An Introduction to Credit Derivatives and CDSW pricing

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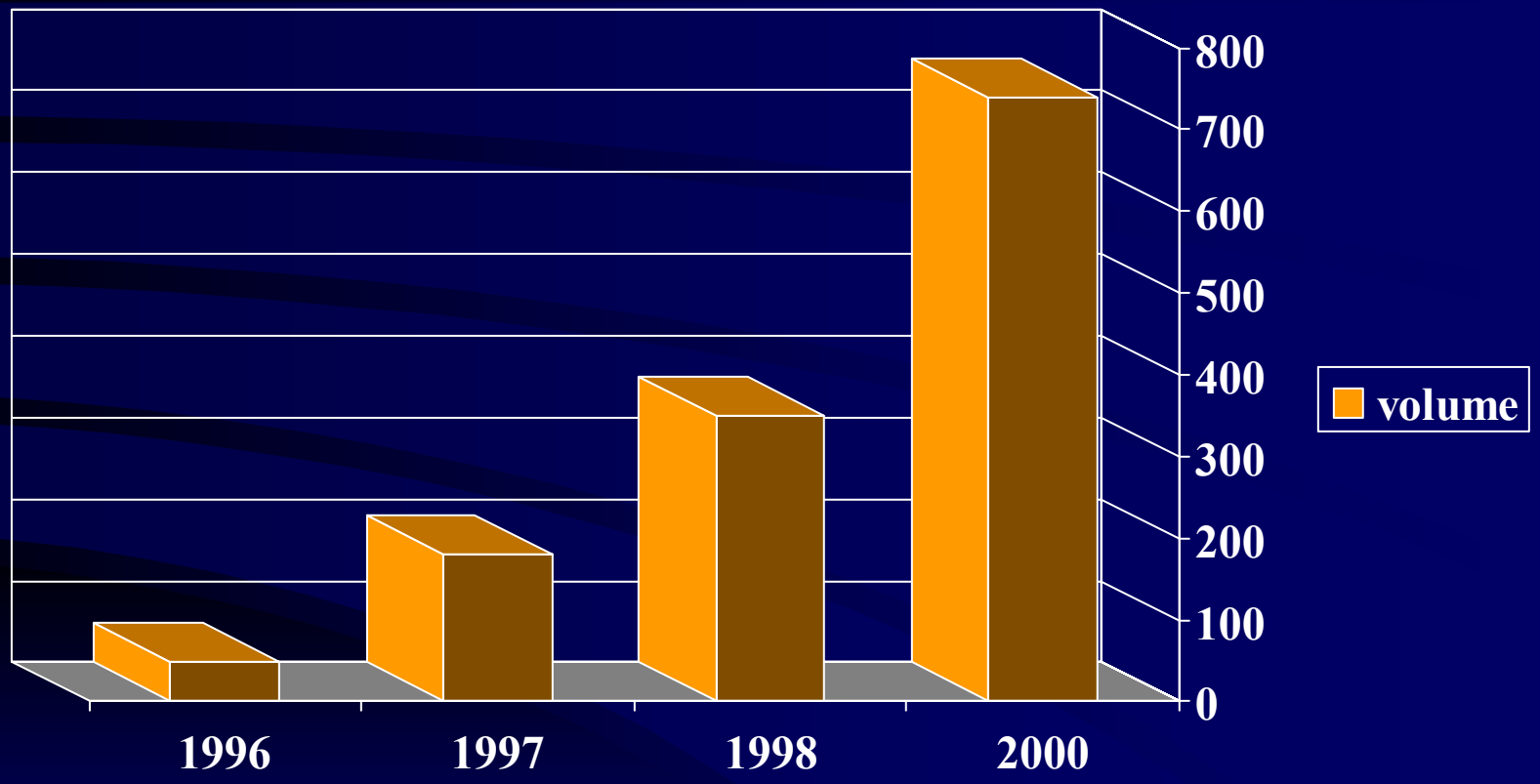
Training outline

- Development of the Credit Derivatives Market
- Types of Credit Derivatives
- Credit Default Swap Structure:
  - Definitions and terminology
- CDSW Pricing Techniques
- Summary

