

Liquidity Risk Premia in Corporate Bond Markets

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Two important puzzles in corporate bond markets

1: Time-series variation of credit spreads

- Integration/segmentation of equity and corporate bond markets?

2: Credit spread puzzle

- Credit spreads much higher than justified by historical default losses
- Long-term AA bonds:
 - Historical default loss generates credit spread of 3 basis points
 - Average credit spread of 67 basis points in our sample
- Hard to explain fully using market risk factors

Liquidity and asset prices

- Recent developments: treat liquidity as a priced *risk* factor
- Hasbrouck-Seppi (2001) and Chordia et al. (2003) document commonality in liquidity
- Acharya-Pedersen (2005) and Pastor-Stambaugh (2003): add equity market liquidity shocks to a multifactor pricing model

Contribution of this paper

1. Do liquidity shocks in equity and government bond market spill over to corporate bond market?
2. Can premia on liquidity risk explain part of the credit spread puzzle?

Related literature

- Credit spread puzzle
 - Elton et al. (2001), Amato and Remolona (2003), Driessen (2005), Collin-Dufresne, Goldstein, and Helwege (2005), Jarrow, Lando, and Yu (2005), Cremers, Driessen, and Maenhout (2006)
- Integration of bond and equity markets
 - Kwan (1996), Collin-Dufresne, Goldstein, and Martin (2001), Campbell and Taksler (2003), Ericsson, Jacobs, and Oviedo (2005)
- Liquidity in corporate bonds
 - Chen, Lesmond, and Wei (2005), Houweling, Mentink, Vorst (2005), Chacko (2005) and Chen, Cheng, and Wu (2005)

Remainder of presentation

- Corporate bond data
- Liquidity measures
- Model
- Results for US market
- Results for European market

Data: Corporate bond returns

- Lehman corporate bond returns, US, Jan 93-Feb 02
- Index level data, by rating class and maturity
 - AAA...CCC ratings; intermediate and long maturities
- Construct expected return (to maturity) by correcting yields for expected default and recovery rates

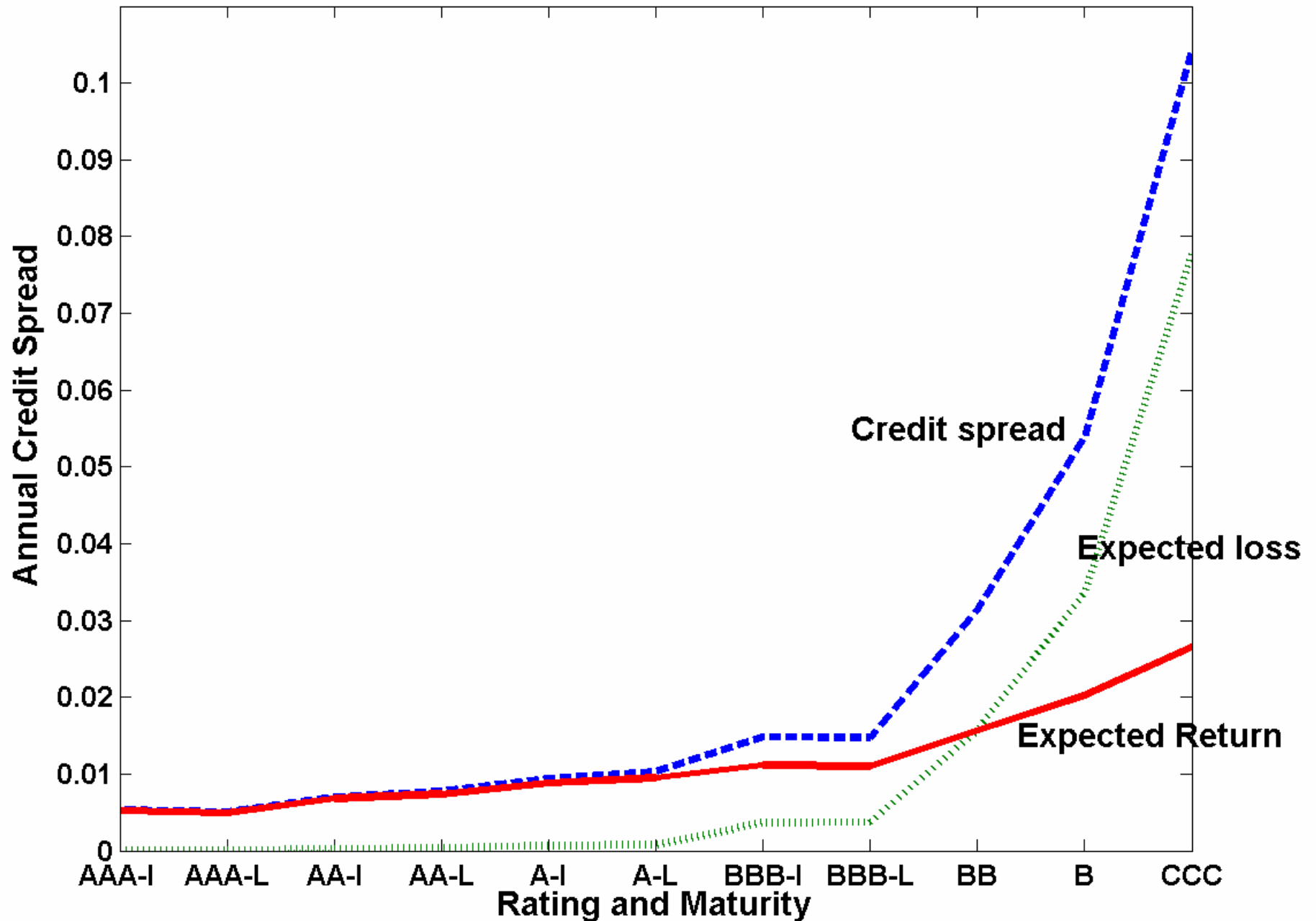
$$E_{t, \mathcal{D}} \left[\frac{1}{B_t} \left(1 - l_{\mathcal{D}} \right) \left(1 + Y_{g,t} \right) S_t \right] = 1$$

