The Impact of Long-Short Speculators on Agricultural Commodity Futures Prices

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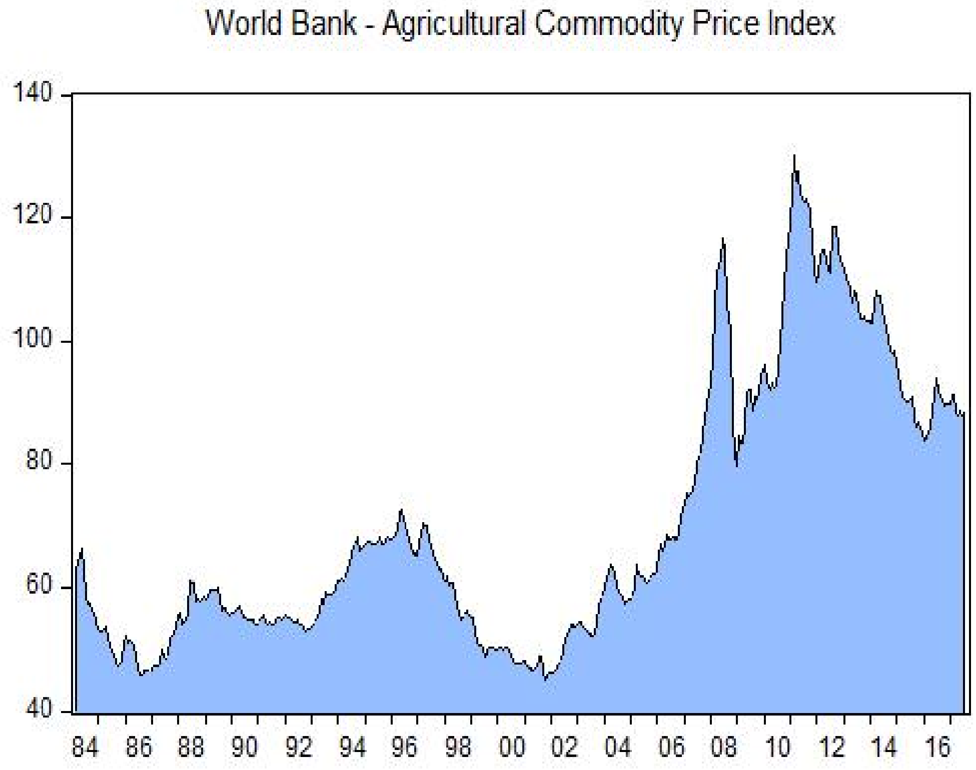
Motivation

- Pronounced spikes and crashes in 2007/08 and 2011
- Commodity index traders (CITs) emerge as important market participants
- Synchronized rise in prices, trading volume and open interest

Are Speculators to blame?



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Are speculators to blame?

Commodity Index Traders

- Empirical literature and public debate focused on CITs
- Inconclusive results
  But: Majority finds evidence that CITs are not accountable

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Long-short Speculators

- Classical or long-short speculators received significantly less attention
- Trading strategies significantly different

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Research question

Does the activity of long-short speculators have an influence on returns volatility in agricultural commodities futures markets?

Is long-short speculation stabilizing or destabilizing?

