TIME-VARYING CREDIT RISK AND LIQUIDITY PREMIA IN BOND AND CDS MARKETS

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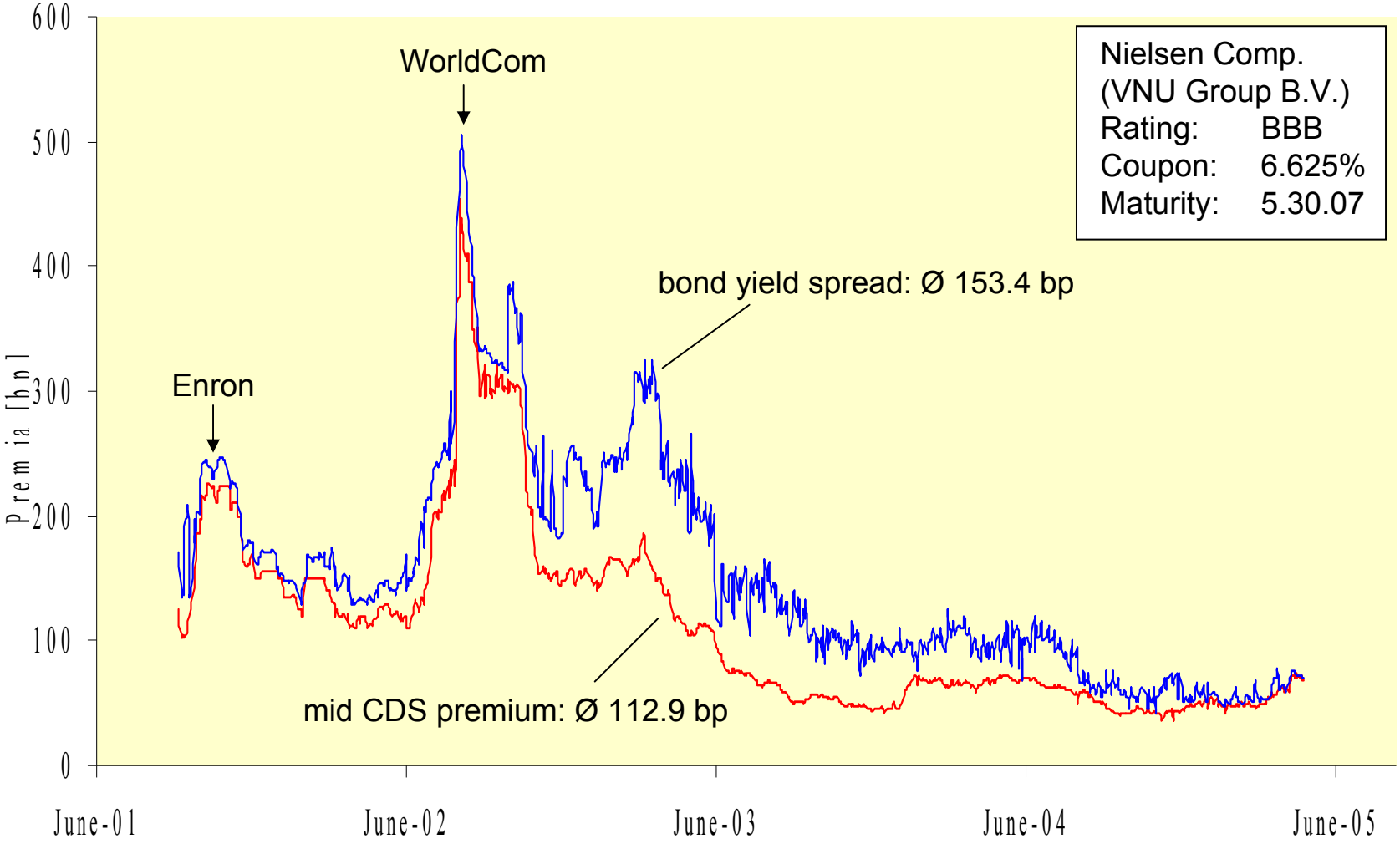
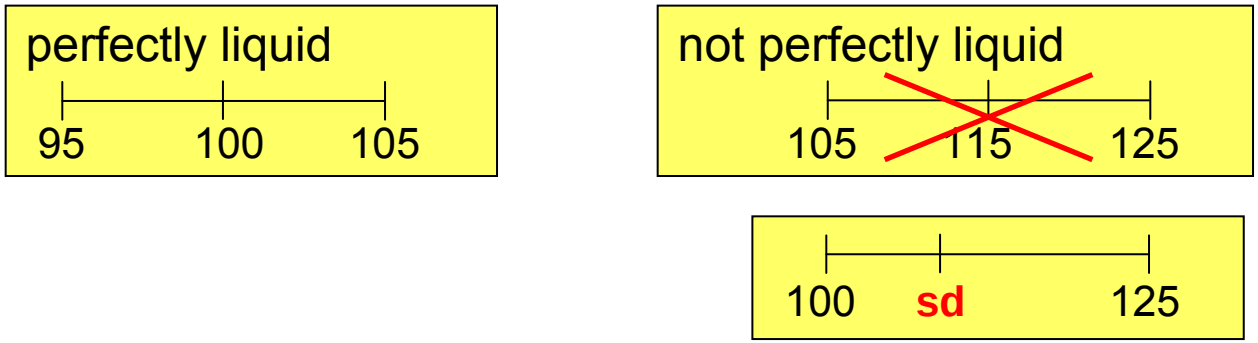
BOND SPREADS AND CDS PREMIA