Development of the Credit Derivatives Market

- Existing exchange traded derivative products are used to control macro-related risk: futures, options, futures on swaps, etc.
- Instrument needed to eliminate firm-specific credit risk/non systematic risk
- Eg., ENRON

Credit derivative volume ($ bln)



Source: BBA

Types of Credit Derivative Instruments

- Credit Default Swap
- Total Return Swap
- Credit Spread Option
- Basket Default Option
- Credit Linked Note

Credit Default Swap Structure

- Definition: Payment by one party in exchange for a credit default protection if a credit default event occurs/triggered. Think of this as Auto/Home insurance.
  - Similar pay off features as PUT OPTION
  - Or, Exotic type option with Knock in feature such as BARRIER OPTON

- CDSW Structure
  - Default Swap Premium
  - Contingent payment

CREDIT DEFAULT SWAP PRICING

MODIFIED HULL & WHITE MODEL

SOME NOTATION:

P(0,T) = Price of risk-free discount bond maturing at time T

q(0,T) = Conditional default probability at time T

Q(T) = Cumulative default probability at time T

and $Q(t_i) = \sum (q_t)\,\Delta t$

1-Q(T) = Survival probability at time T

$C_R(T)$ = Risky par coupon for maturity T

(risk free rate + credit spread)

(1- R) where R is recovery rate

CREDIT DEFAUTL SWAP PRICING

MODIFIED HULL & WHITE MODEL

We start off stripping procedure to drive cumulative default probabilities via risk par curve:

$$100 = \sum_i [\,1 - Q(t_i)]\, C_R(t)\, \Delta t\, P(0,t_i) + 100[\,1 - (Q(t_i)]P(0,t_i)$$

$$+R100 \sum_i q(t_i)\, \Delta t\, P(0,t_i)$$

To price the contract, the swap can be broken down into two legs of cash-flows:

CREDIT DEFAUTL SWAP –
MODIFIED HULL & WHITE MODEL

- A) Constant periodic payment
  (the CDS spread: S_{CDS})

  $S_{CDS}(T) \sum_i [\,1 - Q(t_i)]\, P(0,t_i)\, \Delta t$

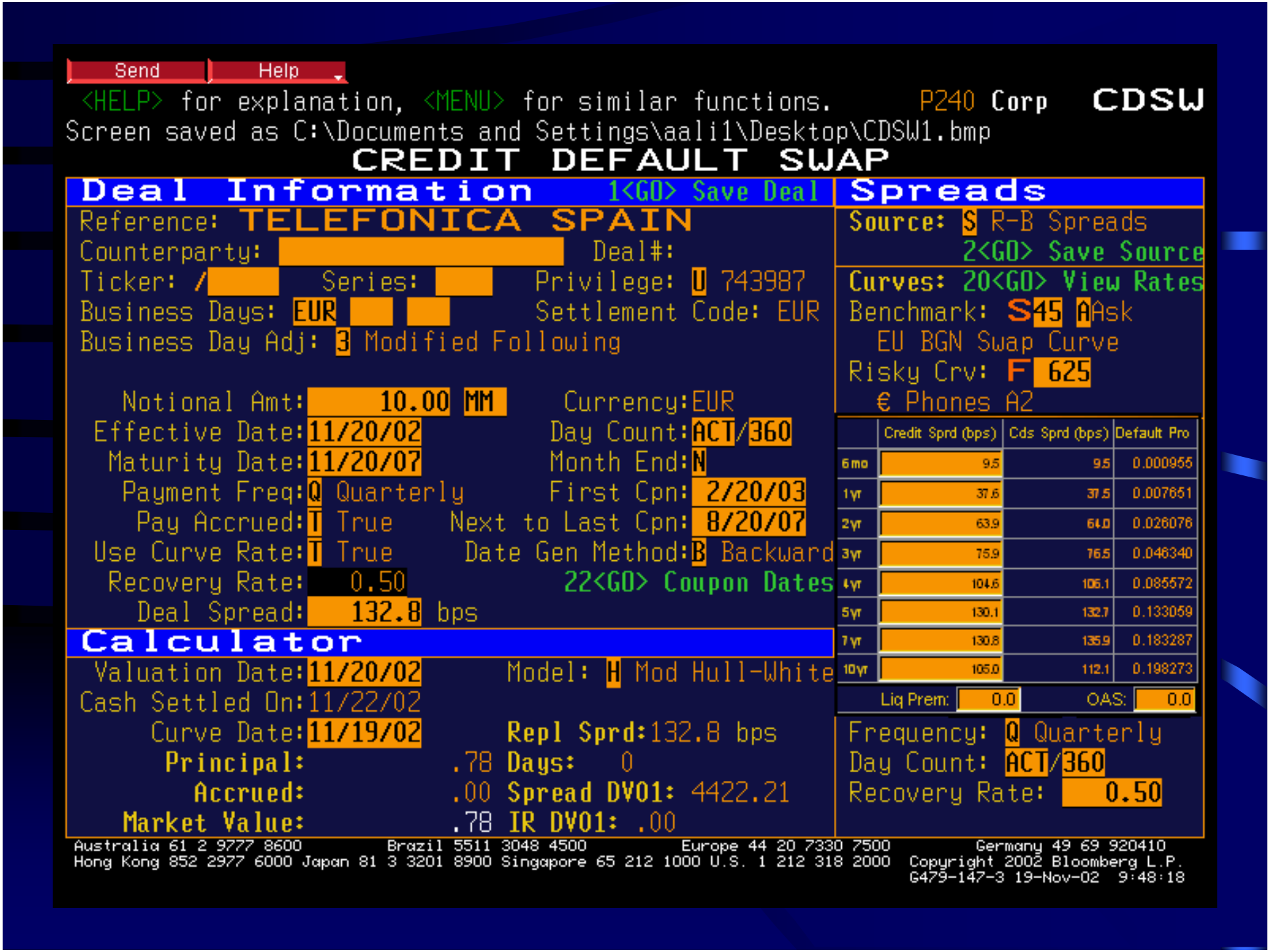
- B) Expected payoff assuming a recovery rate of R: $100(1-R) \sum_i q(t_i)\, \Delta t\, P(0,t_i)$