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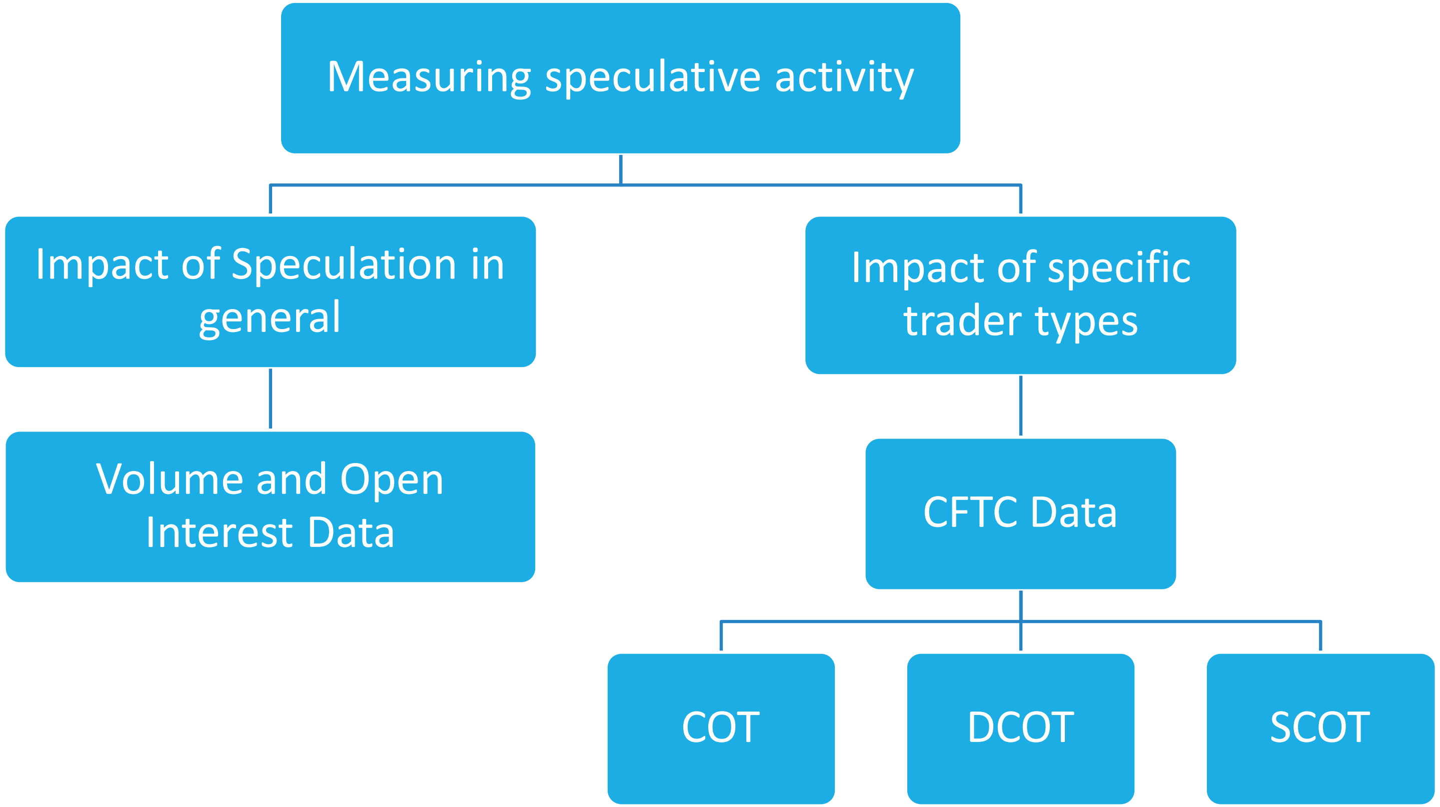
Measure construction

