Bubbles, Froth, and Facts: The Impact of Index Funds on Commodity Futures Prices

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Abstract: Commodity index trader position data from 2004-2009 are used to demonstrate that a large increase in commodity index positions occurred in select commodity markets. However, that increase took place well in advance of the 2007-2008 boom in commodity prices. Moreover, Granger causality tests and long-horizon regressions generally fail to find any link between commodity index activity and commodity futures prices.

JEL Codes: G13, Q11, Q13

Key Words: Commitment's of Traders, index funds, commodity futures markets, speculation

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1. Introduction

A world-wide controversy has erupted about the role of 'long-only' index funds in the recent commodity price boom (Masters and White, 2008; Robles, Torero, and von Braun, 2009; USS/PSI, 2009).[1] It is commonly asserted that speculative buying by index funds in commodity futures markets created a "bubble," with the result that commodity prices far exceeded fundamental values during the boom. This has led to calls for regulation to limit the positions of index funds in commodity futures markets.

In this article, we use data compiled by the U.S. Commodity Futures Trading Commission (CFTC) for select commodity futures markets over 2004-2009 to investigate the activity and impact of index traders. Importantly, new data are utilized on commodity index trader positions in 2004-2005. Previous research suggests that the buildup in index positions was most rapid during this period (Sanders, Irwin, and Merrin, 2008), and hence, the period most likely to show the impact of index traders, if any.

2. Data

Starting in 2007—in response to complaints by traditional traders about the rapid increase in long-only index money flowing into the markets—the Commodity Futures Trading Commission (CFTC) began reporting the positions held by index traders in 12 commodity futures markets in the *Commodity Index Traders* (CIT) report, as a supplement to the traditional *Commitments of Traders* (COT) report. According to the CFTC, index trader positions reflect both pension funds that would have previously been classified as non-commercials (speculators)

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[1] In reality, a variety of investment instruments are lumped under the heading "commodity index fund." These instruments are designed in various ways to gain exposure to returns from a particular index of commodity prices. See Engelke and Yuen (2008) for further details.

as well as swap dealers who would have previously been classified as commercials (hedgers). The *CIT* data are released each Friday in conjunction with the traditional *COT* report and show the combined futures and options positions as of Tuesday's market close. The index trader positions are simply removed from their prior categories and presented as a new category of reporting traders. The *CIT* data include the long and short positions held by commercials (less index traders), non-commercials (less index traders), index traders, and non-reporting traders.

While the CFTC classification procedure has flaws (CFTC, 2008), it is an improvement over the trader classifications in the standard *COT* reports and is generally thought to represent the activity of index traders. The primary limitation of the public *CIT* data is the lack of data prior to 2006. This is a significant limitation because other data suggest that the buildup in commodity index positions was concentrated in the previous two years (Sanders, Irwin, and Merrin, 2008). The CFTC did collect additional data for selected markets over 2004-2005 at the request of the U.S. Senate Permanent Subcommittee on Investigations (USS/PSI, 2009) and these data are used in the present analysis.[2] The selected markets are: Chicago Mercantile Exchange (CME) corn, CME wheat, CME soybeans, and Kansas City Board of Trade (KCBT) wheat.

To correspond with the release dates for the *CIT* data, the Tuesday-to-Tuesday log-relative returns are collected for nearby futures contracts. The futures and CIT data are available from January 6, 2004 through September 1, 2009 (296 weekly observations) for each of the four markets. Table 1 presents summary statistics for various position measures, average nearby futures prices, and the cumulative weekly log-relative nearby futures returns by year for 2004-2009. The summary statistics clearly reveal that the rapid increase in commodity index positions

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[2] The authors are indebted to the staff of the Permanent Subcommittee on Investigations for providing the 2004-2005 index trader position data.

occurred from 2004 to 2006. Over this interval, long positions held by index traders more than tripled in both CME corn and CME wheat. Likewise, index funds' percent of total open interest essentially doubled in CME corn and CME soybeans and increased 40% in CME wheat. It is clear that the build-up in commodity index fund positions was concentrated in the 2004-2006 period, not the 2007-2008 period associated with the alleged commodity bubble.

A more complete picture of the index fund buildup in 2004-2006 can be demonstrated graphically. The common association between index fund positions and prices is illustrated with selected data from 2007-2008. As shown in Figure 1, for markets such as wheat, the correlation over this time period makes a convincing illustration. However, when a larger picture is taken, using data from 2004-2009, the perceived association between prices and CIT positions breaks-down substantially. Indeed, as illustrated in Figure 2, the major increase in CIT net long positions occurred from January 2004 through May 2006. During this period wheat prices were largely unchanged. Similar patterns are observed for the other three markets.