Historical default rates (1985-2003)

Table 1

	US: 5 Years	US: 10 Years	US: 15 Years	Europe: 5 Years
AAA	0.10%	0.48%	0.65%	0.0%
AA	0.31%	0.94%	1.45%	0.0%
A	0.65%	1.95%	3.10%	0.3%
BBB	3.41%	6.93%	10.02%	2.3%
BB	12.38%	21.00%	24.57%	7.3%
B	26.82%	35.41%	40.56%	48.4%
CCC	53.00%	58.44%	61.58%	69.0%

Average Credit Spread per Rating and Maturity Category

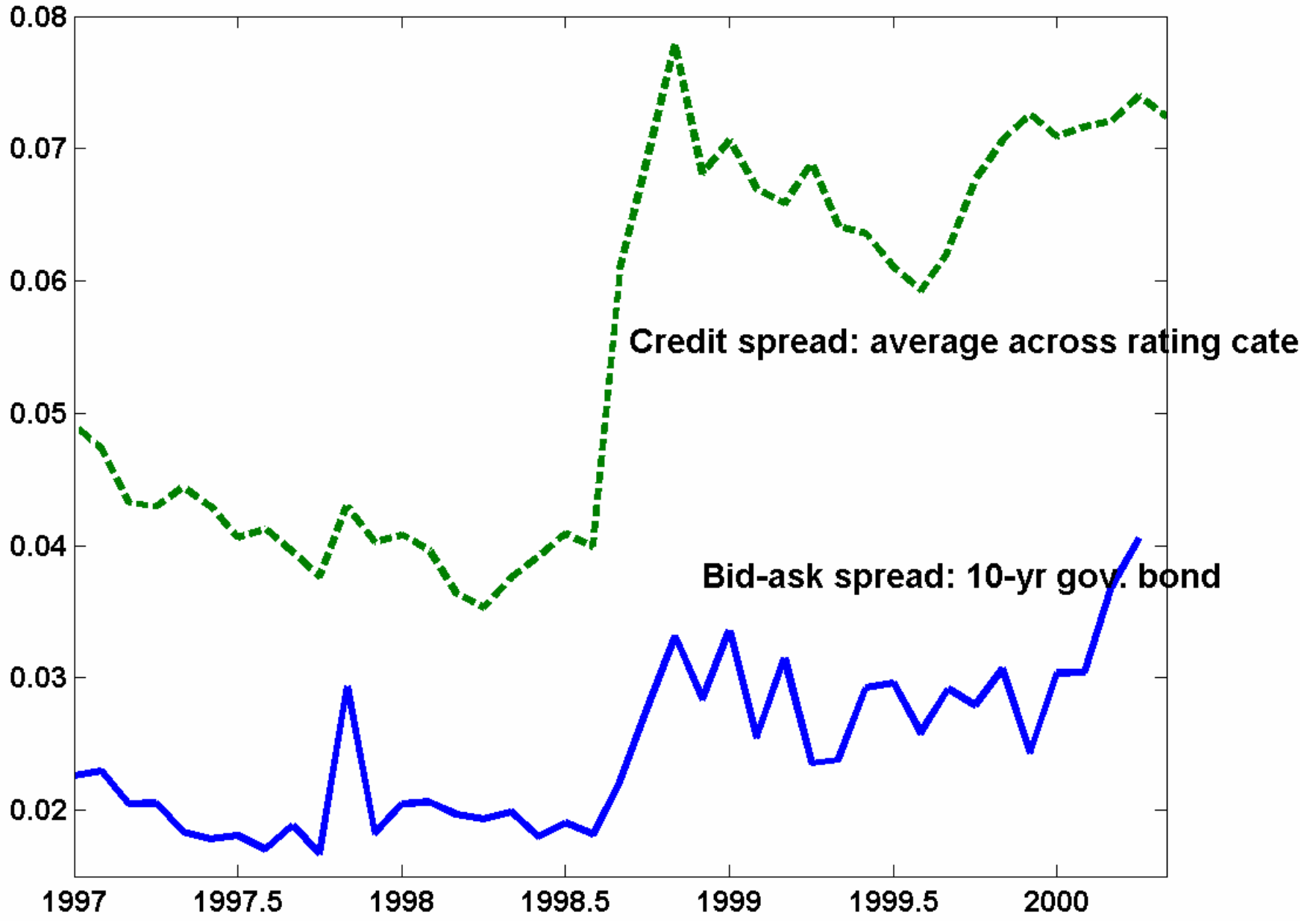


Data (2)

Liquidity measures

- Bid-ask spread for 10 year US T-bond from Fleming (2003)
- ILLIQ for stocks (Datastream)