CONTRIBUTION

- CDS not liquidity-risk free

  different effects in bond and CDS markets



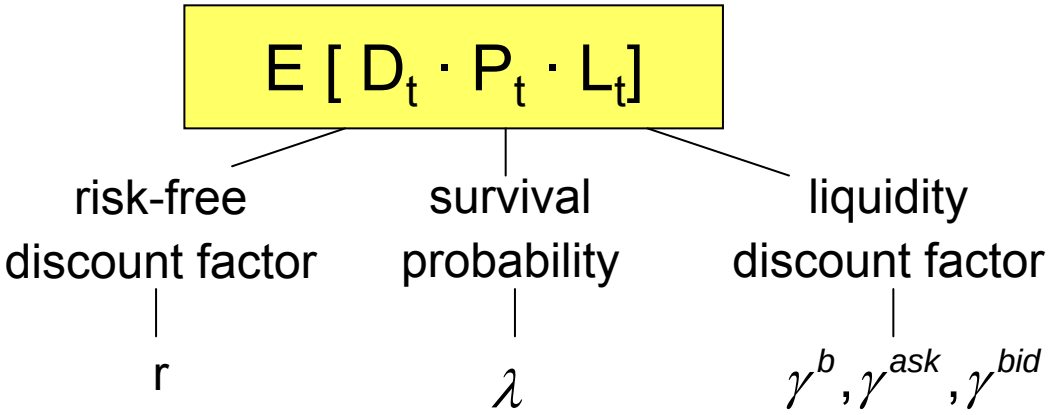
- illiquidity spillover from bond market in case of default
- reduced-form model for both markets
  - identical credit-risk rates
  - bond and CDS bid/ask liquidity rates
- liquidity-risk free bond yield spread and CDS premium
- empirical analysis of credit risk, liquidity, and correlation premia

FINDINGS

- consistently positive liquidity premia in bond market (Longstaff et al. 05)
- bond spread partition : 60% credit risk
  35% liquidity
  5% correlation (Elton et al. 01, Huang/Huang 03)
- CDS market : 95% credit risk
  4% liquidity
  1% correlation (Tang/Yan 07, Nashikkar et al. 07)
- time-varying credit risk, liquidity, and correlation premia
- illiquidity positively related with credit risk (Ericsson/Renault 06)
  - cross-sectional relation of premia
  - changes of illiquidity and credit risk
  - bond liquidity dries up if credit risk increases, CDS depends on rating
- bond and CDS liquidity premia negatively related

THE MODEL

- reduced-form model



- 5-factor risk structure:

  - independent latent factors r, x, y^b, y^{ask}, y^{bid}

  - λ, $\gamma^b, \gamma^{ask}, \gamma^{bid}$ linear functions of latent factors

  $\Rightarrow$ direct correlation of credit risk and liquidity (via x & y)

  $\Rightarrow$ direct (via x) and indirect (via y) correlation of bond & CDS liquidity

