

FEDERAL RESERVE BANK OF MINNEAPOLIS

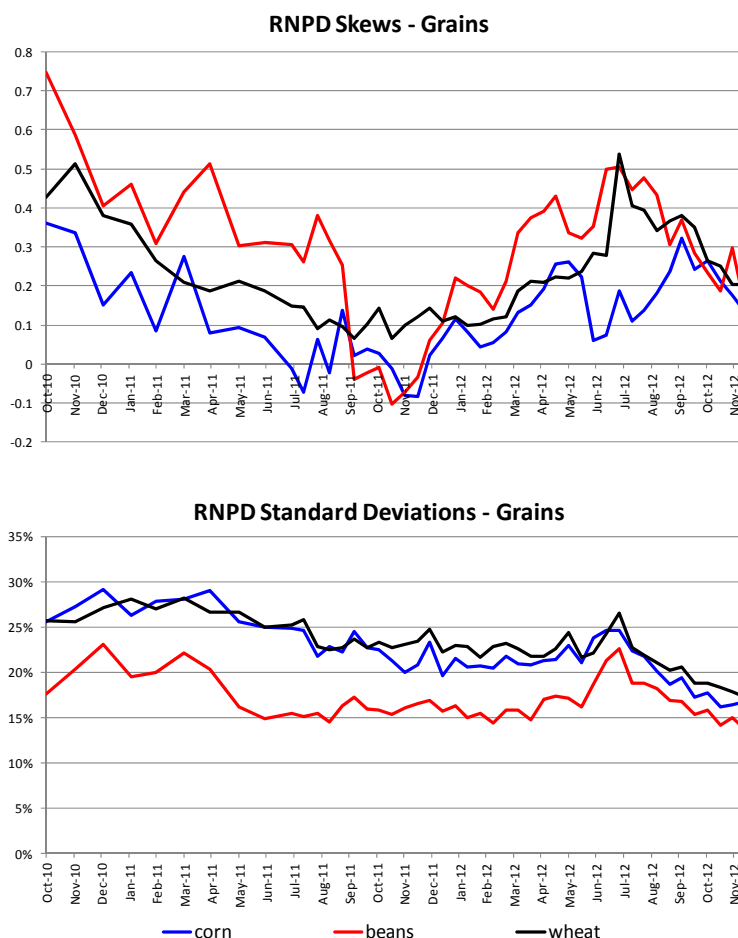
BANKING AND POLICY STUDIES

Minneapolis Options Report December 13th

Commodity Markets

Option trading rose relative to two weeks ago to a more average level last week in most of the commodity markets we follow. RNPD standard deviations held steady.

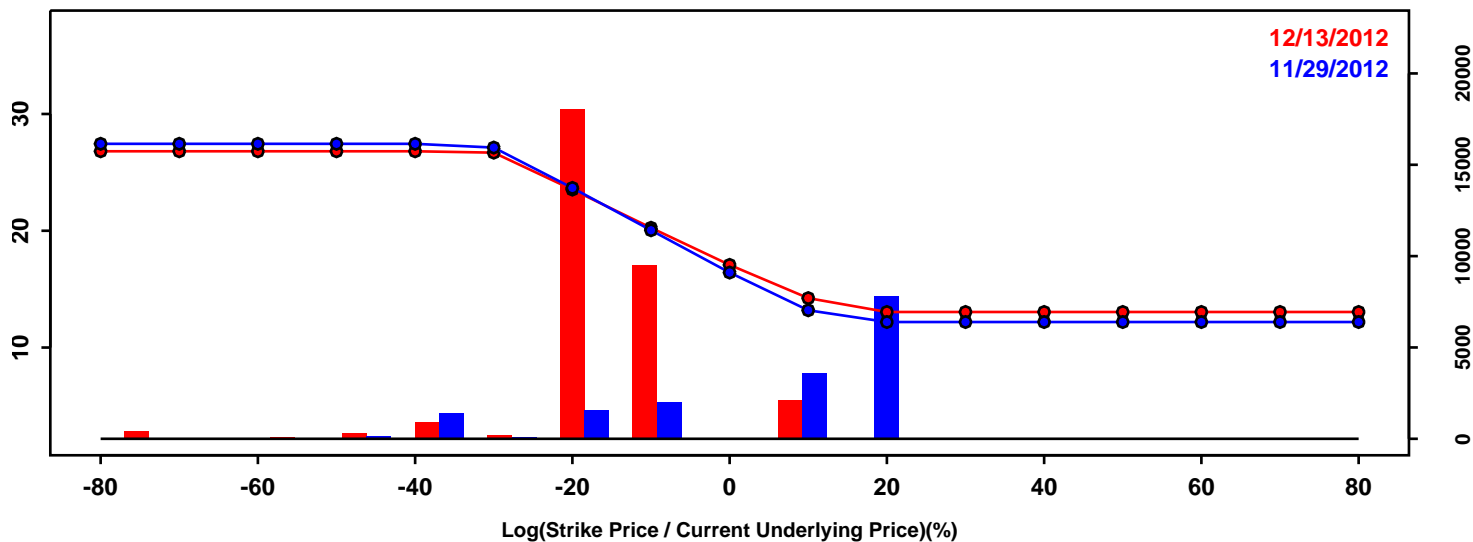
- The risk-neutral probability of a large decrease in the Yen-Dollar increased for the fourth straight period. The probabilities are now decidedly more skewed toward a decrease than an increase. (*See exchange rate reports*)
- RNPD standard deviations increased again this week in the precious metals markets. Trading was relatively strong in options on gold futures. The volatility smiles in both markets shifted higher. (*See Gold and Silver reports*)
- Trading has fallen off in options on grain futures as have upward price bias implied by the RNPDs. Both RNPD skews and standard deviations have declined steadily since the summer. (*See Corn, Soybeans, and Wheat reports*)



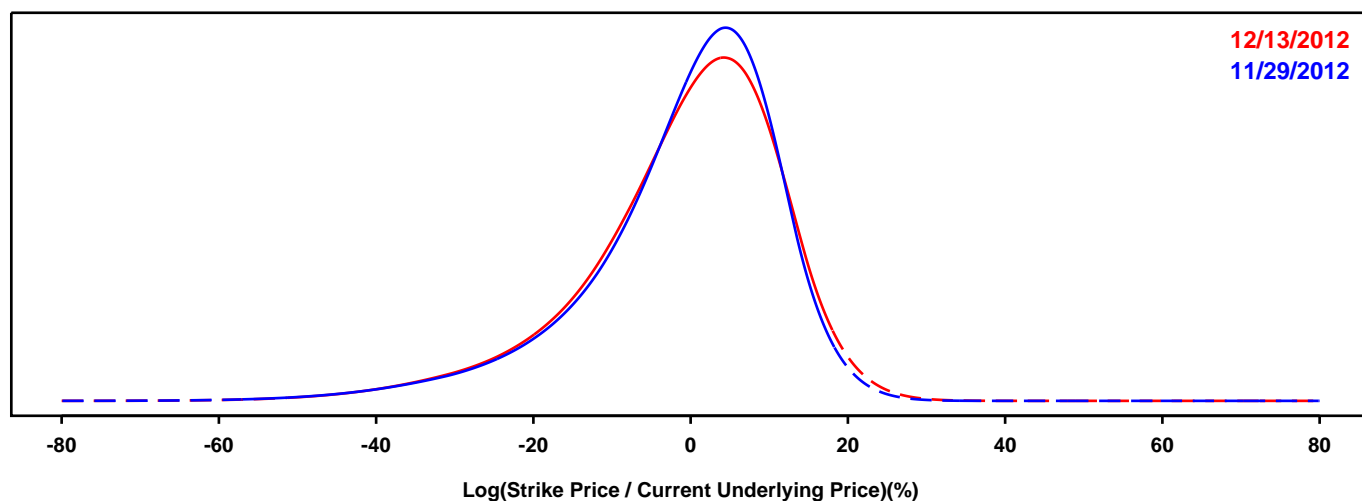
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- S&P 500

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 6 months.

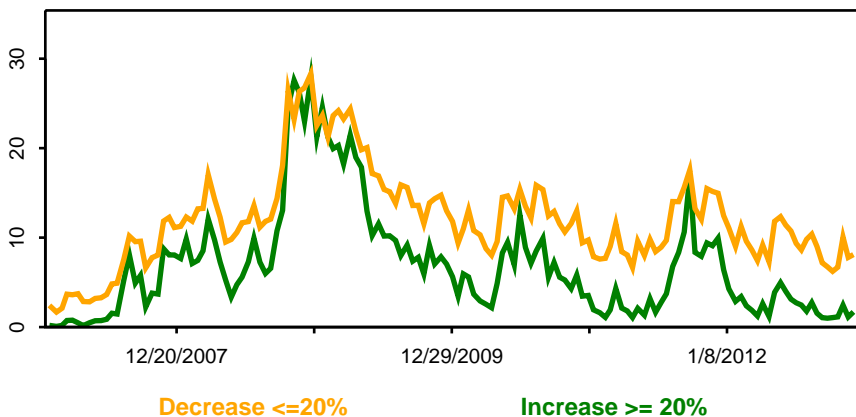
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



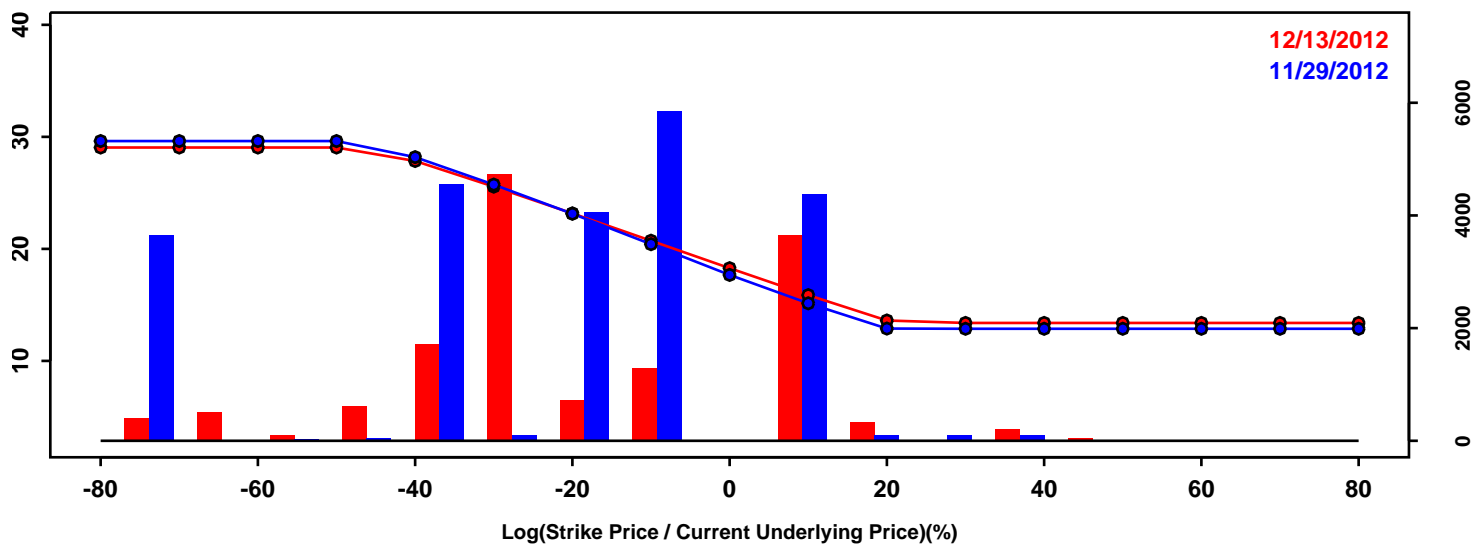
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-17.19%	-17.66%	-0.47%
50th Pct	1.30%	1.04%	-0.25%
90th Pct	12.19%	12.94%	0.75%
Mean	-0.89%	-0.92%	-0.03%
Std Dev	12.37%	12.69%	0.32%
Skew	-1.13	-0.98	0.15
Kurtosis	2.04	1.58	-0.46