10-Year Bond: Bid-Ask Spread and Avg. Credit Spread



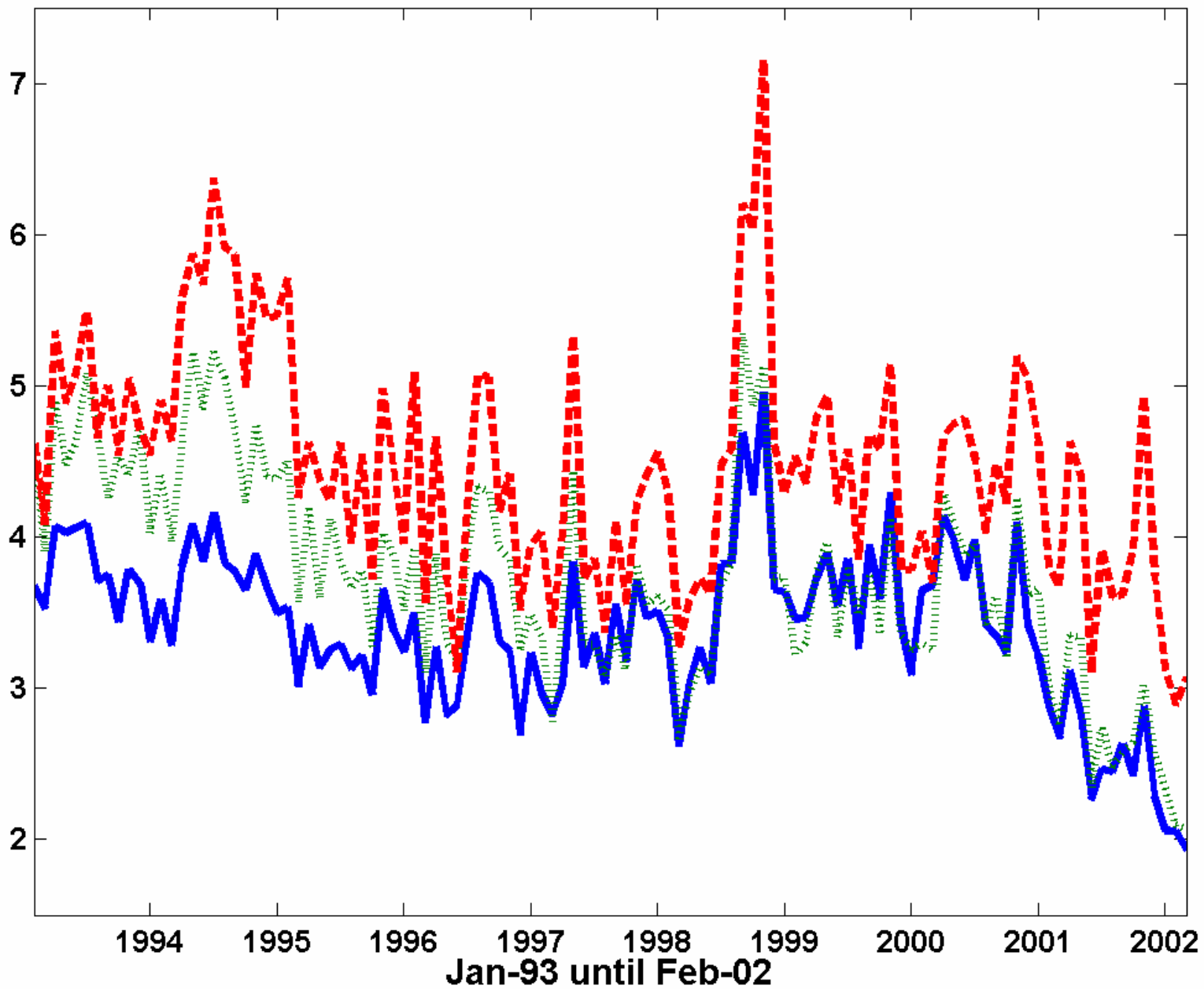
Liquidity measure for equity market

- ILLIQ: measures slope of price/volume relation
- Based on daily data of prices and volume
- Ratio of absolute daily return divided by volume, averaged over one month

$$ILLIQ_{i,t} = \frac{1}{D_t} \sum_{d=1}^{D_t} \frac{|r_{i,t}^d|}{V_{i,t}^d}$$

- Calculated for all S&P1500 stocks and averaged over cross-section to get market-wide liquidity measure

ILLIQ: Large (solid), Medium (dotted), and Small (dashed) Stocks



Model

- APT style multifactor model
 - Equity market return, ILLIQ, Govt bond BAS, Implied equity volatility (VIX)
- Two-step regression approach for excess returns

$$r_{it} = \beta_{F,i} F_t + \beta_{L,i} L_t + e_{it}$$

$$\bar{E} \leftarrow_{i,t} \rightarrow \beta_{F,i} \bar{F} + \beta_{L,i} \bar{L} + u_i, \quad i = 1, \dots, N$$

- Equity risk premium fixed at several values
 - Hard to estimate, fix at 2% - 8%

Empirical results

- Corporate bond returns: significant exposures to market and liquidity factors
 - Low ratings and long maturities are more exposed
- Significant estimates for liquidity risk premium
- Additional liquidity premium goes a long way in explaining credit spread puzzle
 - Only for high grade bonds, credit spreads remain too high
 - This may be solved by including tax effects or jumps