3. Tests for Price Impacts

Granger causality is a standard linear technique for determining whether one time series is useful in forecasting another. The two time series variables we use are futures returns and measures of positions to test if there is causality—in a Granger sense—running from index trader positions to futures returns. The following model is estimated.

$$R_t = \alpha_t + \sum_{i=1}^{m} \gamma_i R_{t-i} + \sum_{j=1}^{n} \beta_j \Delta Position_{t-j} + \varepsilon_t . \quad (1)$$

Each model is estimated for lag lengths of 1 to 4 weeks and the lag structure of the most efficient model is selected using the Schwartz criteria. The relatively short lag search and Schwartz criteria are used to minimize any data mining tendencies associated with the model selection procedure. Models are estimated with OLS. If the residuals demonstrate serial correlation (Breusch-Godfrey Lagrange multiplier test), additional lags of the dependent variable are added until the null of no serial correlation cannot be rejected. White's test for heteroskedasticity is applied and robust standard errors are used to correct the standard errors when necessary.

The commodity index trader "position" in equation (1) is measured in two ways. First, the position variable is measured using the net long position of index traders (long contracts – short contracts). This measure most directly captures the essence of the complaints leveled against index funds: they have become too big. The second position measure is a normalized measure: percent of long positions. So, the index trader long positions (contracts) are divided by the total long positions in the market (contracts) to get the percent of long positions within that market held by index traders. ADF tests indicate both variables were non-stationary in levels over 2004-2009, therefore, first differences were used to estimated equation (1).

As shown in Table 2, the selection procedure chooses a (1,1) model for each market and position measure. Given this, it is not surprising that the null hypothesis of no causality from positions to returns $\left(H_0 : \beta_j = 0\right)$ cannot be rejected at the 5% level for any market or position measure. Indeed, the only marginally statistically significant result (p-value=0.103) is for corn using the percent of long positions as the independent variable. In this sample, full rationality of the markets ($\gamma_i = \beta_j = 0 \forall i, j$) and no autocorrelation ($\gamma_i = 0 \forall i$) also cannot be rejected.

Based on these results, there is no evidence that commodity index trader positions "cause" price changes or returns. However, it is possible that the causal relationship shifted after the initial build up of index positions in the first half of the sample. To test this, the selected models are re-estimated incorporating a 2004-2006 slope-shift variable for the estimated β coefficients. As shown in the final column of Table 2, the shift variable is not statistically different from zero. This suggests that impact of lagged positions on returns was equally unimportant in both the 2004-2006 and 2007-2009 subsamples.

The Granger causality tests are designed to detect the relationship, if any, between weekly positions and returns. Such tests may have low power to detect relationships over longer horizons (e.g., Summers, 1986). Index trader positions may flow in "waves" that build slowly—pushing prices higher—and then fade slowly. In this scenario, horizons longer than a week may be necessary to capture the predictive component of index trader positions. So, we implement the long-horizon regression "fads" models of Jegadeesh (1991),

$$R_t = \alpha_t + \sum_{i=1}^{m} \gamma_i R_{t-i} + \beta \sum_{j=1}^{n} \frac{\Delta Position_{t-j}}{n} + \varepsilon_t . \tag{2}$$

In essence, equation (2) is analogous to (1), except that instead of positions entering the model at alternative lags, it enters the model as a moving average calculated over the most recent *n* observations. Jegadeesh shows that letting the independent variable enter the equation as an average over the most recent *n* observations provides the highest power against a fads-type alternative hypothesis using standard OLS estimation and testing procedures. If the estimated β is positive (negative), then it indicates a fads-style model where prices tend to increase (decrease) slowly over a relatively long time period after wide-spread buying. The "fads" stylization captured in (2) is consistent with the popular notion of speculative pressures creating a "bubble" in commodity prices.

To adequately capture any long horizon impacts, *i* and *j* are determined using a search procedure of the last 12 weeks (n=m=12) and choosing the model that minimizes Schwartz's criteria. The estimated β coefficients for equation (2) are shown in Table 3. As it happens, for all of the markets and positions—except for soybeans in Panel A—the estimation of equation (2) is trivial as the selection criteria chooses models equivalent to those estimated for equation (1).

