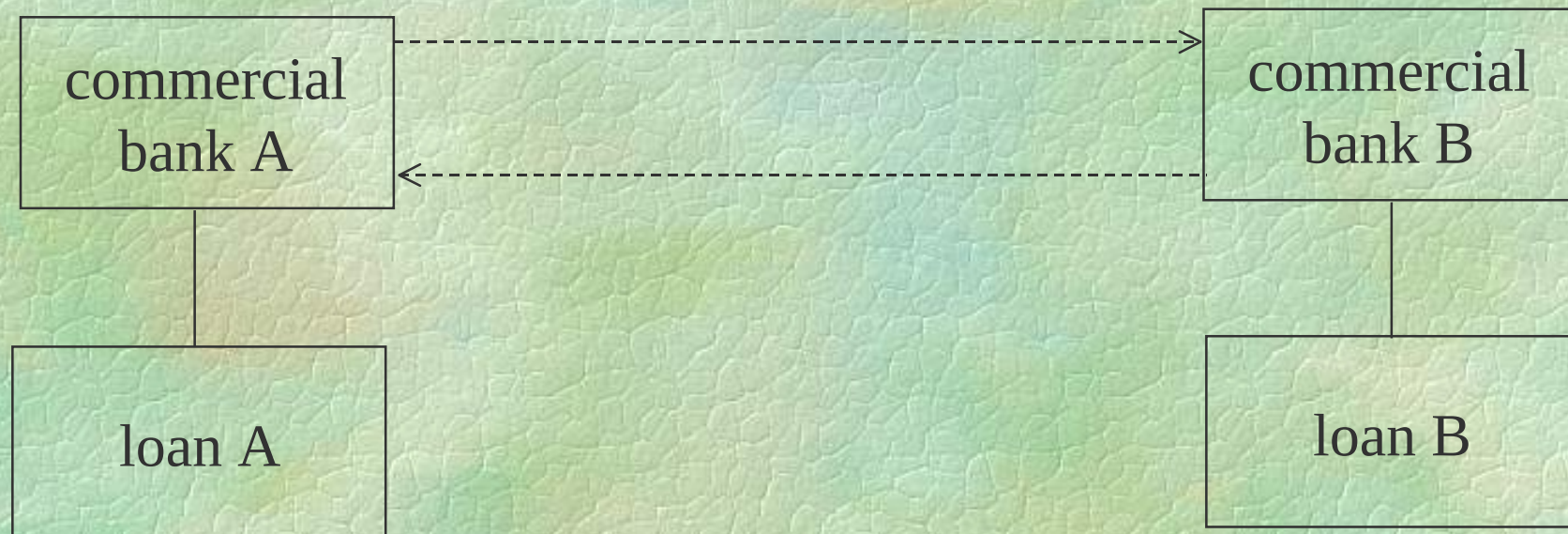
1. one year after the trade date, or
2. the early termination date.

Reference Obligation

Issuer/Borrower:	Federative Republic of Brazil
Rating:	B1 Moody's, B+ Standard and Poor's
Type:	Global
Currency Denomination:	USD
Coupon:	8 ⁷ / ₈ percent payable semiannually
Maturity:	November 5, 2001
Reference Issue Date:	November 5, 1996
Reference Amount Issued:	USD 750,000,000

Credit default exchange swaps

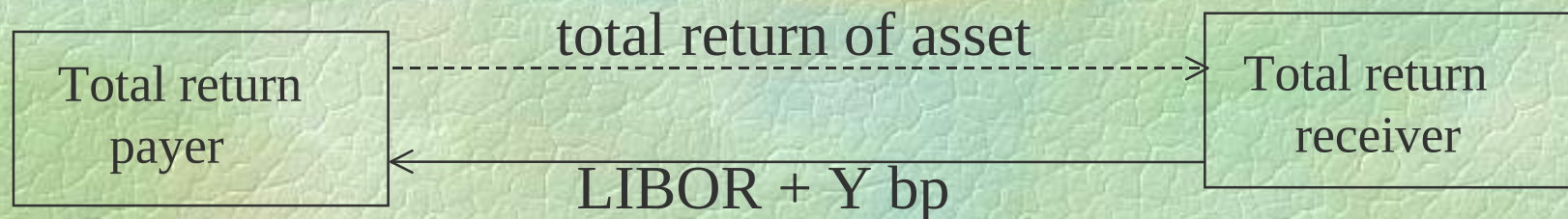
Two institutions that lend to different regions or industries can diversify their loan portfolios in a single non-funded transaction – hedging the concentration risk on the loan portfolios.