THE MODEL

BOND PRICE

Bond Price:

$$c \cdot \sum_{i=1}^{n} E_t\left[D(t_i)\cdot P(t_i,x_{t_0};f)\cdot L\left(t_i,y_{t_0}^{b};g\right)\right]+E_t\left[D(t_n)\cdot P(t_n,x_{t_0};f)\cdot L(t_n,y_{t_0}^{b};g)\right]$$
$$+R\cdot\sum_{j=1}^{N} E_t\left[D(\theta_j)\cdot \Delta P(\theta_j,x_{t_0};f)\cdot L(\theta_j,y_{t_0}^{b};g)\right]$$

CDS ASK PREMIUM

Fixed Leg :

$$s^{ask}\cdot\left(\begin{array}{l}\sum_{i=1}^{m} E_t\left[D(T_i)\cdot P(T_{i-1},x_{T_0};f)\cdot L\left(T_i,y_{T_0}^{ask};g\right)\right]\\ +\sum_{j=1}^{M} E_t\left[\delta_j D(\theta_j)\cdot \Delta P(\theta_j,x_{t_0};f)\right]\end{array}\right)$$

Floating Leg :

$$\sum_{j=1}^{M} E_t\left[D(\theta_j)\cdot\Delta P(\theta_j,x_{t_0};f)\cdot\left[1-R\cdot L(\theta_j,y_{t_0}^{b};g)\right]\right]$$

CREDIT RISK, LIQUIDITY, AND CORRELATION PREMIA

BOND:

credit spread: par bond price $(y^b = f = g = 0) =: \sum_i CF_{t_i} (1 + y + bd)^{-t_i}$

liquidity spread: par bond price $(y^b,\ f = g = 0) =: \sum_i CF_{t_i} (1 + y + bd + bl)^{-t_i}$

correlation spread: par bond price $(y^b,\ f,\ g) =: \sum_i CF_{t_i} (1 + y + bd + bl + bc)^{-t_i}$

CDS:

credit spread: premium sd $s(y^b,\ y^{ask\,/\,bid} = f = g = 0)$

liquidity spread: premium sl mid premium $(y^b,\ y^{ask}, y^{bid},\ f = g = 0) - sd$

correlation spread: premium sc mid premium $(y^b,\ y^{ask}, y^{bid},\ f,\ g) - sd - sl$

market pressure on demand side $\Rightarrow$ ask $\uparrow$ $\Rightarrow$ sl $\uparrow$
$\Rightarrow$ sd closer to bid side

DATA AND EMPIRICAL DESIGN

- period 06/01 to 07/07 ; daily data; 155 firms; Euro-denominated
- risk-free term structure of interest rates : German Gov't Bonds
- CDS : large US investment bank (quotes, transaction prices); 5 yrs
  bonds : Bloomberg (mid prices), rating AAA-CCC

Step 1: process parameter values for x, y^b, y^{ask}, y^{bid}, correlation f, g

Step 2: estimation of time series (x_t, y_t^b, y_t^{ask}, y_t^{bid}), t = 1, …, 1548