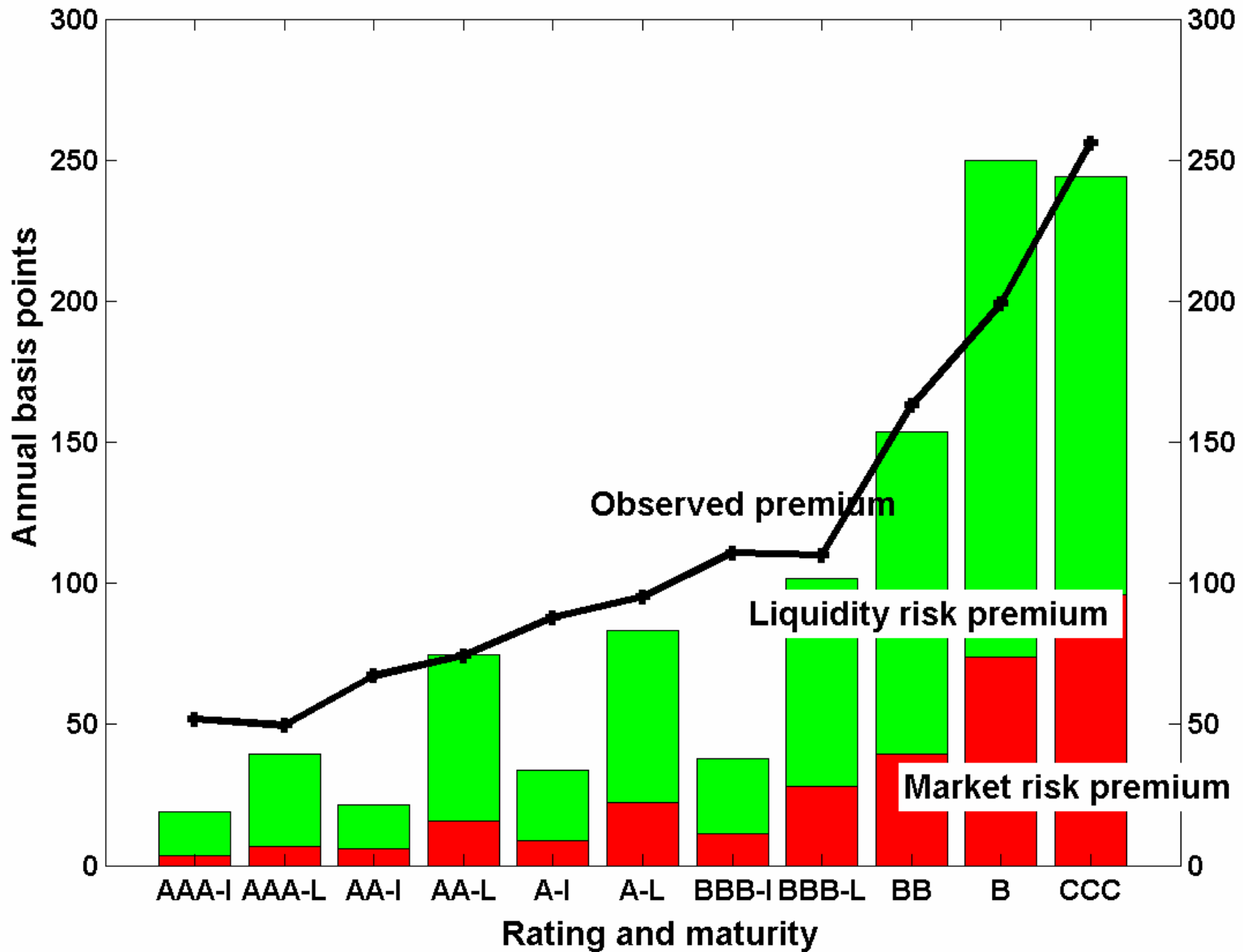
Exposure to liquidity shocks

	ILLIQ Beta (x100)	Gov-Bond BAS Beta (x100)	S&P 500 Beta	VIX Beta
AAA short-mat	-0.22***	-0.17	0.013**	-0.005
AAA long-mat	-0.62***	0.77	0.028	-0.071**
AA short-mat	-0.10	-0.74**	0.024***	0.002
AA long-mat	-0.57***	-1.78	0.063***	-0.012
A short-mat	-0.18**	-1.01**	0.036***	-0.005
A long-mat	-0.55***	-2.04**	0.088***	-0.020
BBB short-mat	-0.19**	-1.16**	0.044***	0.001
BBB long-mat	-0.59***	-2.85**	0.111***	-0.016
BB	-0.77**	-5.28***	0.157***	0.030
B	-1.61***	-5.58**	0.294***	-0.087
CCC	-1.63*	-3.91	0.379***	0.077