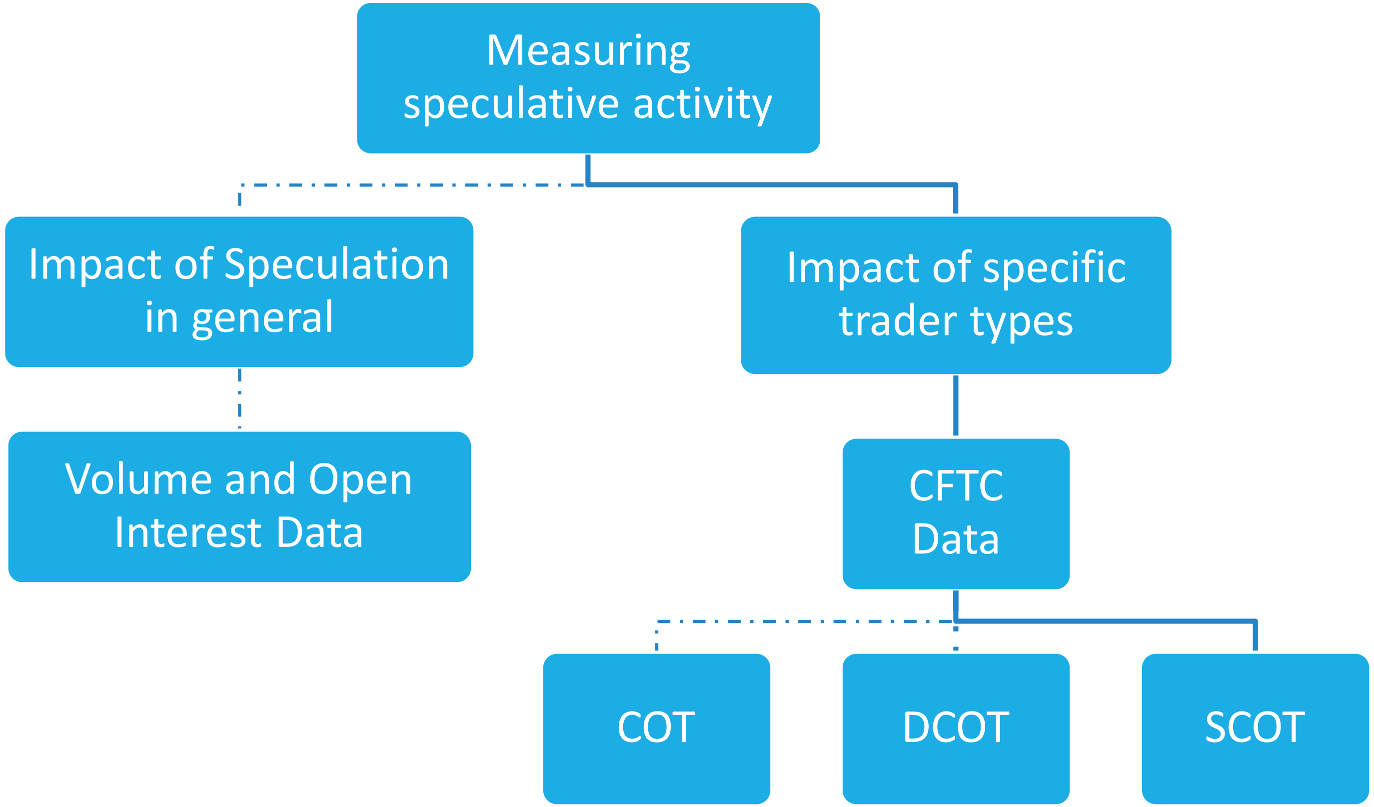


Measure Construction

COT	DCOT	SCOT
Commercials	Processors & Merchants	Commercials
Non-Commercials	Swap Dealers	Non-Commercials
	Managed Money	Index Traders
	Other Reportables	
Non-Reporting	Non-Reporting	Non-Reporting

See Irwin and Sanders (2012)

Measure construction



Measure Construction

Total Open Interest

Measures the impact of positions held by long-short speculators on commodity price volatility.

$$S_{i,t}^{Total} = NCL_{i,t} + NCS_{i,t}$$

Market Share

Measures whether the market share of long-short speculators impacts on commodity price volatility.