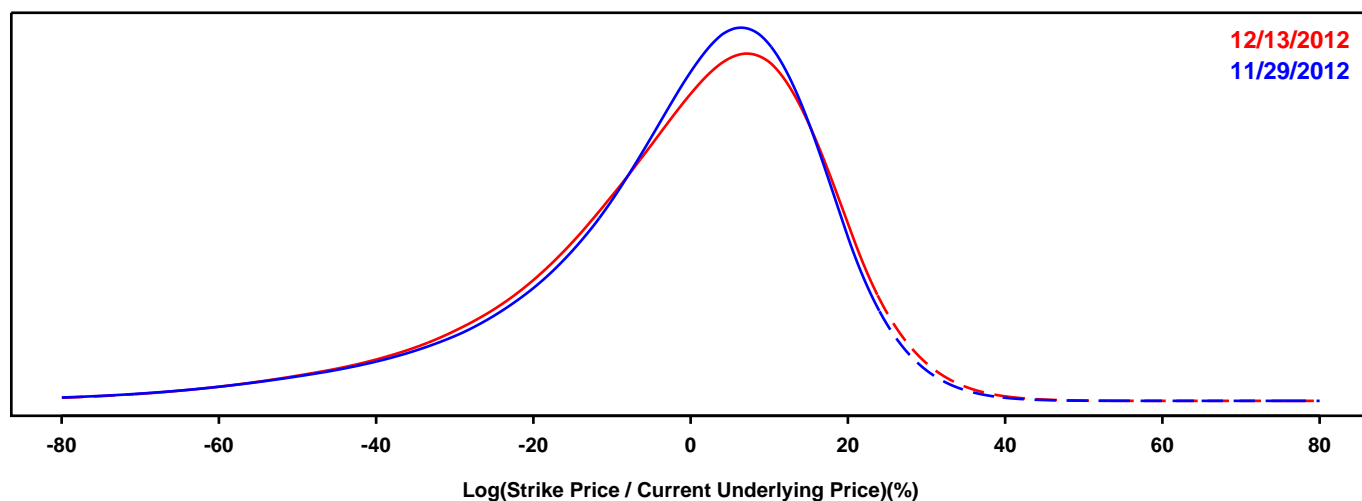
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- S&P 500

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 12 months.

Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



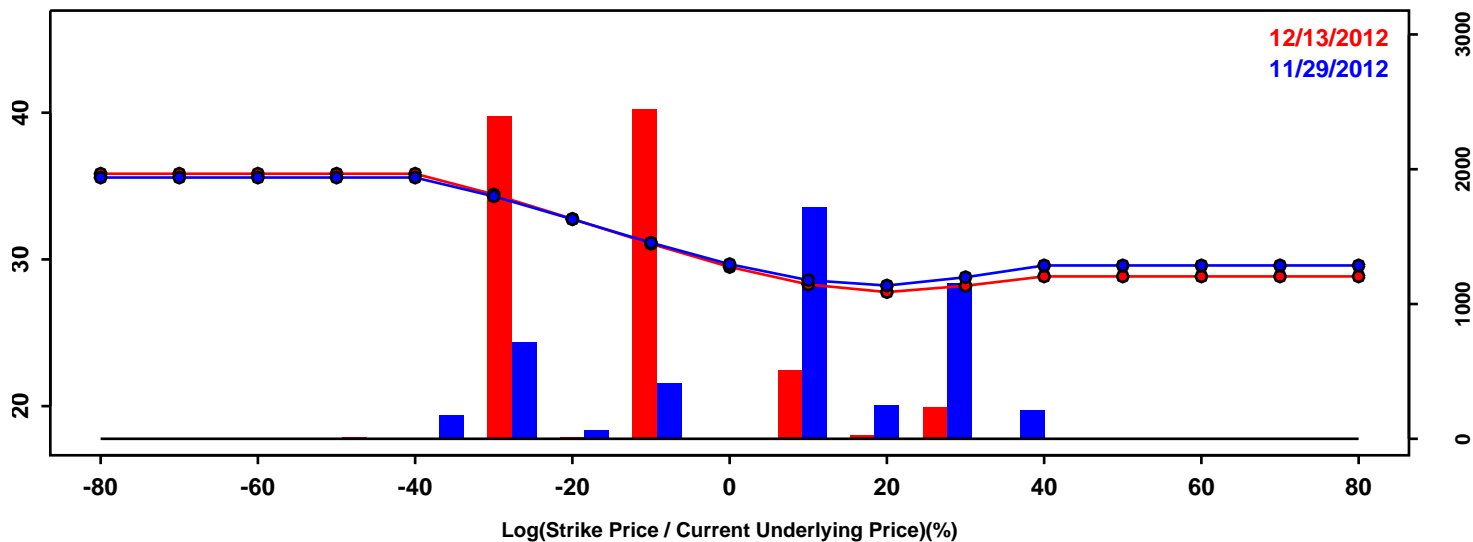
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-27.76%	-28.52%	-0.76%
50th Pct	1.59%	1.36%	-0.23%
90th Pct	17.95%	18.80%	0.85%
Mean	-2.13%	-2.19%	-0.06%
Std Dev	19.26%	19.64%	0.39%
Skew	-1.19	-1.07	0.13
Kurtosis	2.09	1.66	-0.43

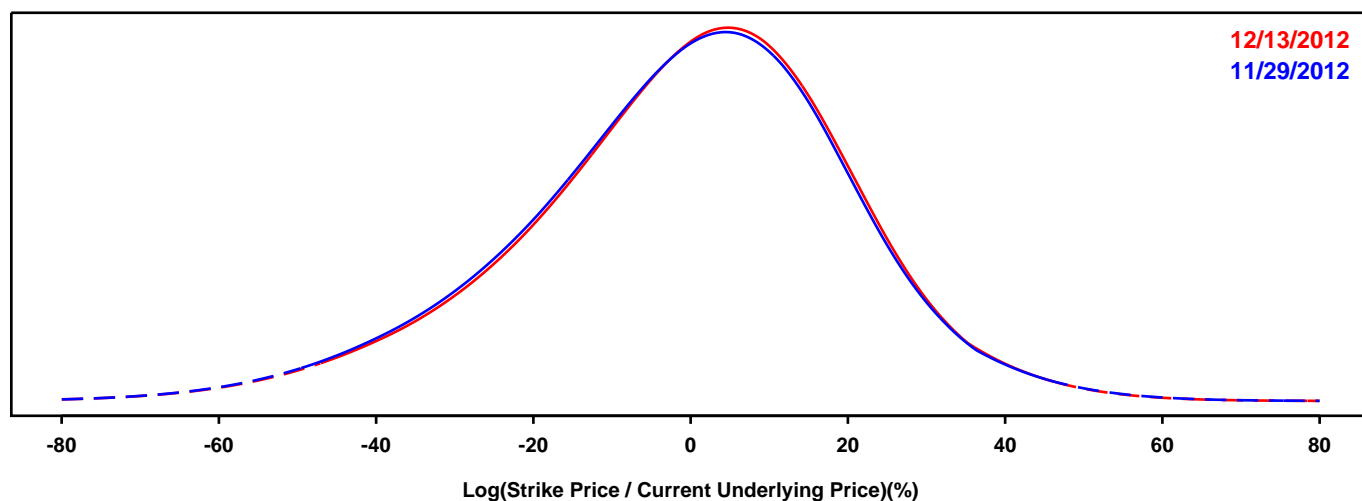
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- CRUDE OIL FUTURES (WTI)

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 6 months.

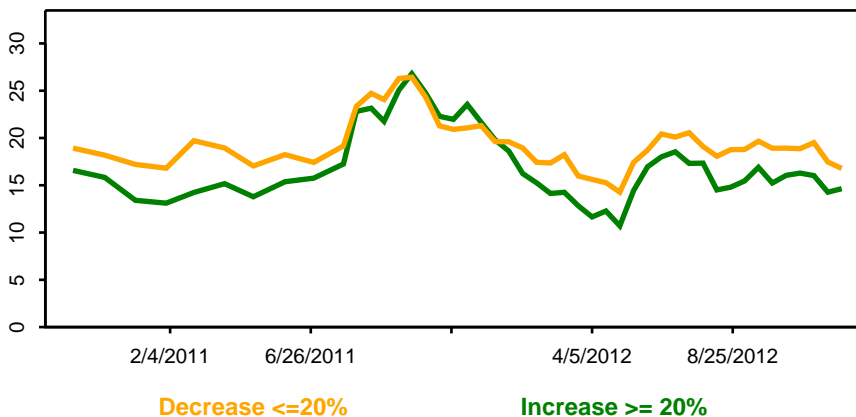
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



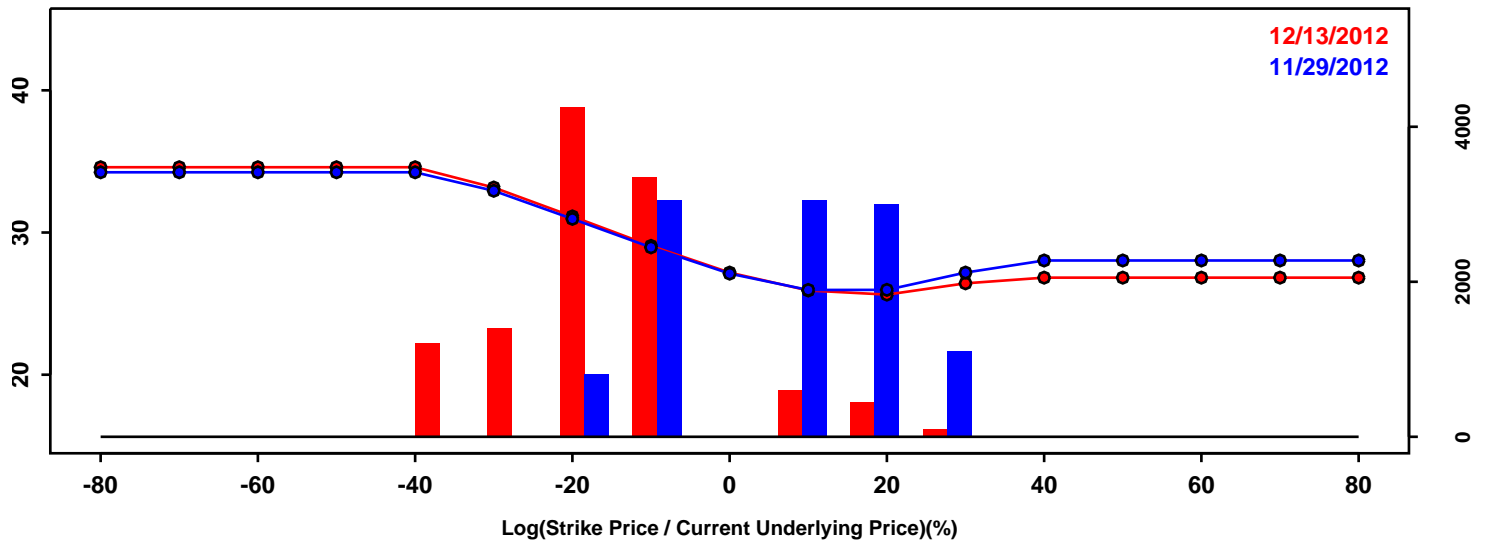
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-28.98%	-28.30%	0.68%
50th Pct	0.77%	1.23%	0.47%
90th Pct	23.81%	24.01%	0.21%
Mean	-0.98%	-0.55%	0.43%
Std Dev	21.09%	20.95%	-0.14%
Skew	-0.39	-0.42	-0.03
Kurtosis	0.47	0.51	0.03