Liquidity risk premia

Table 5

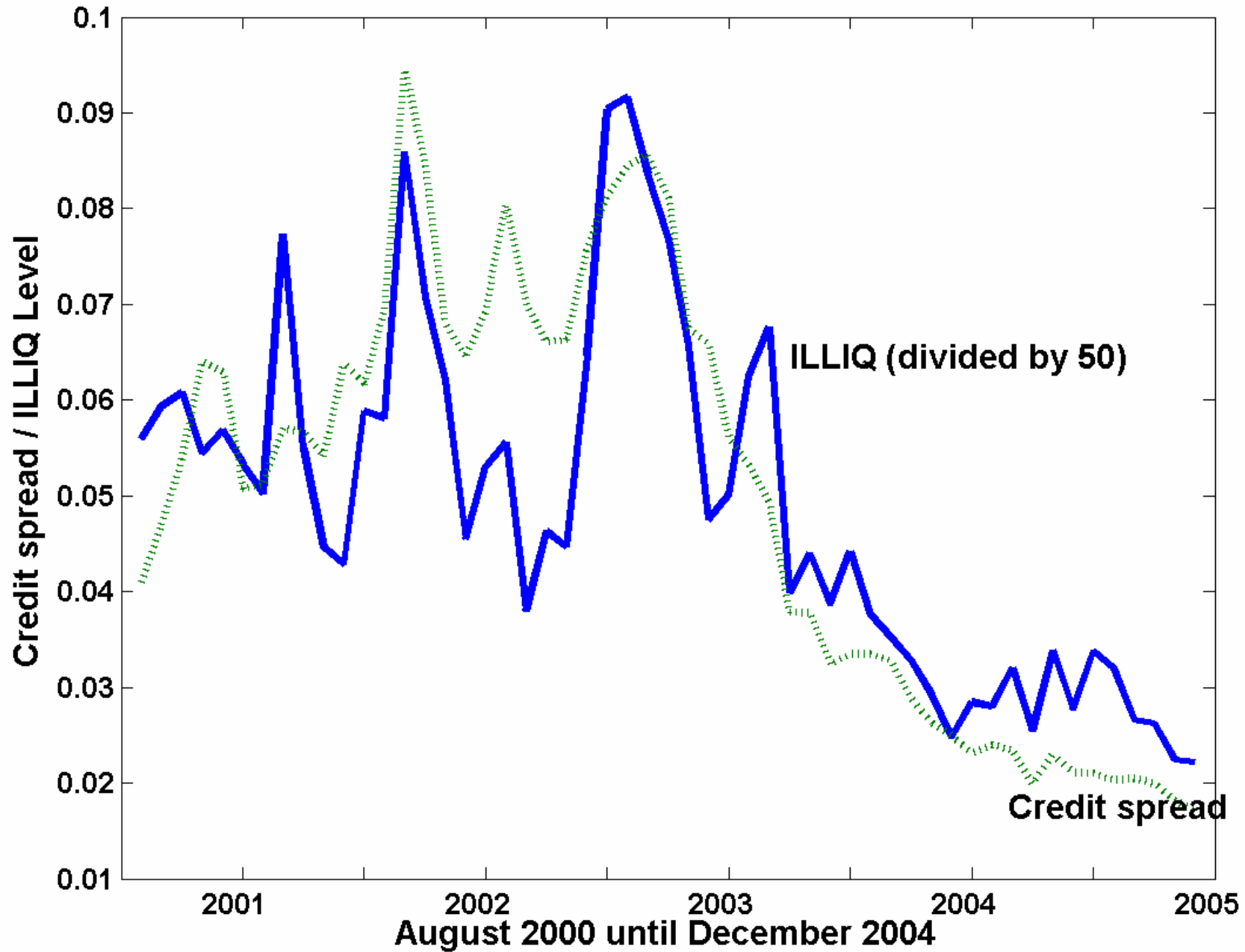
Equity Premium	Regression I	Regression II	
	ILLIQ	ILLIQ	Gov-Bond BAS
2%	-0.068 [-4.21]	-0.060 [-1.60]	-0.010 [-2.38]
3%	-0.056 [-3.45]	-0.045 [-1.20]	-0.010 [-2.31]
4%	-0.044 [-2.74]	-0.030 [-0.80]	-0.010 [-2.24]
6%	-0.022 [-1.32]	-0.000 [-0.00]	-0.009 [-2.09]
8%	0.002 [0.10]	0.029 [0.79]	-0.009 [-1.95]
Cross-sectional R^2 at 4% EP	91.8%	92.1%	



Results for European corporate bonds

- Repeat analysis, now applied to European data
- Euro-denominated corporate bond indices (Lehman)
- 2000-2004 sample
 - Mainly focus on time series exposures
 - Hard to estimate risk premia using short sample

European data: ILLIQ (solid) versus credit spread (dotted)



Conclusions

- Corporate bond returns exposed to both equity and treasury bond market liquidity
 - Both priced, but quite strongly correlated in cross-section
- We explain part of credit spread puzzle by including liquidity as a priced risk factor
 - Most successful for long term and low-grade corporate bonds
 - Jumps may be necessary to explain short-term spreads
- Similar results for European bond market data