- * contingent payments are made only if credit event occurs on a reference asset
- * periodic payments may be made that reflect the different risks between the two reference loans

Total return swap

- exchange the total economic performance of a specific asset for another cash flow



Total return comprises the sum of interests, fees and any change-in-value payments with respect to the reference asset.

A commercial bank can hedge all credit risk on a loan it has originated. The counterparty can gain access to the loan on an off-balance sheet basis, without bearing the cost of originating, buying and administering the loan.

Motivation of the receiver

1. Investors can create *new assets* with a *specific maturity* not currently available in the market.
2. Investors gain *efficient off-balance sheet exposure* to a desired asset class to which they otherwise would not have access.
3. Investors may achieve a *higher leverage on capital* – ideal for hedge funds. Otherwise, *direct asset ownership* is on *on-balance sheet* funded investment.
4. Investors can *reduce administrative costs* via an off-balance sheet purchase.
5. Investors can *access entire asset classes* by receiving the total *return on an index*.

Motivation of the payer

The payer creates a hedge for both the *price risk* and *default risk* of the reference asset.

- * A long-term investor, who feels that a reference asset in the portfolio may *widen in spread* in the *short term* but will recover later, may enter into a total return swap that is shorter than the maturity of the asset. This structure is *flexible* and *does not require a sale of the asset* (thus accommodates a temporary *short-term negative view* on an asset).

Total rate of return bond swap

Total Return Payer:	U. S. Bank
Total Return Receiver:	European bank
Reference Asset:	Reference Bond
Issuer:	U. S. corporate
Coupon:	7.0%
Interest Payable:	Seminannual, 30/360
Final Maturity:	5 years
Collateral Type:	Senior unsecured
Settlement Price:	100
Calculation Amount:	USD 10,000,000
Trade Date:	Today (insert today's date)
Effective Date:	Five business days from today
Termination Date:	The earlier of the effective date plus one year or the "early redemption date"

U.S. Bank Pays:

European Bank Pays:

Termination Payment:

All cash flows of the reference bond on the same day the cash flows of the reference bond are paid 3-month LIBOR + 25 basis points on a quarterly A/360 basis on the calculation amount

On the termination date, any accrued payments due by either the total return payer or total return receiver will be paid. In addition, the following termination payment amount will be made:

$$\text{Calculation Amount} \times [\text{Initial Price} - \text{Market Value}]$$

If positive, the TROR receiver will make this payment to the TROR payer.

If negative, the TROR payer will make this payment to the TROR receiver.

Credit spread derivatives

- Options, forward and swaps that are linked to credit spread.
Credit spread = yield of debt – risk-free or reference yield
- Investors gain protection from any degree of credit deterioration resulting from ratings downgrade, poor earnings etc.
(This is unlike default swaps which provide protection against defaults and other clearly defined ‘credit events’.)

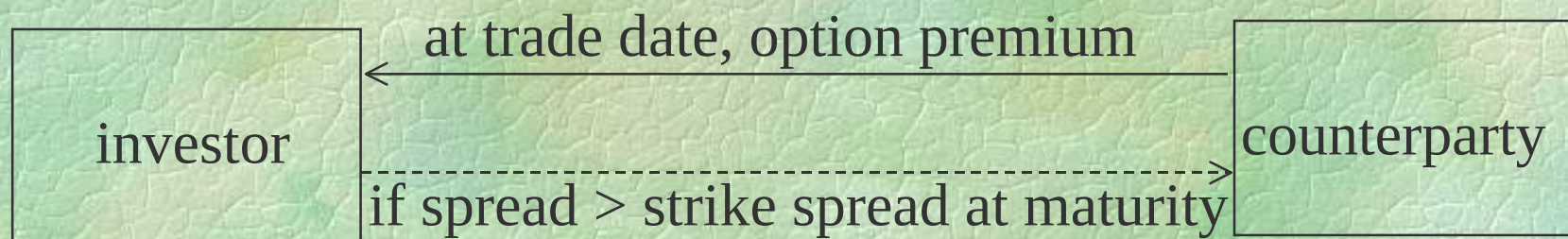
Credit spread option

Use credit spread option

- to hedge against rising credit spreads;
- to target the future purchase of assets at favorable prices.