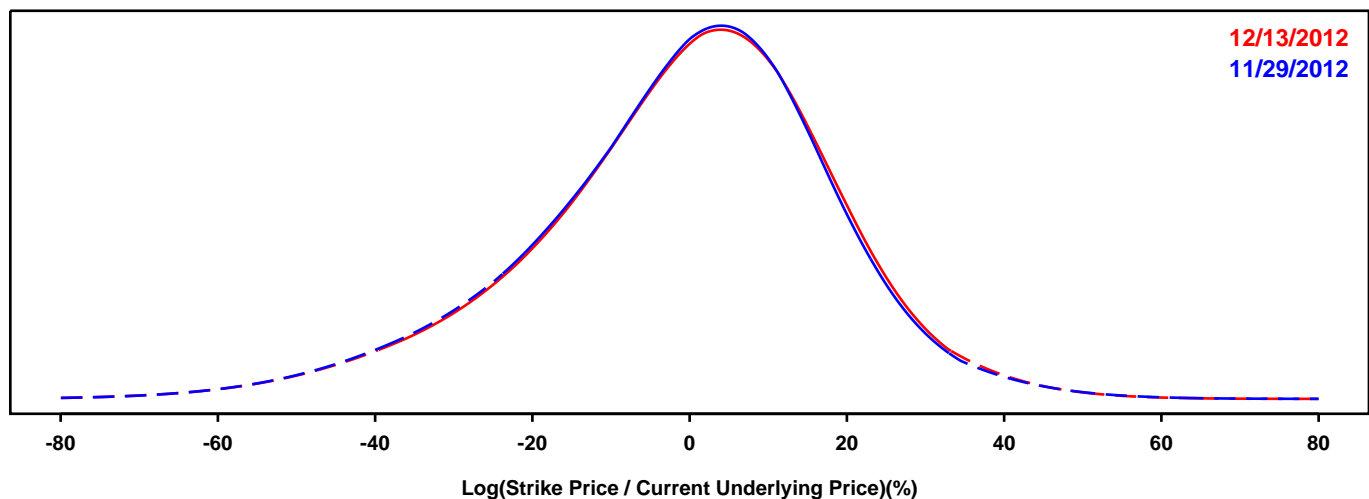
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- CRUDE OIL FUTURES (Brent)

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 6 months.

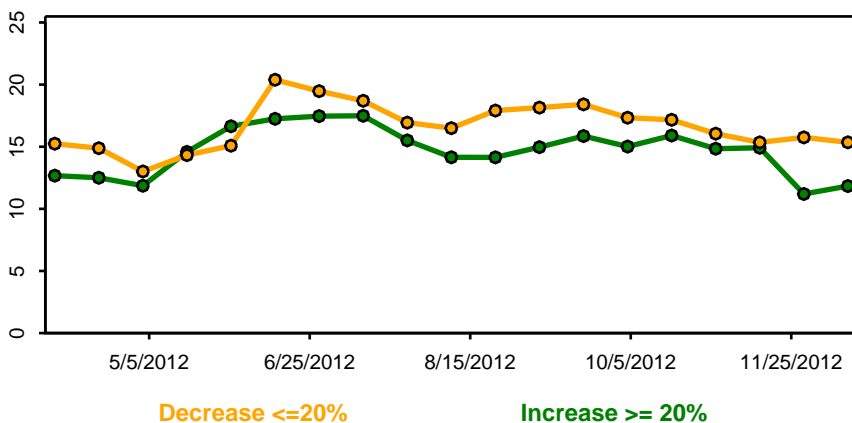
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



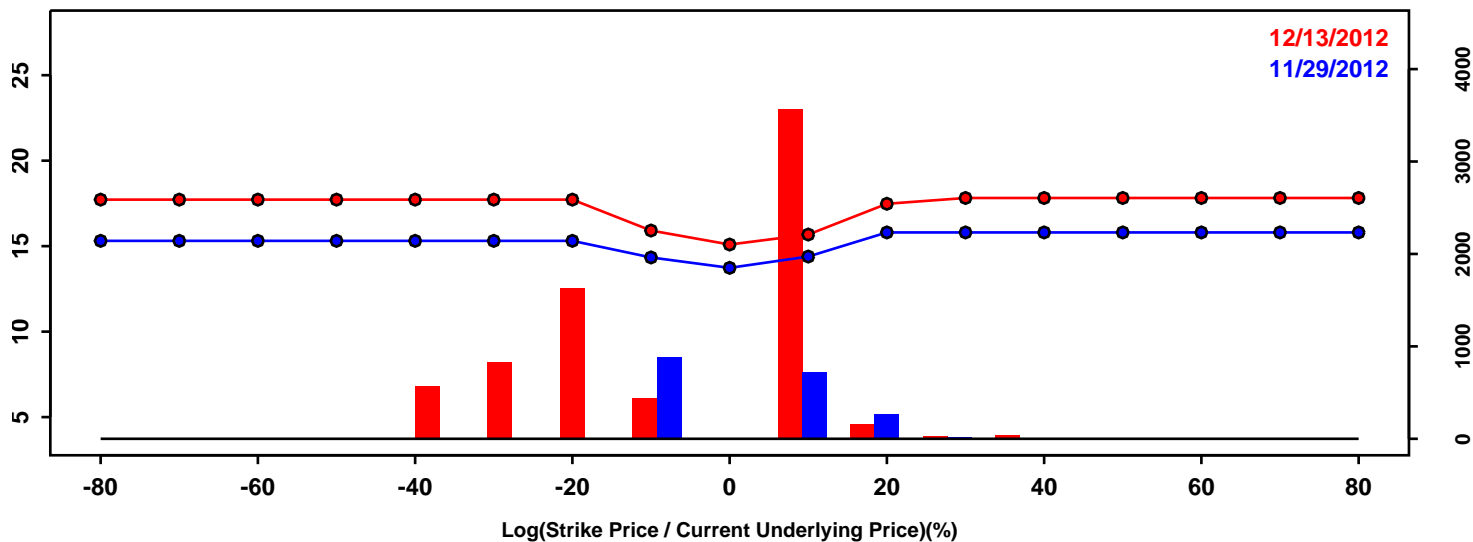
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-27.01%	-26.61%	0.40%
50th Pct	0.70%	1.03%	0.32%
90th Pct	21.04%	21.59%	0.56%
Mean	-1.22%	-0.85%	0.36%
Std Dev	19.39%	19.44%	0.05%
Skew	-0.48	-0.50	-0.02
Kurtosis	0.71	0.70	-0.01

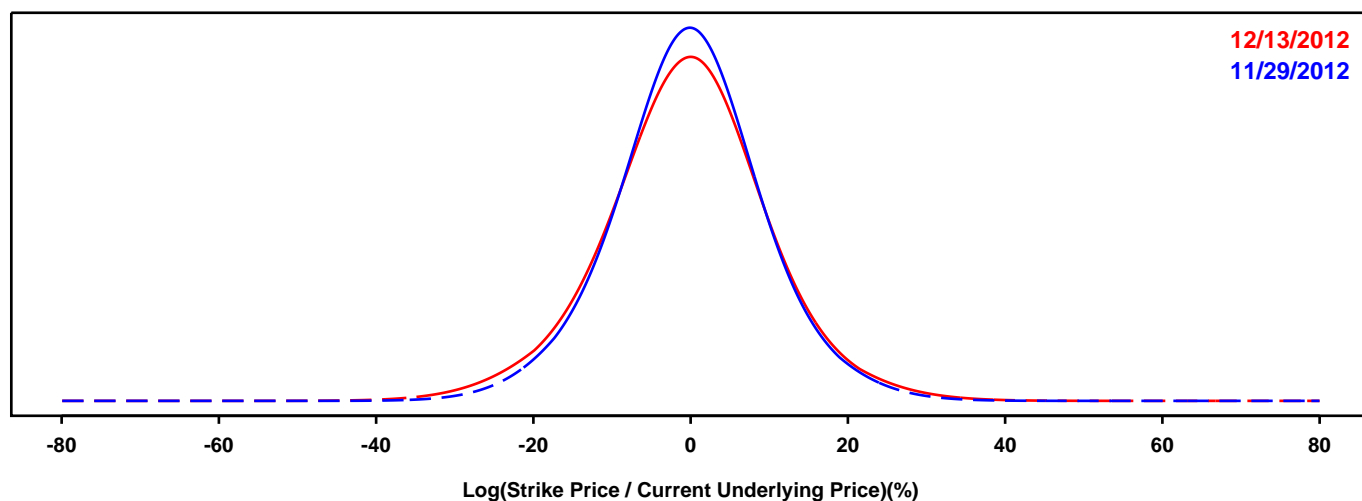
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- GOLD FUTURES

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 6 months.

Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



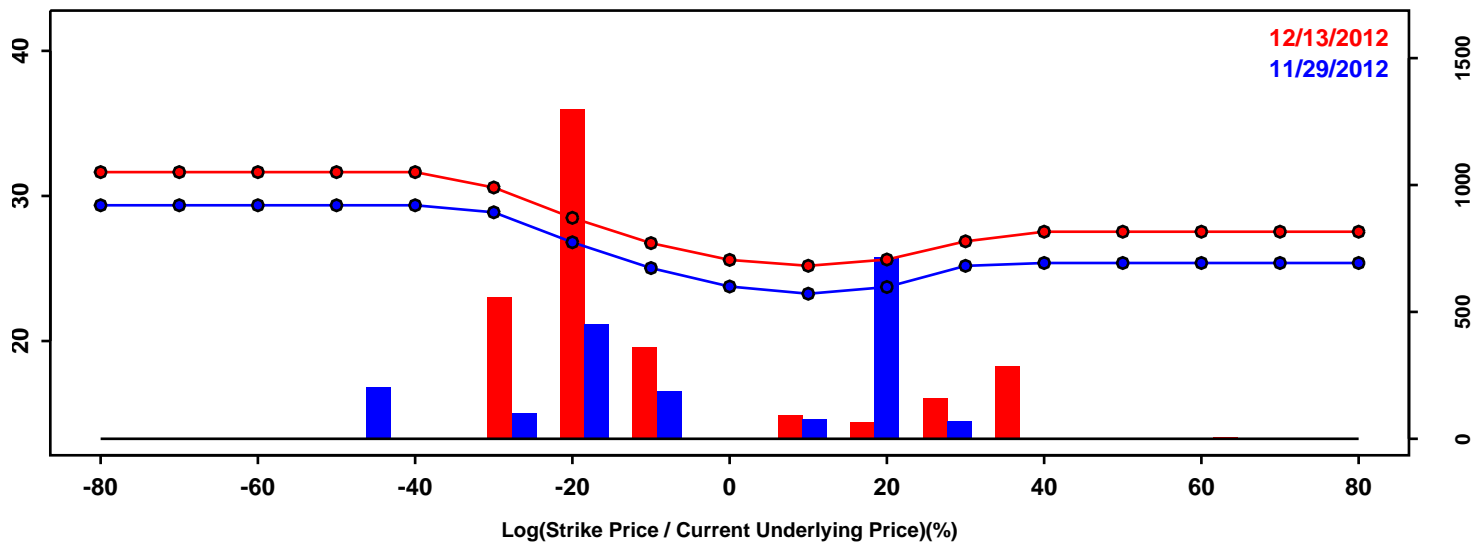
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-12.29%	-13.71%	-1.42%
50th Pct	-0.17%	-0.33%	-0.16%
90th Pct	11.80%	12.49%	0.70%
Mean	-0.16%	-0.44%	-0.28%
Std Dev	9.69%	10.65%	0.96%
Skew	0.00	-0.06	-0.07
Kurtosis	0.52	0.67	0.15