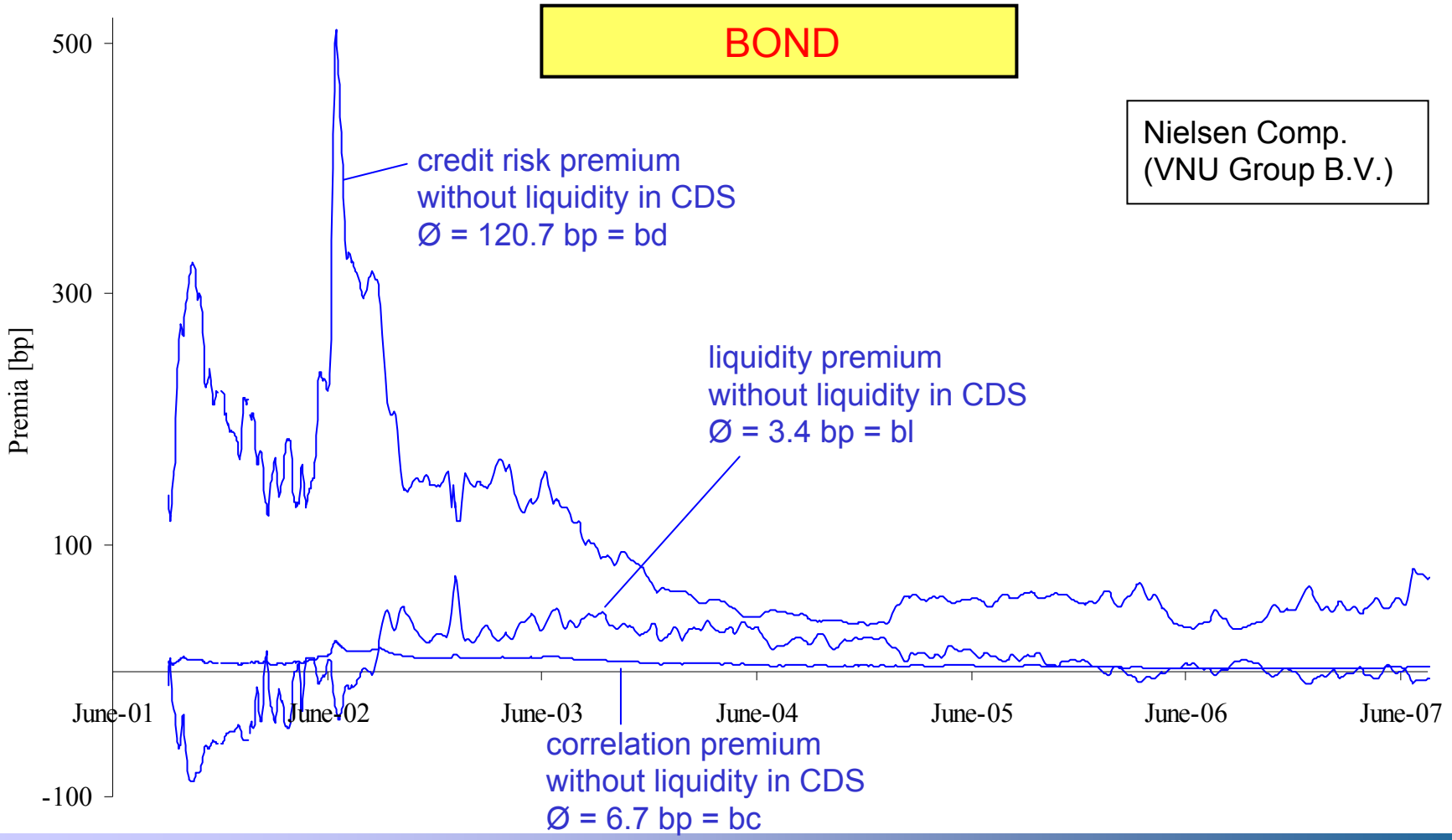
$$\min \sum_t \sum_i (P_{t,i}^{theor.}(\alpha,\ldots,\eta^{c_b}) - P_{t,i}^{obs.})^2$$

Step 3: update f, g from time series (x_t, y_t^b, y_t^{ask}, y_t^{bid}), etc.