Example

An investor wishing to buy a bond at a price below market can sell a credit spread option to target the purchase of that bond if the credit spread increases (earn the premium if spread narrows).



$$\text{Payout} = \text{notional} \times (\text{final spread} - \text{strike spread})^+$$

Payoff of the credit spread put

The holder of the put has the right to sell the bond at the strike spread (say, spread = 330 bps) when the spread moves above the strike spread (corresponding to the dropping of bond price).

- May be used to target the future purchase of an asset at a favorable price.

Example

The investor intends to purchase the bond below current market price (300 bps above US Treasury) in the next year and has targeted a forward purchase price corresponding to a spread of 350 bps. She sells for 20 bps a one-year credit spread put struck at 330 bps to a counterparty (currently holding the bond and would like to protect the market price against spread above 330 bps).

- $spread < 330$; investor earns the premium
- $spread > 330$; investor acquires the bond at 350 bps

Credit-linked notes

They are structured notes embedded with the *credit option*.

- To allow the issuer to reduce the coupon rate if the reference financial index deteriorates
- To reduce the credit exposure of the issuer
- To provide higher rate of return to holders; the extra return is used to compensate the credit risk transferred to the holders.

Example

One-year credit-linked note issued by a credit card company

- promises to pay \$1,000 and an 8% coupon if the index of credit delinquency rate is below 5%;
- if index $> 5\%$, then coupon rate falls to 4%.

A credit option is embedded: right to lower the interest payments if delinquency rate increases.

Basket default notes

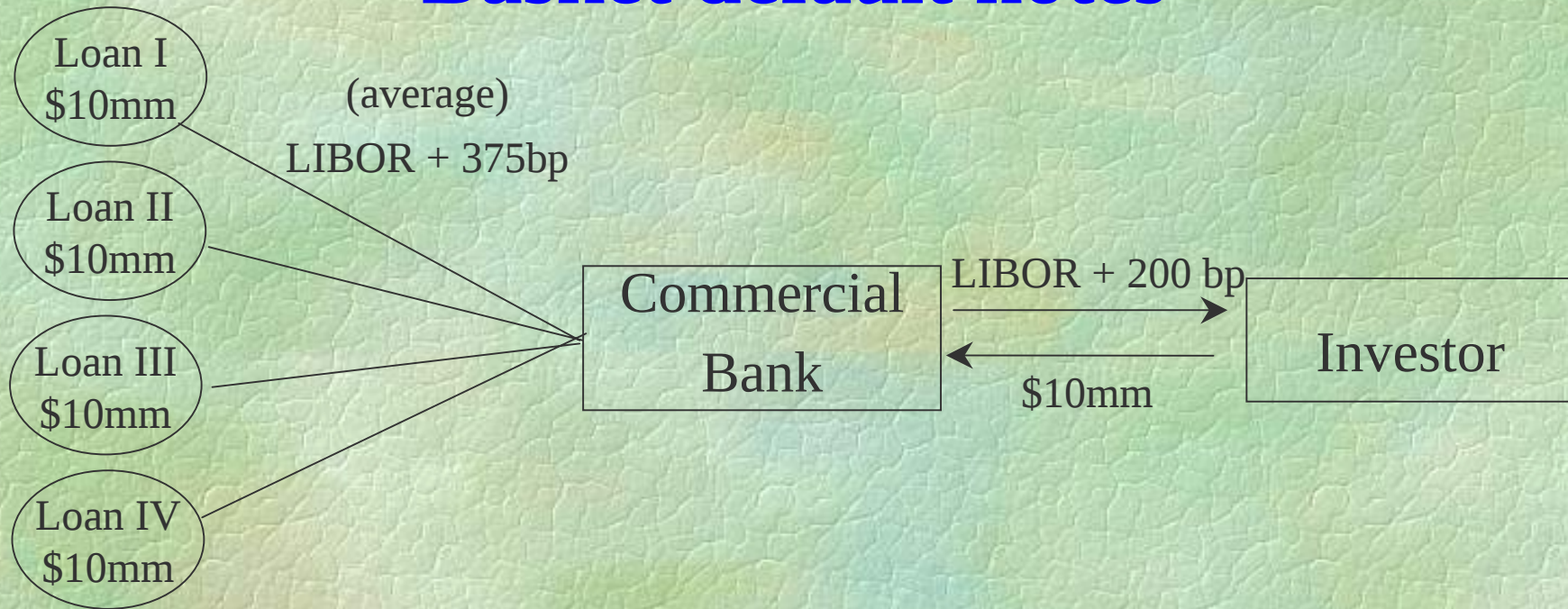
Holder earns an enhanced return for taking on compounded credit-risk – the credit events of a *basket of debts*.