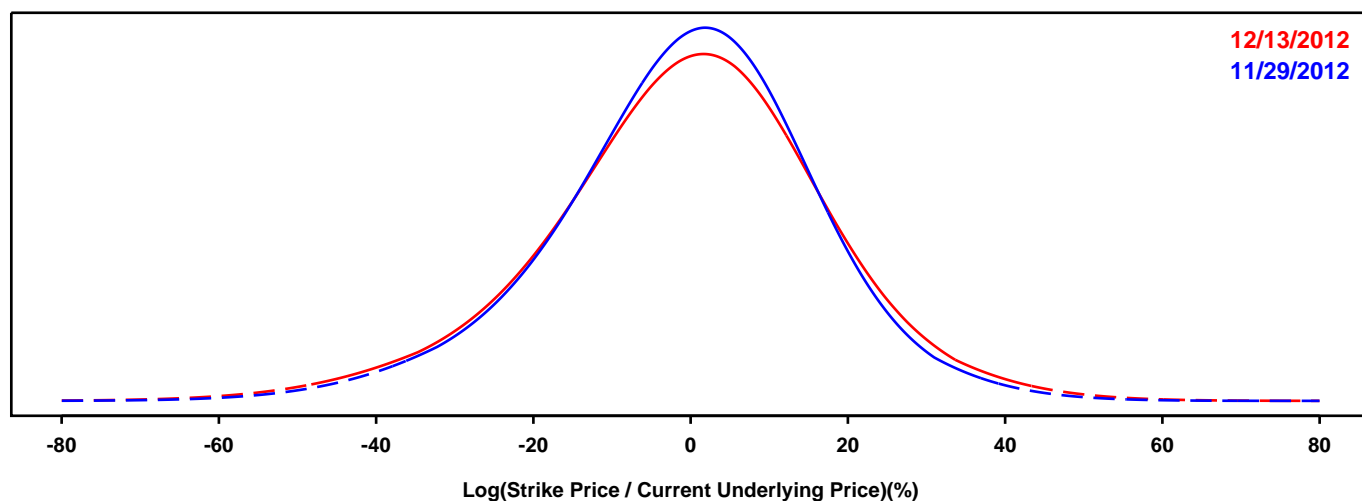
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- SILVER FUTURES

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 6 months.

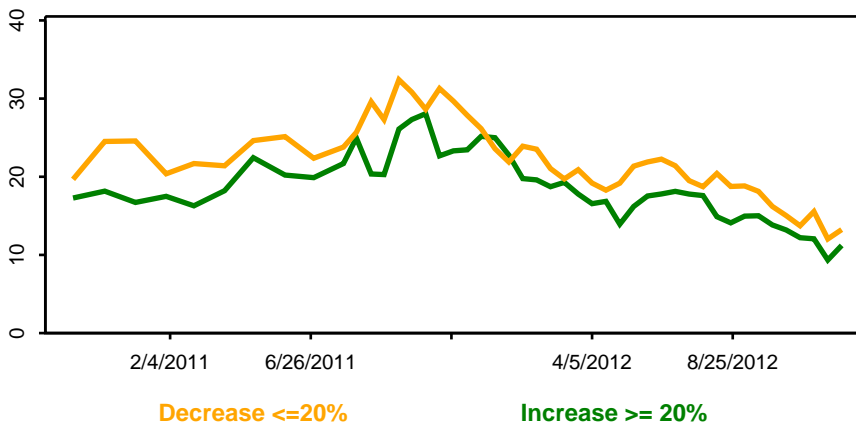
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



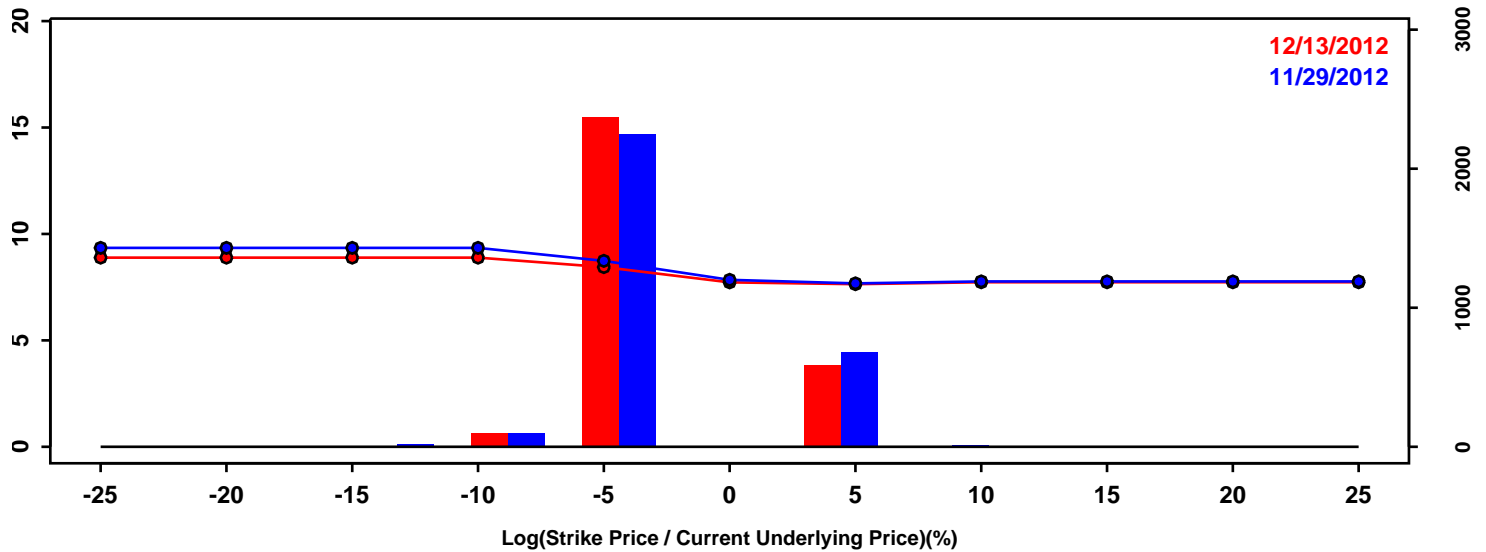
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-22.19%	-23.60%	-1.40%
50th Pct	0.25%	0.26%	0.01%
90th Pct	19.41%	21.16%	1.75%
Mean	-0.64%	-0.55%	0.09%
Std Dev	16.84%	18.13%	1.29%
Skew	-0.30	-0.26	0.03
Kurtosis	0.65	0.66	0.01

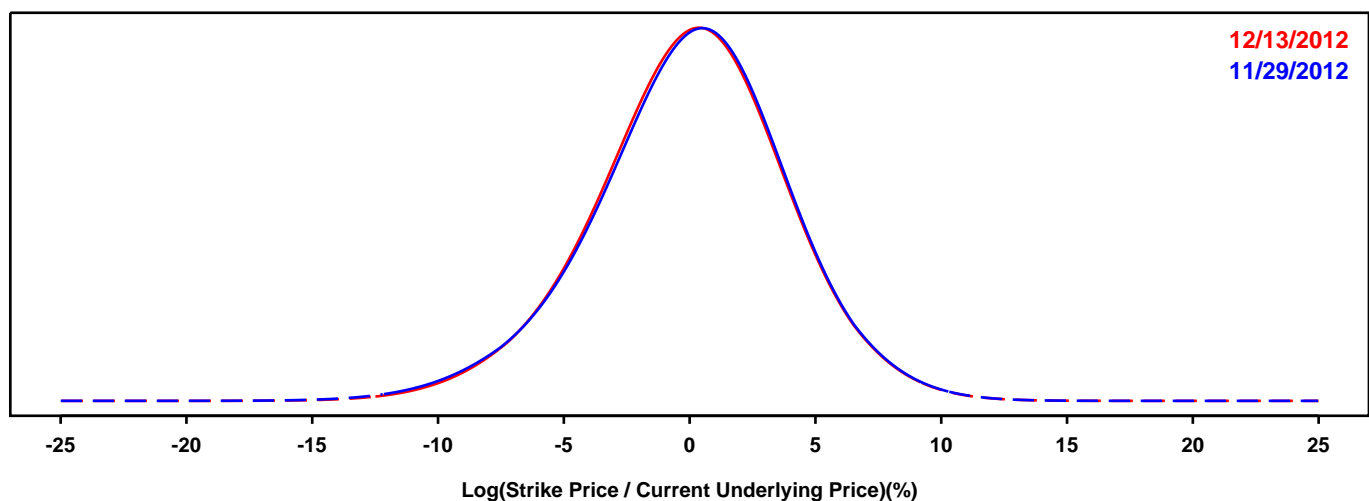
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- DOLLAR-EURO EXCHANGE RATE FUTURES

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 3 months.