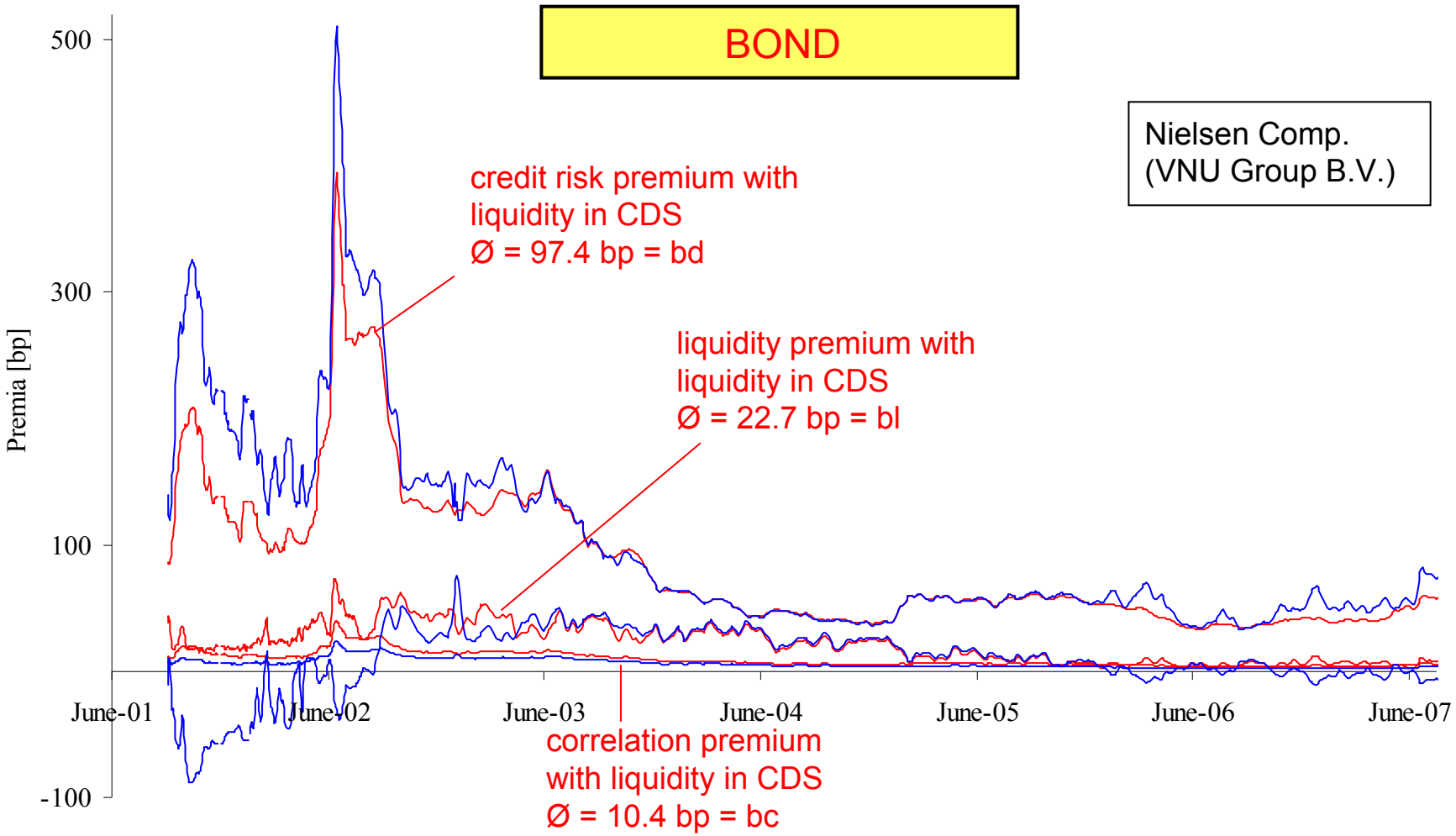
Step 4: synthetic 5 year par bond: bd, bl, bc