Full principals are returned unless a credit event occurs during the life of the note.

First-to-default structure

In the event of a default of any of the bonds in the basket, the holder redeems the note at par times the recovery rate of the first bond to default.

Basket default notes



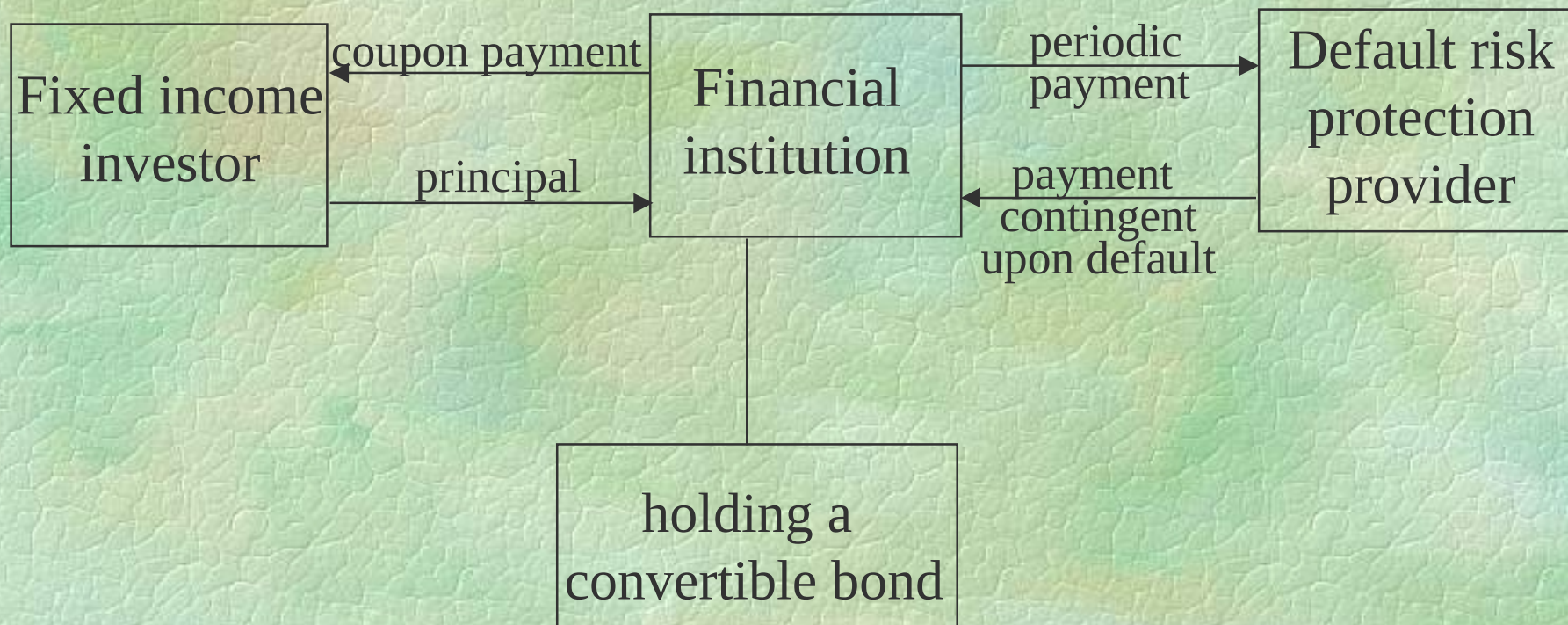
In the event that any of the loans defaults, the note is terminated. The bank keeps the \$10 million of note proceeds, and the defaulted loan is put to the investor.