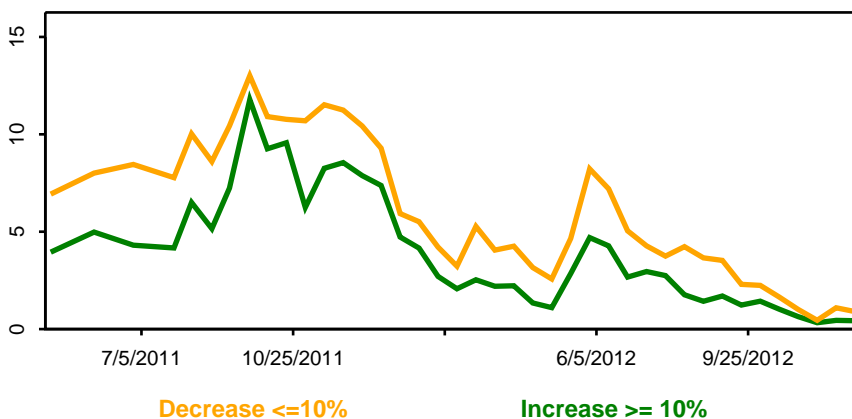
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



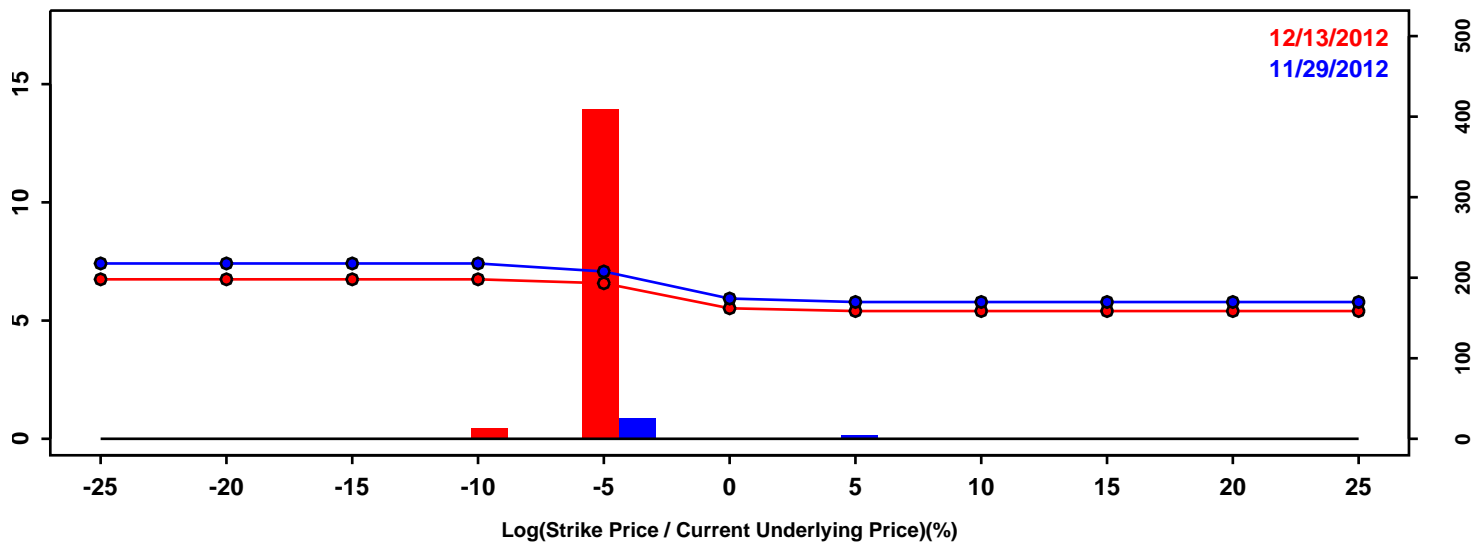
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-5.03%	-4.95%	0.09%
50th Pct	0.21%	0.14%	-0.07%
90th Pct	4.78%	4.77%	-0.02%
Mean	0.04%	0.03%	-0.02%
Std Dev	3.92%	3.86%	-0.06%
Skew	-0.26	-0.19	0.07
Kurtosis	0.43	0.33	-0.09

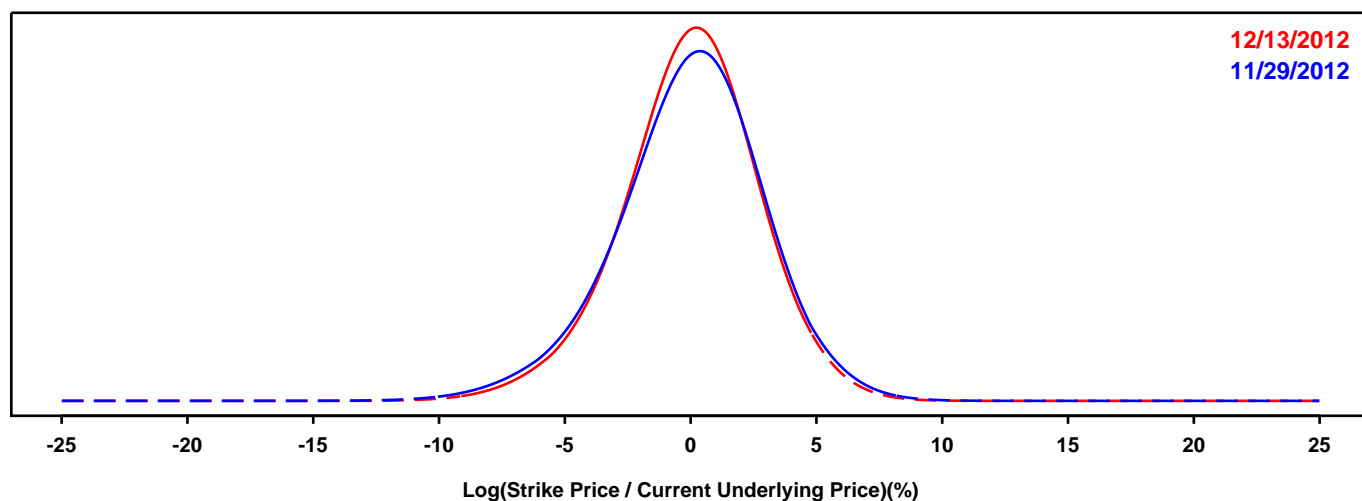
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- DOLLAR-POUND EXCHANGE RATE FUTURES

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 3 months.

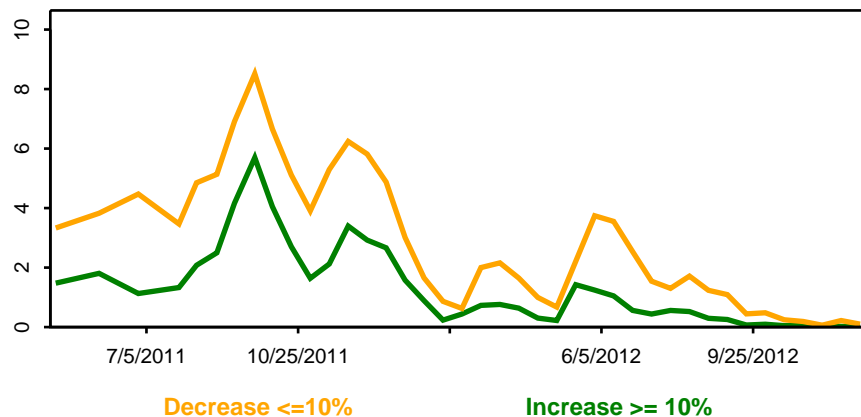
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



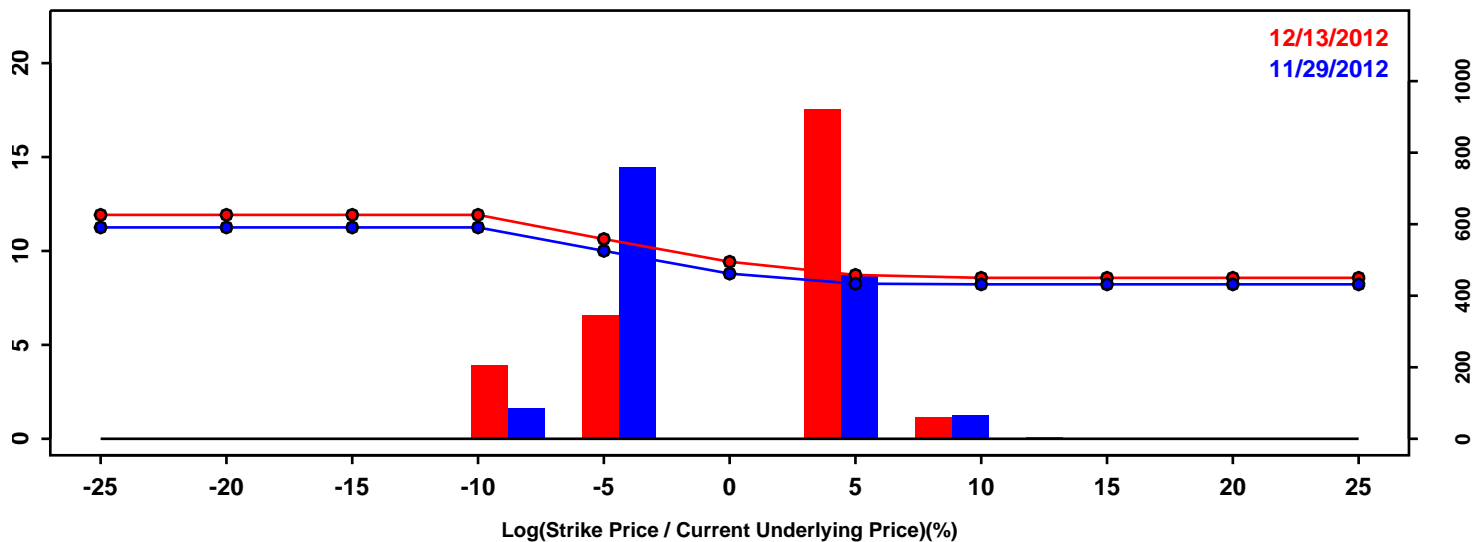
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-3.83%	-3.56%	0.27%
50th Pct	0.13%	0.09%	-0.04%
90th Pct	3.56%	3.35%	-0.21%
Mean	-0.01%	-0.00%	0.01%
Std Dev	2.97%	2.76%	-0.21%
Skew	-0.32	-0.26	0.06
Kurtosis	0.54	0.46	-0.08

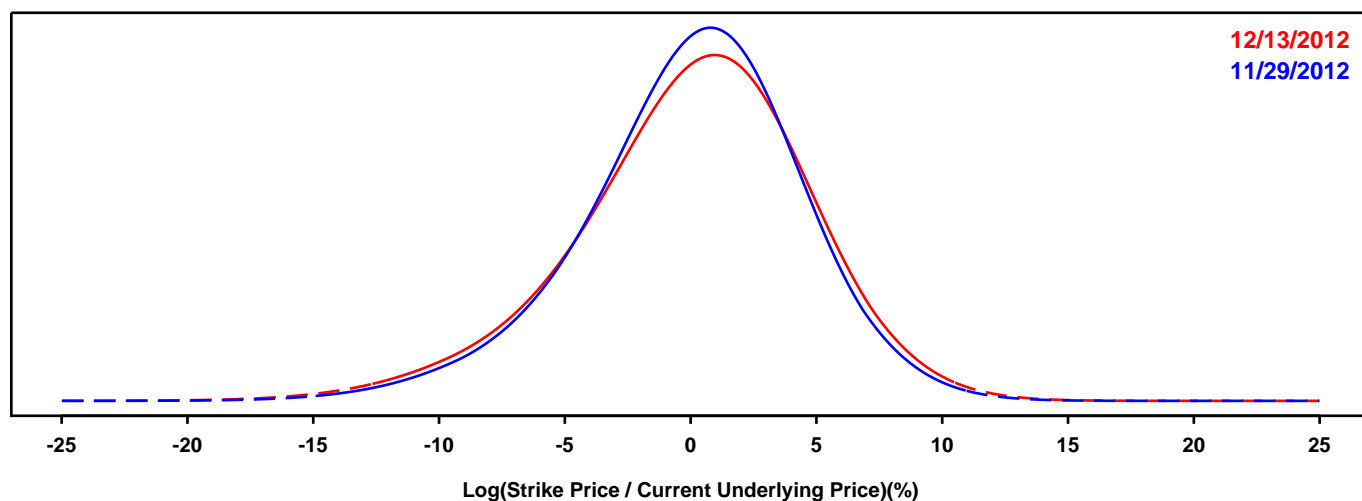
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- YEN-DOLLAR EXCHANGE RATE FUTURES

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 3 months.