That is, $m = n = 1$ which causes equation (2) to be functionally equivalent to equation (1). Only the estimated β coefficient for soybeans in Panel A is statistically different from zero at the 5% significance level. For that model, the estimated β is positive suggesting that increases in long contracts were associated with positive market returns. However, this result has to be viewed with skepticism given the lack of rejections in other markets and the total number of models estimated. Generally, the results of the long-horizon regressions are consistent with the Granger causality results. There is almost no evidence linking commodity index positions with futures market prices.

4. Conclusions

Data from 2004-2009 are used to examine the overall size and impact of commodity index trader positions in the CME corn, CME soybeans, CME wheat, and KCBT wheat futures contracts. There was a fairly dramatic and massive build-up in commodity index fund positions in the grain markets examined. For instance, the number of contracts held by index funds in the CME wheat contract increased nearly fourfold from 2004 to 2006. However, the build-up in commodity index contracts and the peak level of index holdings pre-dates the 2007-2008 increase in commodity prices for which they are blamed. This observation cast serious doubt on the hypothesis that commodity index speculation drove the 2007-2008 commodity price increase. Formal econometric tests fail to find a statistical link between commodity index positions and commodity futures returns. Both Granger causality tests and long-horizon regressions generally fail to reject the null hypothesis that commodity index positions have no impact on futures prices. Overall, the data trends and econometric results are not consistent with the argument that index funds caused a bubble in commodity futures prices.

The presented results are consistent with previous academic evidence pertaining to speculation and price behavior (e.g., Bryant, Bessler, and Haigh, 2006). By the nature of hypothesis testing, empirical studies cannot preclude a speculative impact on commodity prices; it can only fail to reject the null hypothesis of no speculative impact. Unfortunately, those legislators and public policy commentators who can most easily shape the outcome of this debate do not share the same null hypothesis. Indeed, they have a well-defined enemy: speculators in general and index funds in particular. The outcome of this policy debate has wide-ranging implications for the U.S. futures industry and the commodity pricing system. Regulatory miscues could drive financial commodity investments overseas or into physical markets. The absence of index funds in U.S. futures markets may reduce liquidity and potentially degrade the market's performance in terms of price discovery, efficiency, and risk-sharing capacity.

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Table 1. Summary Statistics, Commodity Index Trader Positions and Futures Prices, 2004-2009.

Year/Market	(contracts) Long Position	(contracts) Short Position	Percent of Total Open Interest	Percent of Total Long Positions	(cents) Nearby Futures Price	(%) Nearby Futures Return
2004						
CME Corn	118,286	455	7%	14%	255	-31.9%
CME Soybeans	36,862	1,717	6%	12%	748	-15.6%
CME Wheat	57,187	744	15%	30%	349	-33.1%
KCBT Wheat	14,792	4	10%	19%	369	-16.9%
2005						
CME Corn	236,424	4,135	14%	27%	211	-22.3%
CME Soybeans	78,740	1,973	11%	22%	610	4.0%
CME Wheat	138,821	1,851	24%	48%	321	-8.5%
KCBT Wheat	18,307	4	10%	19%	346	12.1%
2006						
CME Corn	408,138	7,662	13%	26%	262	33.4%
CME Soybeans	119,287	3,679	14%	26%	594	-4.6%
CME Wheat	201,605	4,883	21%	42%	405	21.7%
KCBT Wheat	25,954	115	8%	17%	469	18.4%
2007						
CME Corn	370,682	12,020	11%	21%	375	-2.6%
CME Soybeans	155,864	4,766	12%	23%	866	45.9%
CME Wheat	197,338	11,179	21%	39%	639	40.2%
KCBT Wheat	31,560	519	11%	22%	644	49.7%
2008						
CME Corn	405,241	44,122	12%	21%	528	-28.6%
CME Soybeans	162,233	12,765	14%	26%	1228	-29.2%
CME Wheat	198,485	27,644	24%	43%	797	-49.5%
KCBT Wheat	26,687	1,054	13%	24%	836	-46.4%
2009						
CME Corn	316,896	45,133	14%	25%	374	-29.8%
CME Soybeans	138,406	17,230	15%	27%	1037	27.1%
CME Wheat	168,117	23,220	24%	42%	543	-37.3%
KCBT Wheat	26,508	1,243	15%	29%	585	-27.4%

Note: CME denotes Chicago Mercantile Exchange and KCBT denotes Kansas City Board of Trade. Data for 2009 ends on September 1, 2009.

