Lecture 14: Options Markets

Economics 252, Spring 2011

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Open Yale courses

OPTION/STRIKE		EXP	-CALL-		-PUT-	
			VOL	LAST	VOL	LAST
ACE Ltd	40	Nov	...	...	2500	2.80
AOL TW	20	May	76	2.55	2129	0.85
21.85	22.50	Apr	1493	0.50	619	1.20
21.85	22.50	Jul	963	1.95	14110	2.55
AmOnline	25	Apr	983	0.05	12977	3.30
21.85	25	May	1196	0.45	220	3.60
21.85	25	Jul	1339	1	160	4.20
21.85	25	Oct	1706	1.65	14105	4.30
21.85	27.50	Apr	177	0.05	10097	5.80
21.85	27.50	Oct	1253	1.15	153	6.40
AT&T Cda	22.50	Oct	...	...	2740	1.90
AT&T	15	Jul	593	1.10	5500	1.10
Abbt L	50	Apr	1231	2.95	605	0.30

Black-Scholes Formula

$$C = S\mathrm{N}(d_1) - e^{-rT} E\mathrm{N}(d_2)$$

where

$$d_1 = \frac{\ln(\frac{S}{E}) + rT + \sigma^2 T/2}{\sigma \sqrt{T}}$$

$$d_2 = \frac{\ln(\frac{S}{E}) + rT - \sigma^2 T/2}{\sigma \sqrt{T}}$$

Put-Call Parity

- In discrete time: $C + \dfrac{E}{(1+r)^T} = S + P.$

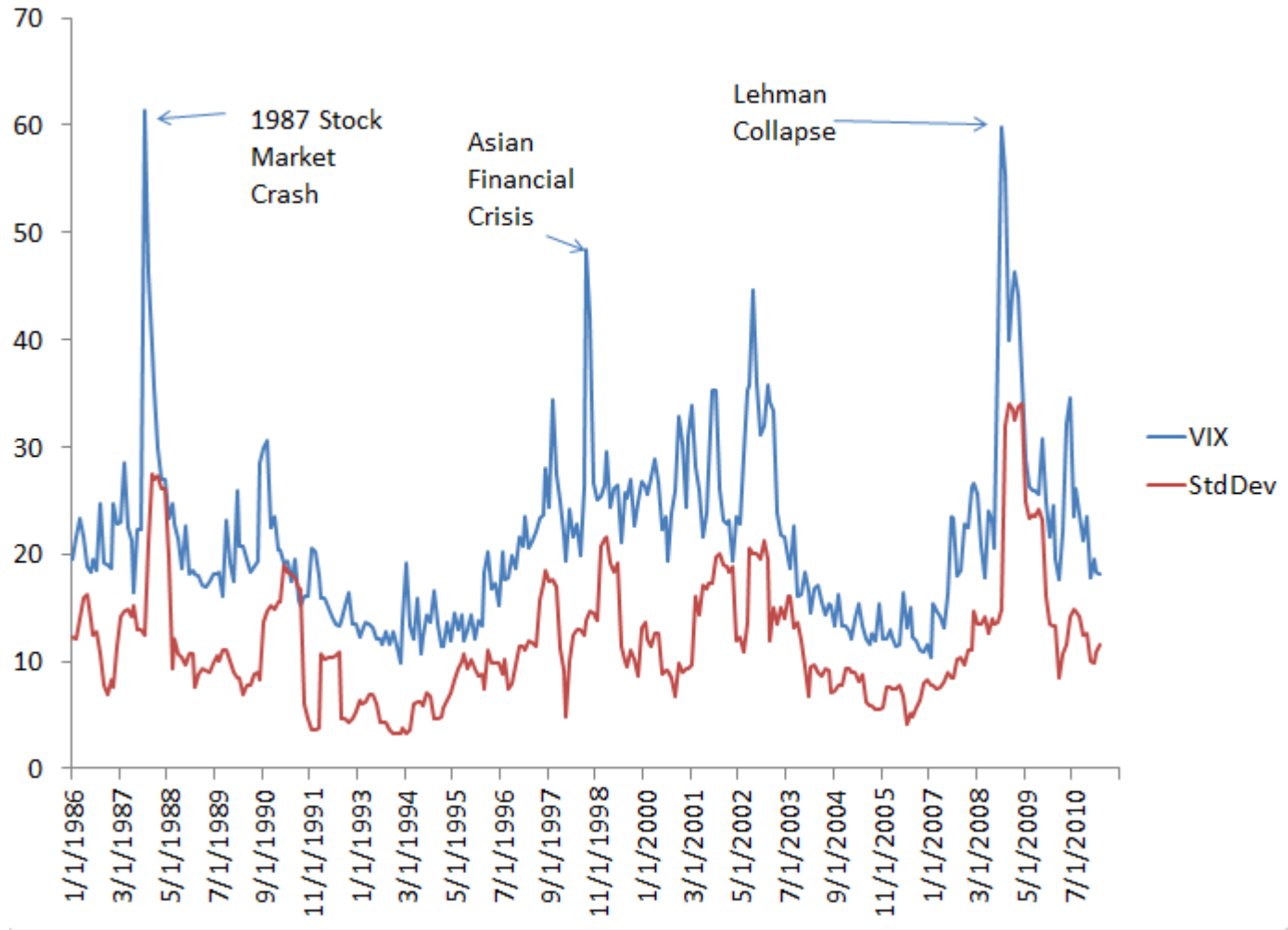- In continuous time: $C + E \times e^{-r \times T} = S + P.$

- Variables:
  - S: Current stock price.
  - C: Price of a European call-option written on stock S with strike price E and with time to maturity T.
  - P: Price of a European put-option written on stock S with strike price E and with time to maturity T.
  - r: Risk-free rate.

Implied and Actual Volatility Monthly Jan 1986-Mar 2011

Actual S&P 500 Volatility Monthly Jan 1872- March 2011