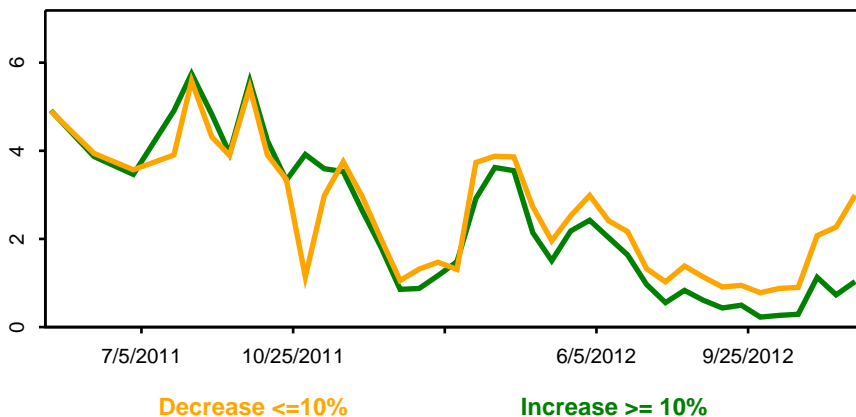
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



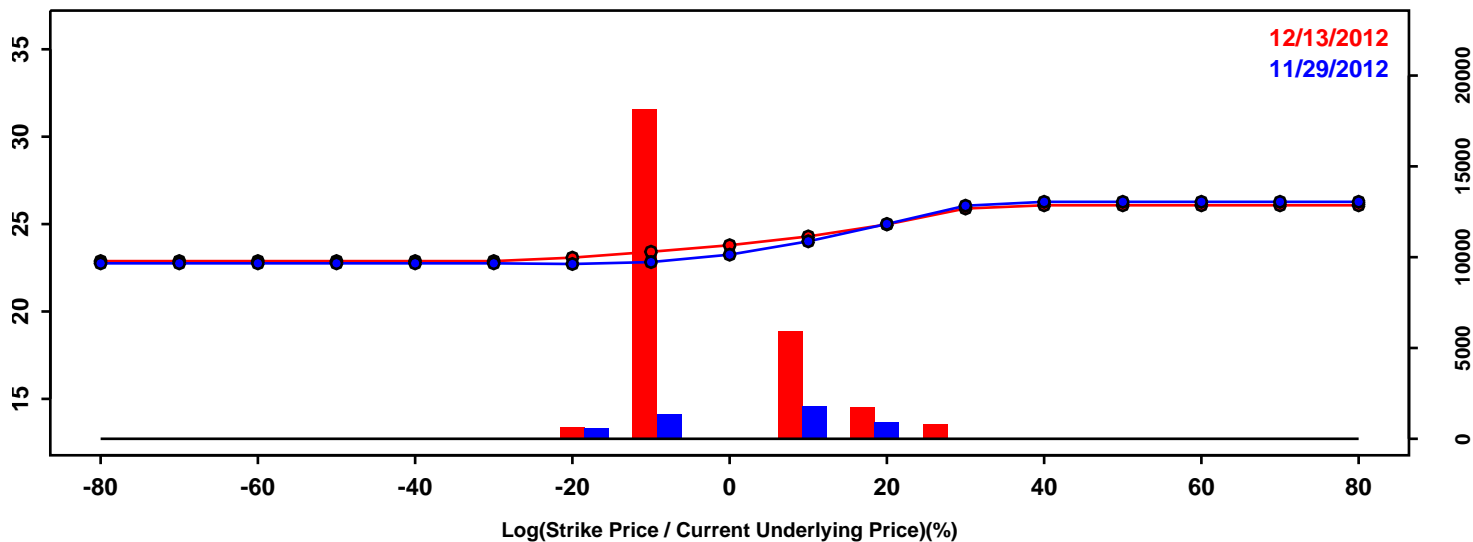
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-5.67%	-6.16%	-0.50%
50th Pct	0.30%	0.37%	0.07%
90th Pct	5.31%	5.69%	0.38%
Mean	0.03%	0.05%	0.01%
Std Dev	4.41%	4.73%	0.32%
Skew	-0.42	-0.44	-0.03
Kurtosis	0.61	0.56	-0.05

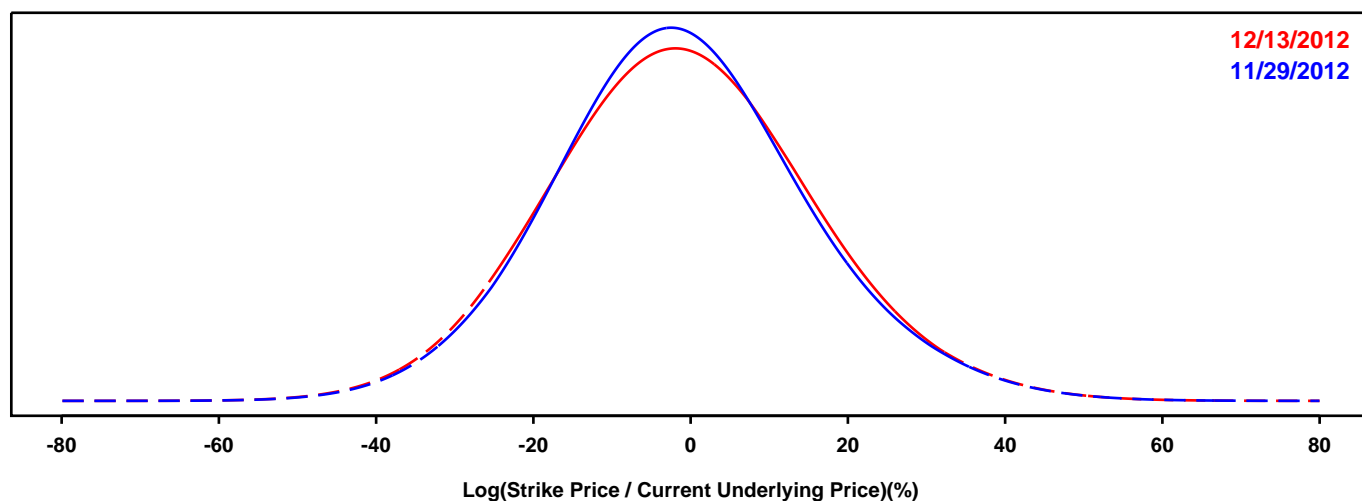
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- CORN FUTURES

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 6 months.

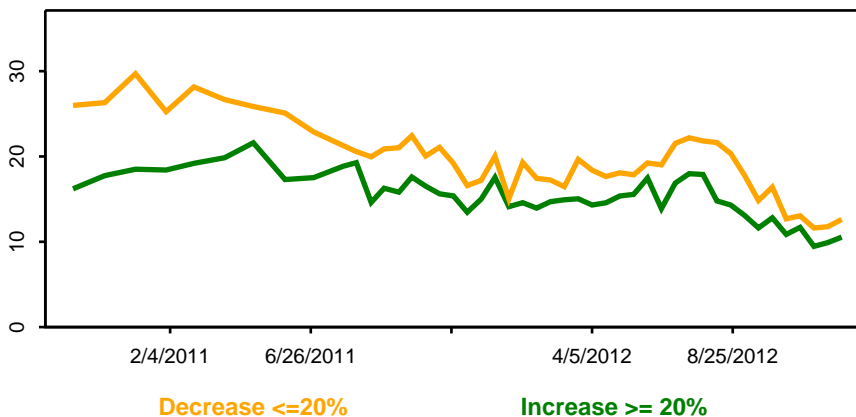
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



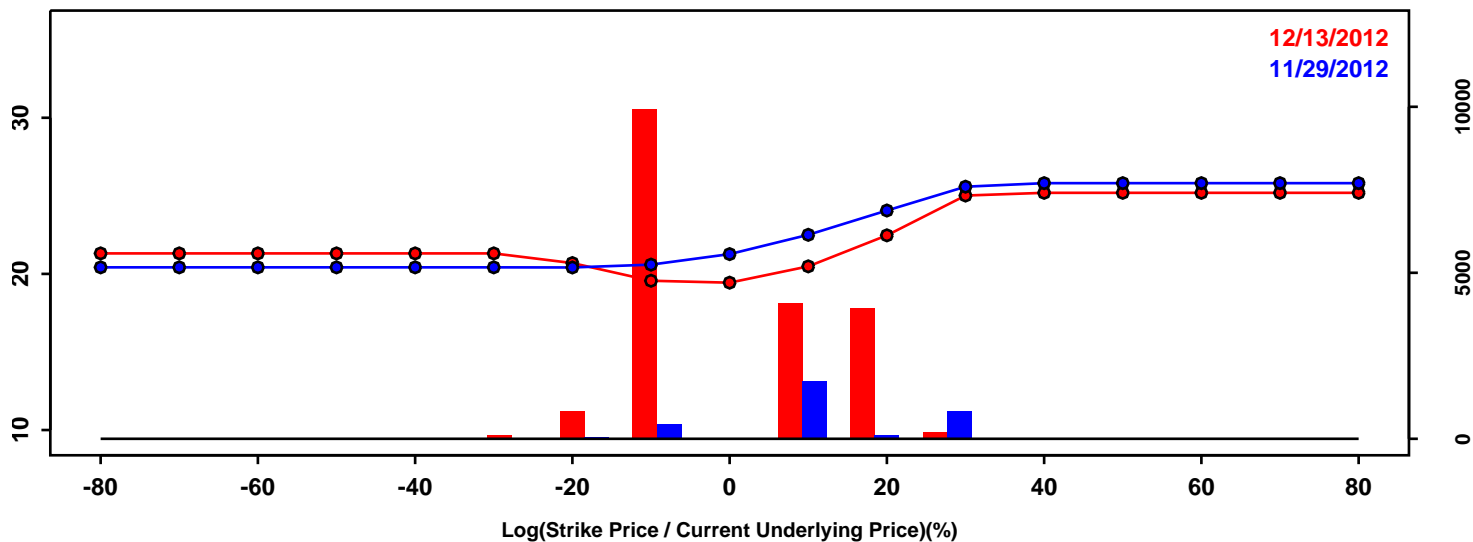
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-21.52%	-22.18%	-0.66%
50th Pct	-1.64%	-1.36%	0.28%
90th Pct	19.93%	20.51%	0.59%
Mean	-1.14%	-1.01%	0.13%
Std Dev	16.38%	16.78%	0.40%
Skew	0.18	0.13	-0.04
Kurtosis	0.26	0.12	-0.14

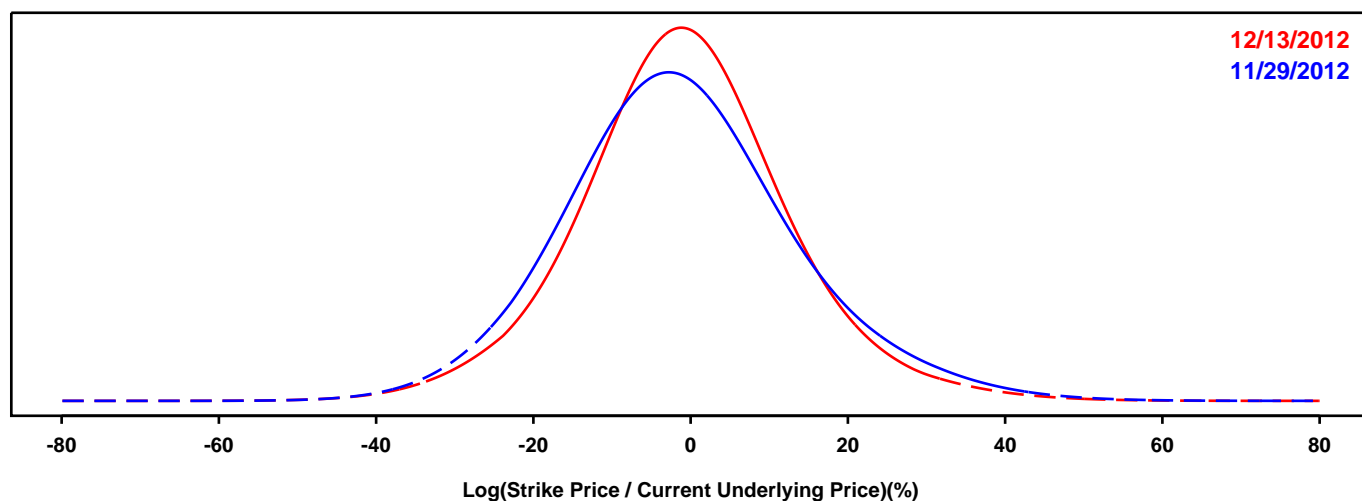
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- SOYBEAN FUTURES

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 6 months.