Solution:

$$S_{CDS}(T) = \frac{100(1-R) \sum i\, q(ti)\, \Delta t\, P(0,ti)}{\sum i\, [\,1 - Q(ti)]\, P(0,ti)\, \Delta t}$$

Bloomberg screen CDSW

- The following screen shows page CDSW for pricing credit default swaps using either Hull-White or generic JPMorgan model
- The JPM model assumes two cash flows to present-value: the premium and the reciprocal premium if one is hedging the CDSW (these will be different: the CDSW bid-offer spread)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<HELP> for explanation, <MENU> for similar functions.
P240 Corp
CDSW
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Ticker: /
Series:
Privilege: U 743987
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Settlement Code: EUR
Business Day Adj: 3 Modified Following
Notional Amt: 10.00 MM
Currency: EUR
Effective Date: 11/20/02
Day Count: ACT/360
Maturity Date: 11/20/07
Month End: N
Payment Freq: Q Quarterly
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Pay Accrued: T True
Next to Last Cpn: 8/20/07
Use Curve Rate: T True
Date Gen Method: B Backward
Recovery Rate: 0.50
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Calculator
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Model: H Mod Hull-White
Cash Settled On: 11/22/02
Curve Date: 11/19/02
Repl Sprd: 132.8 bps
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Days: 0
Accrued: .00
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Market Value: .78
IR DV01: .00
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EU BGN Swap Curve
Risky Crv: F 625
€ Phones A2
Credit Sprd (bps)
Cds Sprd (bps)
Default Pro
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1yr 37.6 37.5 0.007651
2yr 63.9 64.0 0.026076
3yr 75.9 76.5 0.046340
4yr 104.6 106.1 0.085572
5yr 130.1 132.7 0.133059
7yr 130.8 135.9 0.183287
10yr 105.0 112.1 0.198273
Liq Prem: 0.0
OAS: 0.0
Frequency: Q Quarterly
Day Count: ACT/360
Recovery Rate: 0.50
Australia 61 2 9777 8600
Brazil 5511 3048 4500
Europe 44 20 7330 7500
Germany 49 69 920410
Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 212 1000 U.S. 1 212 318 2000
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