

MFE 230M: CDS

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Outline

- Two payment streams in a CDS
- Valuation of CDS
 - Forecast pools' cash flows
 - Estimate prepayment and default parameters
 - Forecast prepayment and default speeds
 - Calculate bonds' cash flows from waterfalls
 - Calculate CDSs' cash flows and value them

Two Payment Streams of CDS

- A CDS contract involves two streams of payments
 - Payments from protection seller to protection buyer (the variable leg).
 - Payments from protection buyer to protection seller (the fixed leg).

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Protection seller	Long credit risk	Bets few defaults	Pays variable leg
Protection buyer	Short credit risk	Bets many defaults	Pays fixed leg

Two Payment Streams of CDS

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 - Does **not** compensate for prepayments.

Two Payment Streams of CDS

- Payments from protection seller to protection buyer (the variable leg):
 - Compensate for defaults. **Make defaults look like prepayments.**
 - Compensate for shortfalls in interest payments.
 - Does **not** compensate for prepayments.
- Payments from protection buyer to protection seller (the fixed leg):
 - Upfront premium
 - Fixed coupon

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Valuation Framework

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 - Forecast interest payments from ARM.
- 2) Forecast bonds' cash flows using **waterfall**.
 - In this deal, there are **two** waterfalls: waterfall for principal payments and waterfall for interest payments
- 3) Calculate CDS cashflows
 - Variable leg
 - Fixed leg

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- Estimate separately for ARM and FRM
- Covariates
 - Prepayment: should include summer indicator and coupon gap.
 - Default: should include **loan to value ratio**.
- There are four sets of parameters:

$$\{\text{ARM / FRM}\} \times \{\text{Prepayment / Default}\}$$

Predict Prepayment and Default Speeds

Use the $\{\text{ARM} / \text{FRM}\} \times \{\text{Prepayment} / \text{Default}\}$ hazard parameters to forecast prepayment and default speeds

- Predicting prepayment and default speeds requires forecasting the covariates:

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- Predicting prepayment and default speeds requires forecasting the covariates:
 - Prepayment: coupon gap (same as in HW2 from the Hull and White model).
 - Default: loan to value ratio

$$\frac{\text{remaining balance}}{\text{home price}}$$

- Forecasting loan to value ratio involves
 - Forecasting remaining balance.
 - Forecasting house prices.

Forecast Home Prices

- House prices follow a GBM of the form

$$dH_t = (r_t - q_H)H_t dt + \phi_H H_t dW_{H,t}$$

where,

r_t = riskless short rate,

q_H = .025(the rental flow rate),

ϕ_H = .12(volatility)

- H_0 is backed out from

$$H_0 = \text{remaining balance} \times \frac{\text{home price}}{\text{remaining balance}} = \frac{\text{remaining balance}}{LTV}$$

Current Principal: (6/30/09)	\$52,416,155	\$226,122,657
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Current LTV (6/30/09)	85.6%	85.6%
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Waterfall for Principal Payments

- 1) Prepaid principals go to A bonds followed by M bonds
- 2) Defaults reduce principals from CE certificates first, then M bonds, followed by A bonds.

Waterfall

Prepayments



Defaults



Bond Class	Bond Principal March 27, 2006 (\$000)	Bond Principal June, 30, 2009 (\$000)	Spread To Libor
A1	396,254	Prepaid in Full	0.08
A2	171,485	107,769	0.18
A3	24,954	24,954	0.28
M1	38,481	38,481	0.36
M2	30,150	30,150	0.38
M3	18,646	18,646	0.39
M4	16,265	16,265	0.51
M5	15,075	15,075	0.55
M6	13,488	13,488	0.62
M7	13,092	13,092	1.15
M8	11,505	619	1.4
M9	9,124	0	2.25
M10	10,315	0	2.25
CE Certificates	24,597	0	0

Waterfall for Interest Payments

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- Each bond has a promised interest payment

Remaining balance \times (LIBOR + spread)

Waterfall for Interest Payments

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- Each bond has a promised interest payment

$$\text{Remaining balance} \times (\text{LIBOR} + \text{spread})$$

- In each period, interest payments go to A bonds first, followed by M bonds.

CDS payments

- Two CDS. One for M-2 bond and one for M-5 bond.
 - Which starts to pay first?
 - Which will more likely to pay more?

Questions