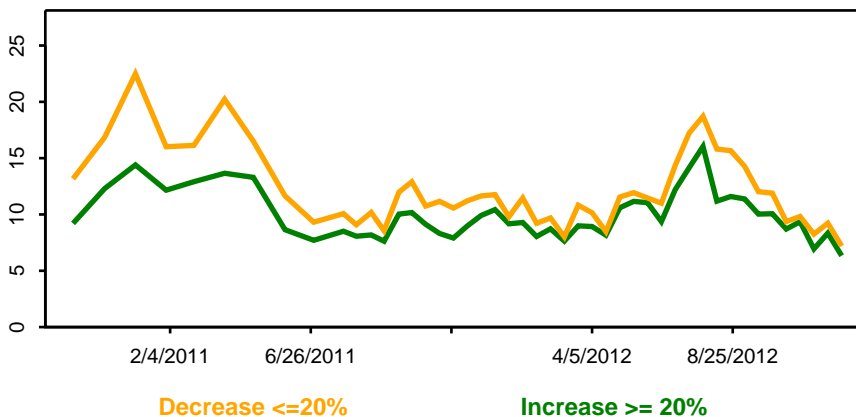
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



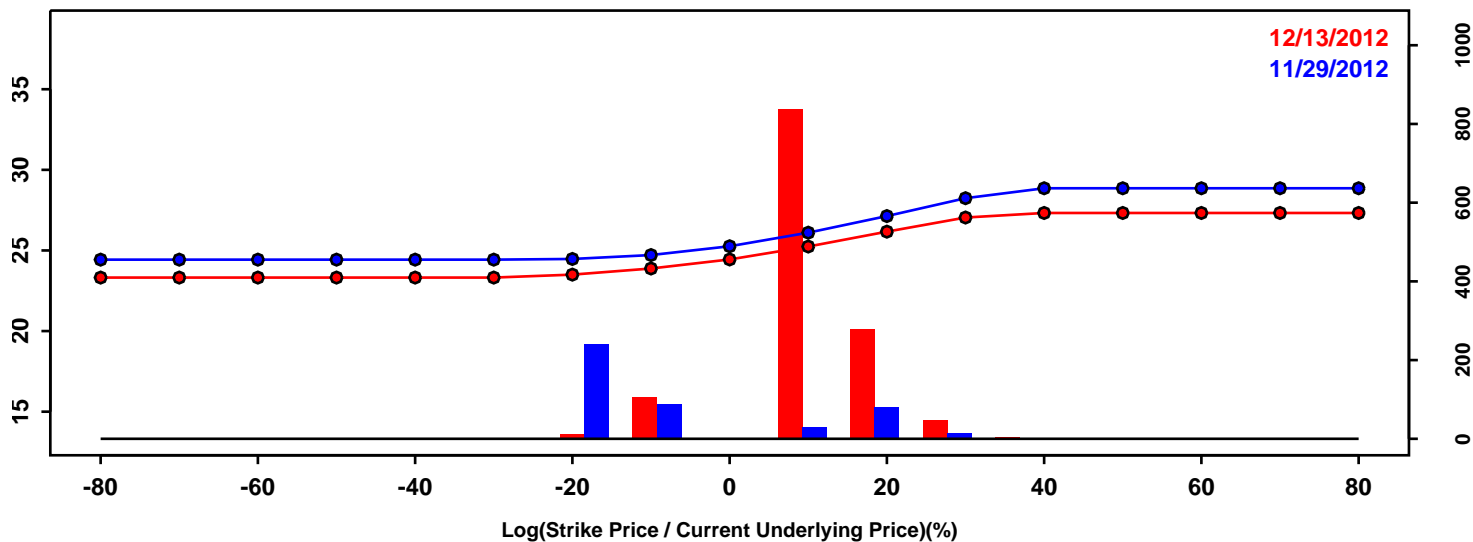
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-19.37%	-17.37%	2.01%
50th Pct	-1.80%	-0.94%	0.86%
90th Pct	18.13%	16.07%	-2.07%
Mean	-1.08%	-0.68%	0.40%
Std Dev	14.98%	13.63%	-1.35%
Skew	0.30	0.14	-0.16
Kurtosis	0.46	0.78	0.31

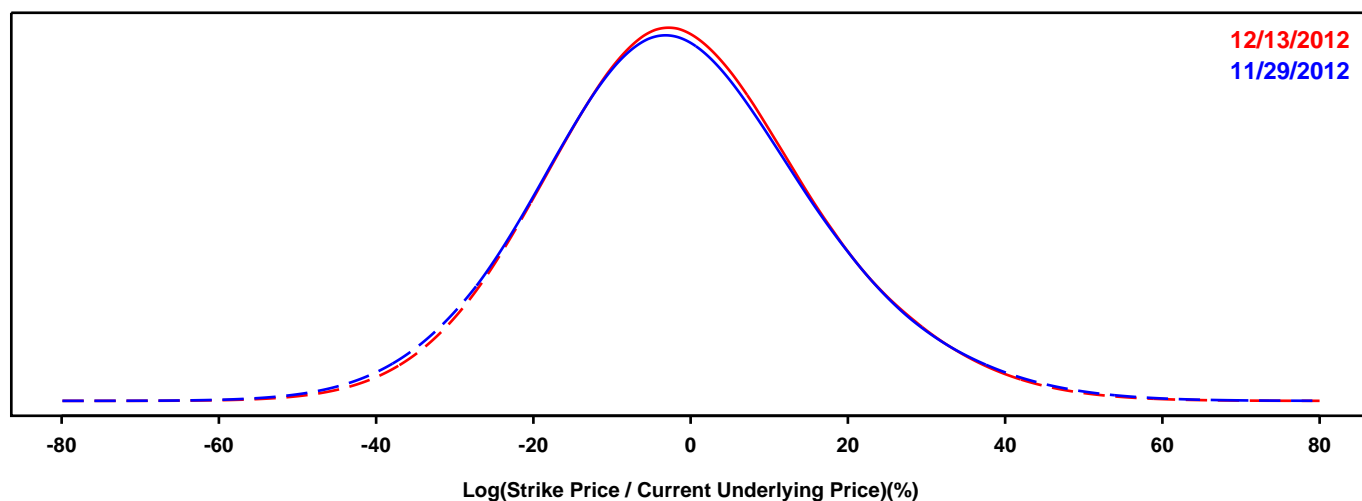
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- WHEAT FUTURES

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 6 months.

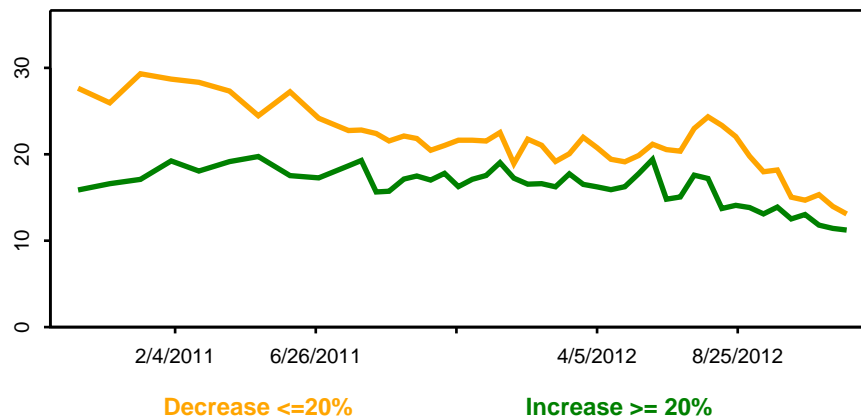
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change



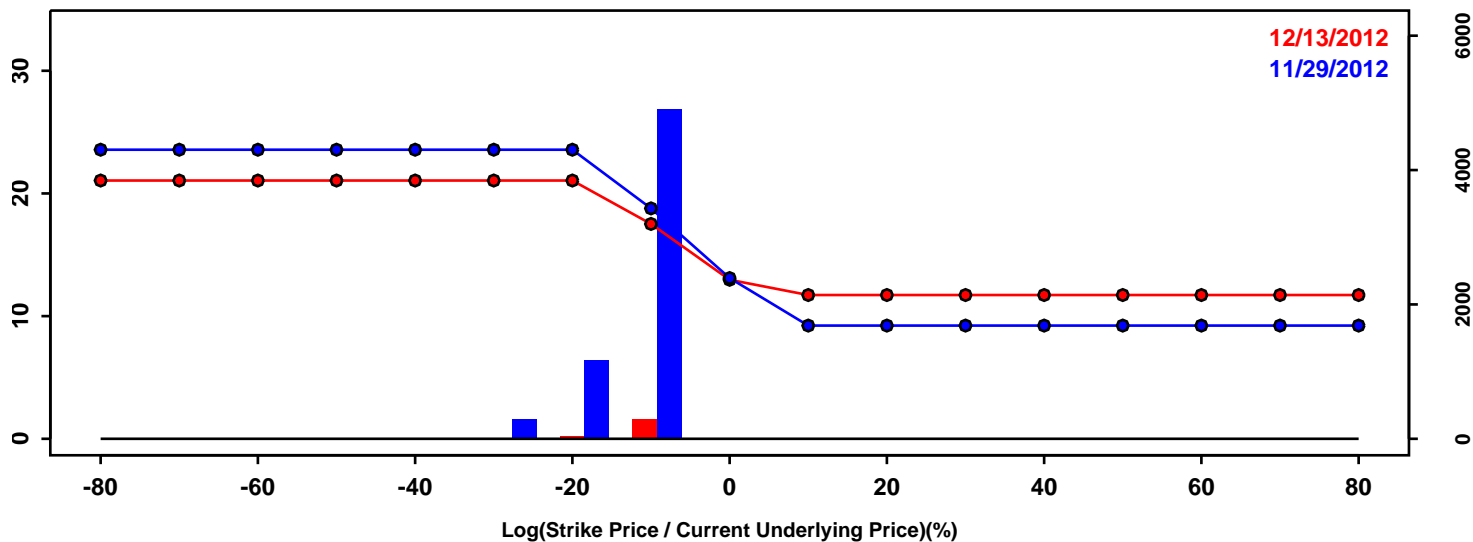
Statistics of the Log Return Distributions