Effectively, the investor bears the *risk of the first default*. However, any subsequent defaults are the sole responsibility of the bank.

Stripping different components of convertible bonds

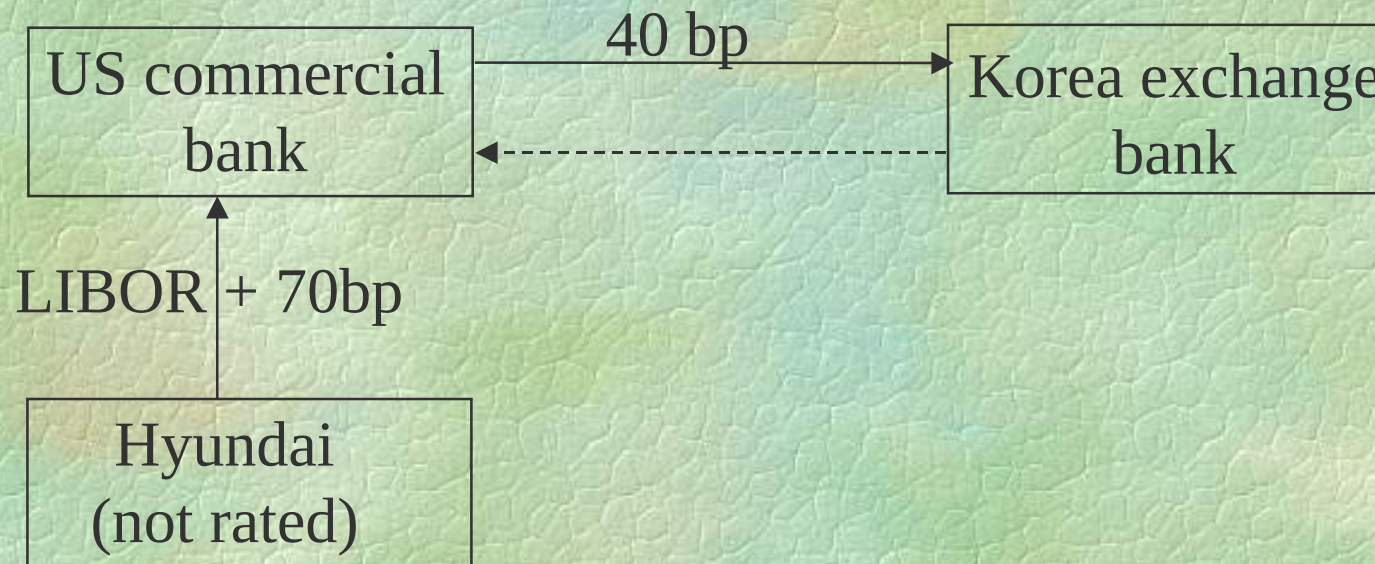
A convertible bond consists of 3 components

- bond component
- equity component
- default risk



Correlation of defaults

Before the Fall 1997 crisis, several Korean banks were willing to offer credit default protection on other Korean firms.



- * Political risk, restructuring risk and the risk of possible future war lead to potential high correlation of defaults.

Advice: Go for a *European bank* to buy the protection.

Risks inherent in credit derivatives

- *counterparty risk* – counterparty could renege or default
- *legal risk* – arises from ambiguity regarding the definition of default
- *liquidity risk* – thin markets (declines when markets become more active)
- *model risk* – probabilities of default are hard to estimate

Market efficiencies provided by credit derivatives

1. Absence of the reference asset in the negotiation process - flexibility in setting terms that meet the needs of both counterparties.
2. *Short sales* of credit instruments can be executed with reasonable *liquidity* - hedging existing exposure or simply *profiting from a negative credit view*. Short sales would open up a wealth of arbitrage opportunities.
3. Offer considerable flexibilities in terms of *leverage*. For example, a hedge fund can both *synthetically finance the position* of a portfolio of bank loans but avoid the administrative costs of direct ownership of the asset.

Growth is driven by the value created

- Credit risk is inherent in virtually all financial instruments and transactions.
- Quantitative techniques for credit portfolio management are improving.
- Credit markets are inefficient, creating many opportunities to capture value.
- Flexibility in product design to cater all needs.

Emerging market debts contribute the asset class to which credit derivatives can add the most value.