5 year CDS: sd, sl, sc

FIRM-SPECIFIC ANALYSIS



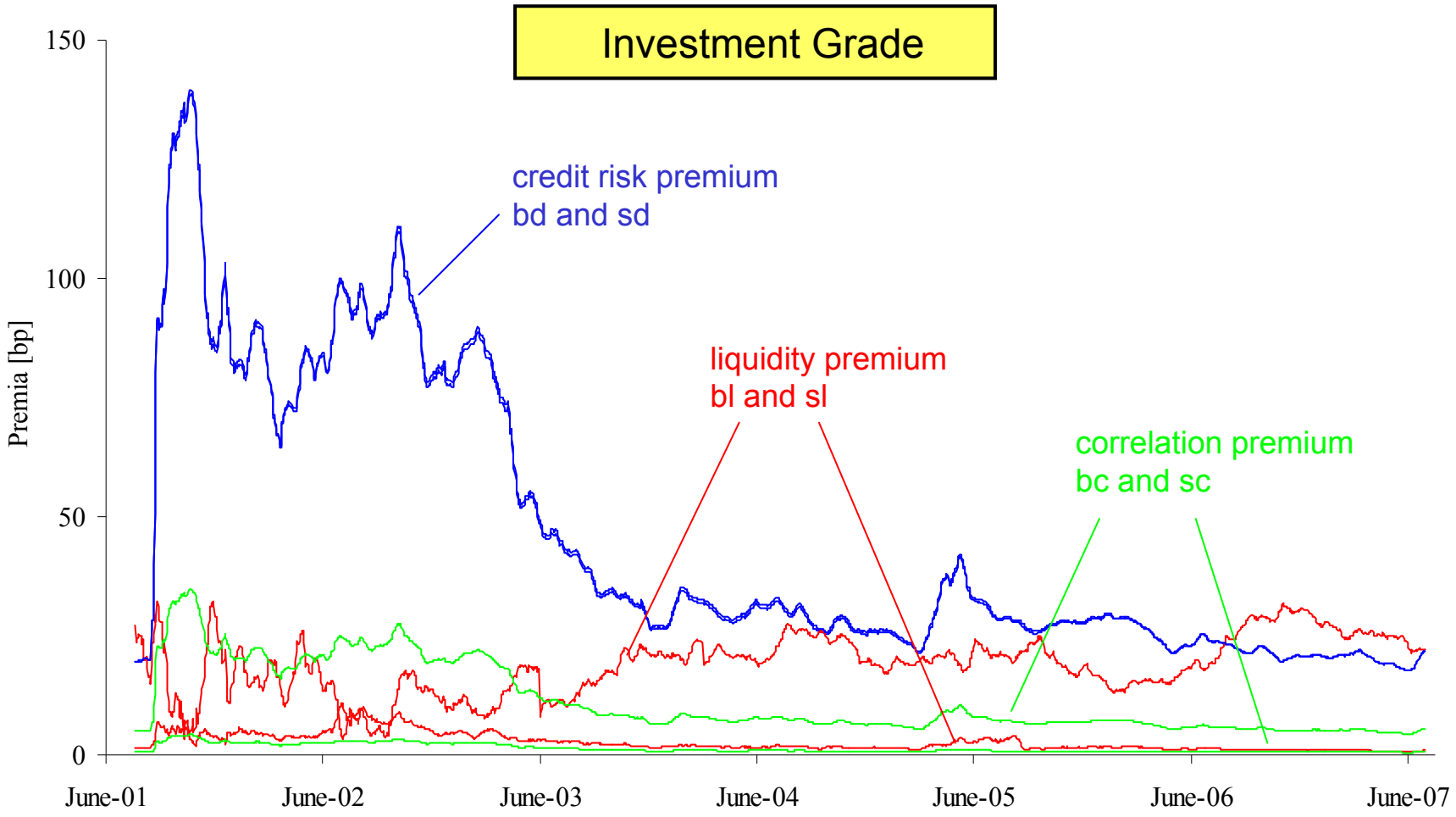
FIRM-SPECIFIC ANALYSIS



ANALYSIS BY RATING CLASS

	AAA-BBB	BB-CCC	All
bd min/max	32.7 1.0 / 1,214.4	274.7 32.6 / 1,807.1	44.4
bl min/max	23.9 0.6 / 567.1	52.6 1.5 / 451.6	26.4
bc min/max	3.9 -1.3 / 251.5	17.3 0.4 / 353.5	3.6
sd min/max	33.4 4.2 / 1,281.9	278.2 34.0 / 1,948.4	44.8
sl min/max	1.9 -2.3 / 27.7	5.8 -153.8 / 194.3	1.9
sc min/max	0.3 -6.7 / 51.8	6.3 -3.2 / 98.9	0.4