	11/29/2012	12/13/2012	Change
10th Pct	-23.40%	-22.56%	0.84%
50th Pct	-2.00%	-1.73%	0.27%
90th Pct	21.57%	21.30%	-0.27%
Mean	-1.35%	-1.08%	0.27%
Std Dev	17.78%	17.27%	-0.52%
Skew	0.20	0.20	-0.00
Kurtosis	0.27	0.20	-0.07

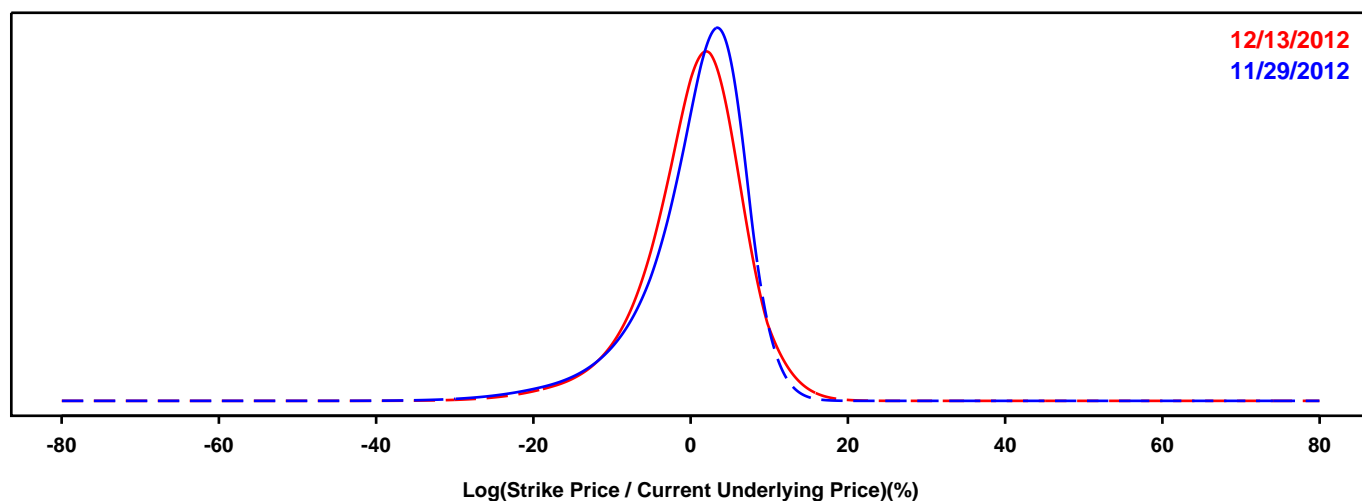
RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- iSHARES DOW JONES US REAL ESTATE

Log returns are based on the risk neutral density function of the underlying asset derived from options that expire in approximately 3 months.

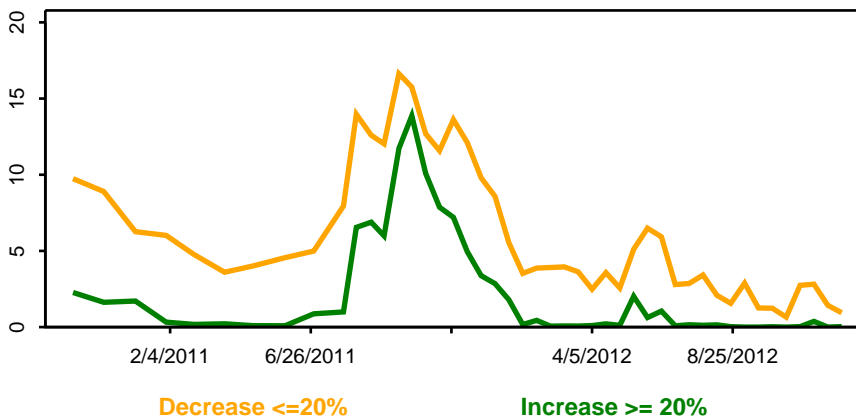
Implied Volatilities (lines--left axis) and Volume (bars--right axis)



Risk Neutral PDF of the Log Return Distribution



Probability of a Large Change

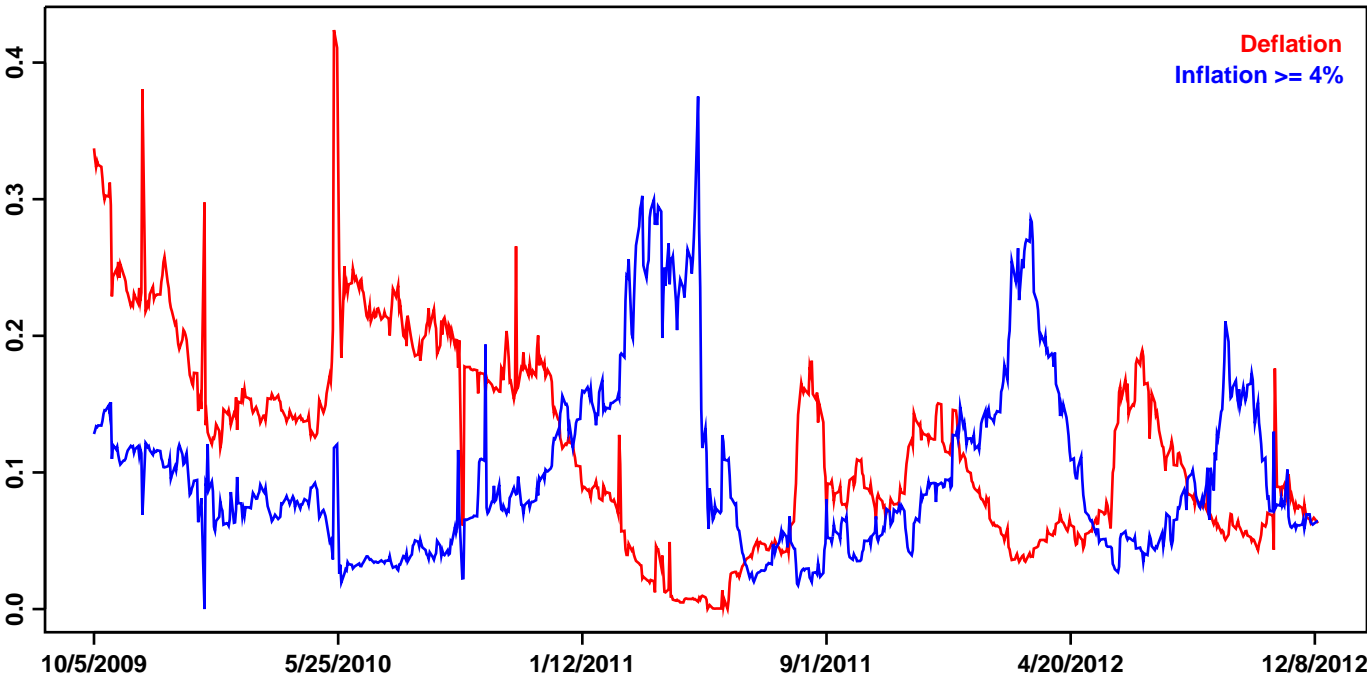


Statistics of the Log Return Distributions

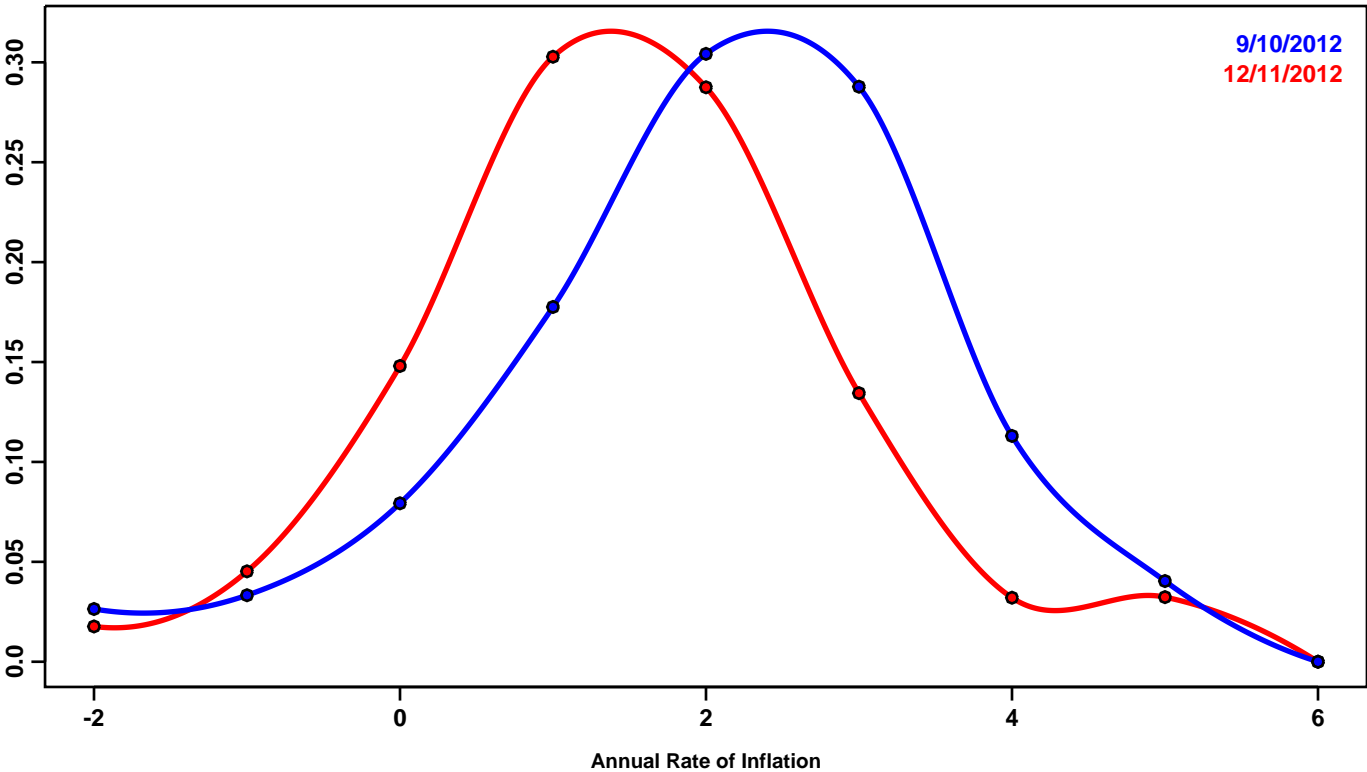
	11/29/2012	12/13/2012	Change
10th Pct	-7.97%	-7.75%	0.22%
50th Pct	1.79%	1.06%	-0.73%
90th Pct	7.42%	7.60%	0.18%
Mean	0.57%	0.40%	-0.16%
Std Dev	6.67%	6.48%	-0.19%
Skew	-1.31	-0.82	0.49
Kurtosis	2.87	1.84	-1.03

RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- Inflation Caps & Floors

Probability of Deflation and High Inflation over the Next Year



Risk Neutral Density Function for Inflation over the Next Year



RISK NEUTRAL PROBABILITY DENSITY FUNCTIONS -- Inflation Caps & Floors

Probabilty of Deflation and High Inflation over the Next 5 Years