Table 2. Granger Causality Test Results for CFTC Commodity Index Traders, Positions Do Not Lead Returns, 2004-2009.

$$R_t = \alpha_t + \sum_{i=1}^{m} \gamma_i R_{t-i} + \sum_{j=1}^{n} \beta_j \Delta Position_{t-j} + \varepsilon_t$$

		p-values for Hypothesis Tests			**2004-2006**
Market	**m,n**	**$\beta_j=0, \forall j$**	**$\gamma_i=0, \forall i$**	**$\gamma_i=\beta_j=0, \forall i,j$**	**β_j Shift**
Panel A: Positions Measured in Net Long Contracts					
CME Corn	1,1	0.413	0.998	0.713	0.2994
CME Soybeans	1,1	0.446	0.468	0.430	0.6737
CME Wheat	1,1	0.841	0.741	0.916	0.4387
KCBT Wheat	1,1	0.895	0.462	0.757	0.3419
Panel B: Positions Measured in Percent of Long Positions					
CME Corn	1,1	0.103	0.710	0.263	0.6287
CME Soybeans	1,1	0.171	0.256	0.225	0.3155
CME Wheat	1,1	0.402	0.864	0.618	0.6152
KCBT Wheat	1,1	0.384	0.481	0.473	0.7200

Note: CME denotes Chicago Mercantile Exchange and KCBT denotes Kansas City Board of Trade. Data for 2009 ends on September 1, 2009.

Table 3. Long-Horizon Granger Causality Test Results for CFTC Commodity Index Trader Positions, Positions Do Not Lead Returns, 2004-2009.

$$R_t = \alpha_t + \sum_{i=1}^{m} \gamma_i R_{t-i} + \beta \sum_{j=1}^{n} \frac{\Delta Position_{t-j}}{n} + \varepsilon_t$$

Market	**m,n**	**β**	**t-stat.**	**p-value**
Panel A: Positions Measured in Net Long Contracts				
CME Corn	1,1	-0.000	-0.819	0.413
CME Soybeans	1,8	0.001	2.246	0.025
CME Wheat	1,1	-0.000	-0.201	0.841
KCBT Wheat	1,1	-0.000	-0.132	0.895
Panel B: Positions Measured in Percent of Long Positions				
CME Corn	1,1	-0.524	-1.630	0.103
CME Soybeans	1,1	0.294	1.368	0.171
CME Wheat	1,1	-0.127	-0.838	0.402
KCBT Wheat	1,1	-0.169	-0.871	0.384

Note: CME denotes Chicago Mercantile Exchange and KCBT denotes Kansas City Board of Trade. Data for 2009 ends on September 1, 2009.

Figure 1. Long-Only Index Fund Positions and Wheat Prices, June, 2007 – December 2008.

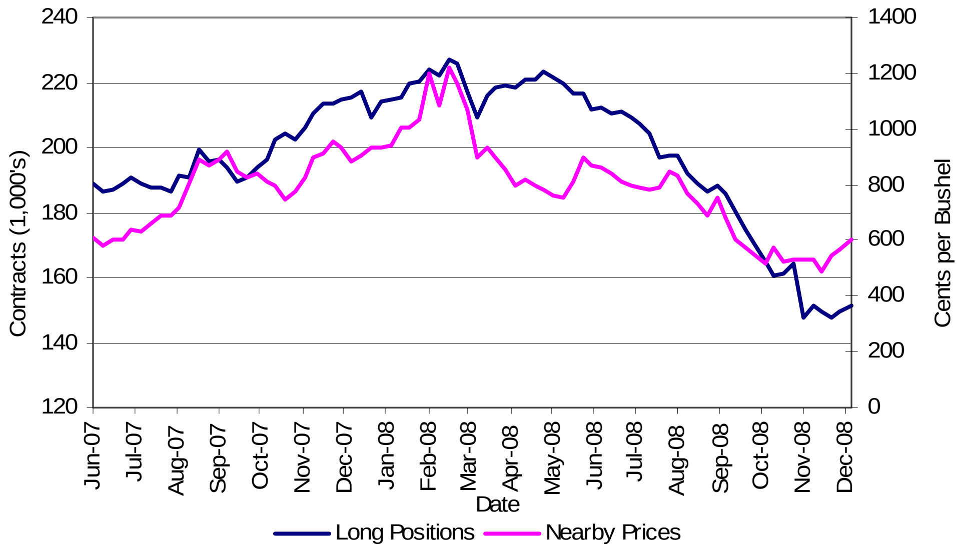

Figure 2. Long-Only Index Fund Positions and Wheat Prices, January 2004 – September 2009.