$$S_{i,t}^{Share} = \frac{NCL_{i,t} + NCS_{i,t}}{2 * OI_{i,t}}$$

Data description

Commodity	Exchange	Contract Size	Sample	Currency
Corn	Chicago Board of Trade (CBOT)	5.000 Bushels	02/2006–06/2017	US dollar
Soybeans	Chicago Board of Trade (CBOT)	5.000 Bushels	02/2006–06/2017	US dollar
Sugar	Intercontinental Exchange (ICE)	112.000 Pounds	02/2006–06/2017	US dollar
Wheat	Kansas City Board of Trade (KCBT)	5.000 Bushels	02/2006–06/2017	US dollar
Feeder Cattle	Chicago Mercantile Exchange (CME)	50.000 Pounds	02/2006–06/2017	US dollar
Coffee	Intercontinental Exchange (ICE)	37.500 Pounds	02/2006–06/2017	US dollar

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1. GARCH Models
2. Granger Causality Tests

Methodology – GARCH model

- Preliminary tests indicate GARCH(1,1) as appropriate
- Incorporation of frequently discussed macroeconomic factors

Mean equation: $r_{i,t} = \alpha_0 + \beta_1 SP500_t + \beta_2 Tbill_t + \beta_3 ExRate_t + \beta_4 Oil_t + \eta_{i,t}$

$with\ \eta|\Omega_{t-1} \sim t_\nu(0, \sigma^2)$

Variance equation: $\sigma_{i,t}^2 = \delta_0 + \delta_1 \eta_{i,t-1}^2 + \delta_2 \sigma_{i,t-1}^2 + \delta_3 s_{i,t-1}$

Methodology – Granger Causality test

Starting point is the following VAR model

$$\sigma^2_{i,t} = c_{i,1} + \sum_{m=1}^{p} \alpha_{i,m}\sigma^2_{i,t-m} + \sum_{n=1}^{q} \beta_{i,n}s_{i,t-n} + \varepsilon_{i,t}$$

$$s_{i,t} = c_{i,2} + \sum_{m=1}^{p} \gamma_{i,m}\, s_{i,t-m} + \sum_{n=1}^{q} \delta_{i,n}\sigma^2_{i,t-n} + \upsilon_{i,t}$$

Minimizing Schwartz information criterion indicates $p = q = 1$

Null hypothesis:

- $s_{i,t}$ helps to forecast $\sigma^2_{i,t}$: $\beta_1 = \beta_2 = \cdots = \beta_n = 0$
- $\sigma^2_{i,t}$ helps to forecast $s_{i,t}$: $\delta_1 = \delta_2 = \cdots = \delta_n = 0$

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Results - GARCH model (S^{Total})

	Corn	Soybeans	Sugar	Wheat	Feeder Cattle	Coffee
			Mean equation			
$Constant$	0.115	0.189	-0.080	0.009	0.106	-0.017
$S\&P$ 500	-0.032	0.103	-0.021	0.094	0.097^{***}	0.21^{**}
$TBill$	0.011^{*}	0.003	0.006	0.003	0.001	-0.009
$ExRate$	-1.311^{***}	-1.071^{***}	-0.918^{***}	-1.546^{***}	0.138	-1.243^{***}
Oil	0.115^{***}	0.086^{***}	0.135	0.070	0.053^{***}	0.109^{***}
			Variance equation			
$Constant$	0.957^{**}	0.977^{**}	0.894^{***}	2.516^{***}	0.323^{**}	1.198^{**}
$ARCH$	0.061^{***}	0.141^{***}	0.077^{***}	0.083^{**}	0.082^{***}	0.053^{**}
$GARCH$	0.886^{***}	0.775^{***}	0.887^{***}	0.767^{***}	0.869^{***}	0.875^{***}
$SpecAct$	**-0.010**	$\mathbf{-0.088}^{**}$	$\mathbf{-0.186}^{**}$	$\mathbf{-0.227}^{**}$	$\mathbf{-0.046}^{***}$	$\mathbf{-0.146}^{***}$

Results - GARCH model (S^{Share})