MEAN CREDIT RISK, LIQUIDITY, AND CORRELATION PREMIA



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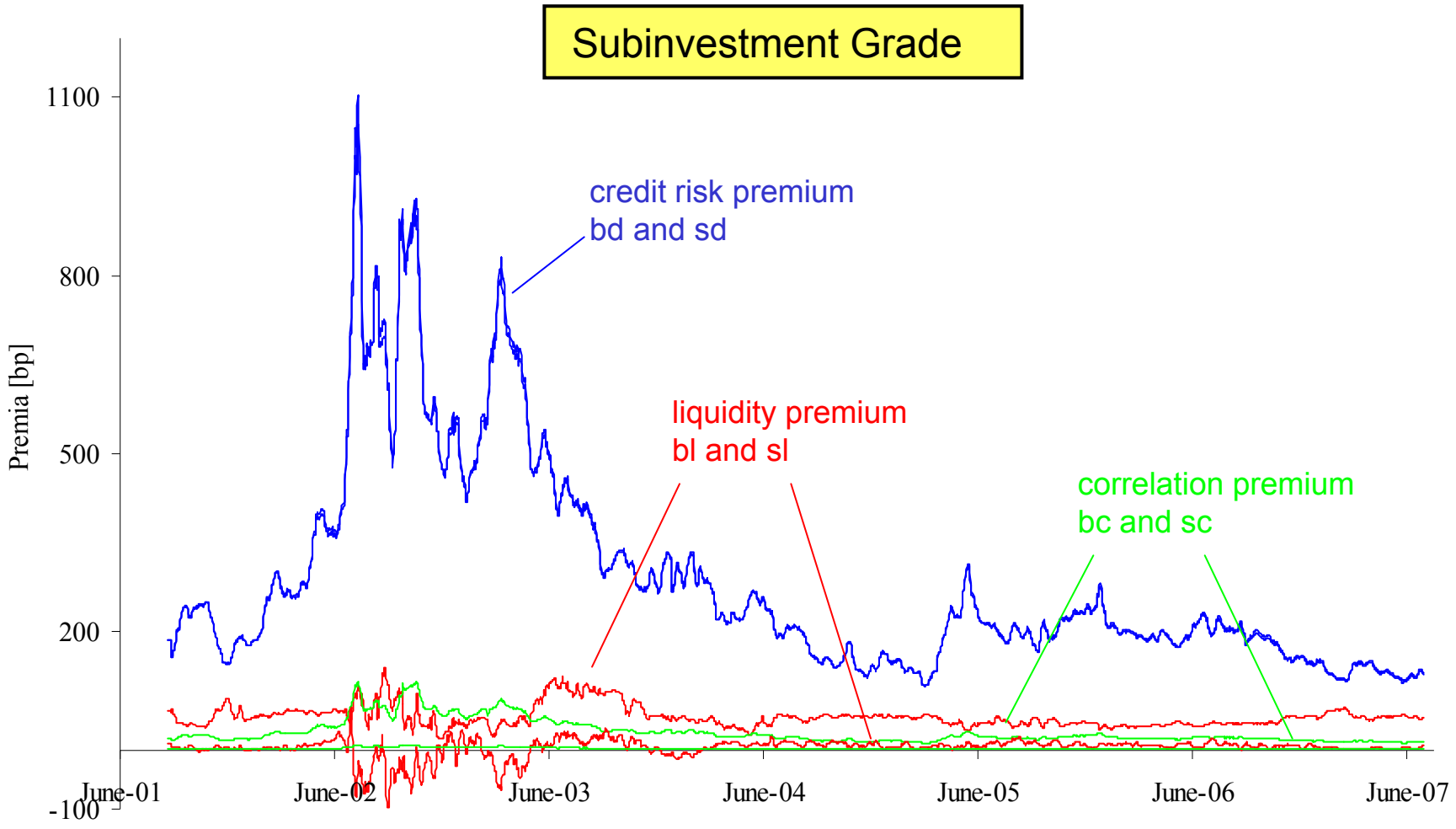

TIME SERIES ANALYSIS

Vector Autoregressive Model

IG	Credit Risk		Liquidity	
	Δbd	Δsd	Δbl	Δsl
Δ bond $_{-1}$	-0.41	0.18	-0.45	-0.01
Δ CDS $_{-1}$	0.14	-0.07	-0.02	-0.53
SubIG				
Δ bond $_{-1}$	-2.54	1.79	-0.46	-0.08
Δ CDS $_{-1}$	2.28	-1.51	-0.01	-0.64

- credit risk premia move jointly, liquidity premia reversely
- bond liquidity premia affect CDS liquidity premia in IG, not vice versa
- SubIG: slight impact of CDS liquidity, but limited economic significance

TIME SERIES ANALYSIS

Vector Error Correction Model

IG	Increasing Risk Phase		Decreasing Risk Phase	
	Credit Risk	Liquidity	Credit Risk	Liquidity
Coint. Coef.	-1.02	68.96	-1.00	-43.21
ECT bond	-0.14	0.00	-0.01	0.00
ECT CDS	0.07	-0.05	0.05	0.03
SubIG				
Coint. Coef	-1.02	2.90	-1.02	2.37
ECT bond	-2.92	-0.07	-2.48	-0.13
ECT CDS	-2.46	-0.27	-1.90	-0.16

CONCLUSIONS

- decomposition study
- liquidity in bond and CDS market modelled differently
- credit risk affects liquidity but not vice versa
- 60% credit risk, 35% liquidity, 5% correlation in bond market
- 95% credit risk, 4% liquidity, 1% correlation in CDS market
- CDS liquidity matters
- time-varying liquidity premia
  explanation : CREDIT CHANNEL
- asymmetric liquidity spill-over
- sensitive to market situation / rating