	Corn	Soybeans	Sugar	Wheat	Feeder Cattle	Coffee
			Mean equation			
$Constant$	0.111	0.161	-0.073	-0.004	0.098	-0.009
$S\&P$ 500	-0.036	0.106	-0.012	0.105	0.092^{**}	0.212^{**}
$TBill$	0.012^{*}	0.003	0.006	0.002	0.002	-0.009
$ExRate$	-1.326^{***}	-1.038^{***}	-0.899^{***}	-1.524^{***}	0.113	-1.196^{***}
Oil	0.112^{***}	0.087^{***}	0.134^{***}	0.070	0.051^{**}	0.107^{***}
			Variance equation			
$Constant$	0.990^{**}	0.815^{**}	0.642^{**}	2.309^{***}	0.341^{***}	0.833^{**}
$ARCH$	0.061^{***}	0.127^{***}	0.074^{***}	0.079^{**}	0.090^{***}	0.048^{*}
$GARCH$	0.885^{***}	0.801^{***}	0.899^{***}	0.781^{***}	0.858^{***}	0.898^{***}
$SpecAct$	**-0.087**	$\mathbf{-0.099}^{**}$	$\mathbf{-0.162}^{**}$	$\mathbf{-0.292}^{**}$	$\mathbf{-0.058}^{***}$	$\mathbf{-0.204}^{***}$

Results – Granger Causality test

H_0	Lags	F-Stat.	Estimated Coefficient	H_0	Lags	F-Stat.	Estimated Coefficient
			Corn				
$S^{Total} \to \sigma^2$	1	0.116	-0.006	$S^{Share} \to \sigma^2$	1	5.602^{**}	-0.035^{***}
$\sigma^2 \to S^{Total}$		0.102	0.012	$\sigma^2 \to S^{Share}$		1.375	0.049
			Soybeans				
$S^{Total} \to \sigma^2$	1	6.922^{***}	-0.043^{***}	$S^{Share} \to \sigma^2$	1	18.153^{***}	-0.071^{***}
$\sigma^2 \to S^{Total}$		0.858	-0.042	$\sigma^2 \to S^{Share}$		-0.071	-0.009
			Sugar				
$S^{Total} \to \sigma^2$	1	4.810^{**}	-0.039^{**}	$S^{Share} \to \sigma^2$	1	4.916^{**}	-0.038^{**}
$\sigma^2 \to S^{Total}$		2.106	-0.036^{*}	$\sigma^2 \to S^{Share}$		0.212	-0.012

Results – Granger Causality test

H_0	Lags	F-Stat.	Estimated Coefficient	H_0	Lags	F-Stat.	Estimated Coefficient
			Wheat				
$S^{Total} \rightarrow \sigma^2$	1	11.724^{***}	-0.033^{***}	$S^{Share} \rightarrow \sigma^2$	1	15.601^{***}	-0.042^{***}
$\sigma^2 \rightarrow S^{Total}$		0.632	0.052	$\sigma^2 \rightarrow S^{Share}$		0.634	0.049
			Feeder Cattle				
$S^{Total} \rightarrow \sigma^2$	1	1.619	-0.011	$S^{Share} \rightarrow \sigma^2$	1	8.419^{***}	-0.029^{***}
$\sigma^2 \rightarrow S^{Total}$		0.262	-0.073	$\sigma^2 \rightarrow S^{Share}$		0.005	-0.009
			Coffee				
$S^{Total} \rightarrow \sigma^2$	1	9.859^{***}	-0.028^{***}	$S^{Share} \rightarrow \sigma^2$	1	32.318^{***}	-0.053^{***}
$\sigma^2 \rightarrow S^{Total}$		0.011	0.006	$\sigma^2 \rightarrow S^{Share}$		0.511	0.042

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1 Empirical results indicate that long-short speculators' activity reduces volatility

2 Findings are in line with the traditional theory

3 Previous empirical literature on CITs and on the impact of speculation receives in general comparable results

Long-short speculators' activity reduces volatility of agricultural commodity prices

Thank you for your attention

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