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Stoll, Hans R;Whaley, Robert E
The Journal of Alternative Investments; Summer 2011; 14, 1; ProQuest Central
pg. 50

Commodity Index Investing: *Speculation or Diversification?*

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During the past four years, many investment managers broadened the range of asset classes held in their portfolios to include physical commodities. Because buying the physical commodities directly is costly and cumbersome, the investment is typically made through investment vehicles such as commodity index funds, rate-of-return swaps, and/or exchange-traded funds (ETFs) and notes (ETNs). These investment vehicles, in turn, are created using fully collateralized, well-diversified, long-only portfolios of commodity futures contracts. Despite the nature of the investment, commodity index investors are sometimes called "speculators" because they are not users of the underlying commodity. This moniker is a misnomer. Speculators normally take positions in individual commodities; indexers hold well-diversified portfolios of commodities. Speculators buy or sell commodities based on a directional view about prices; indexers buy based only on the fact that commodities serve to reduce the risk of their overall investment portfolio. Speculators typically use leverage (e.g., take futures positions depositing only the necessary margin) to magnify their exposure to price movements; indexers are fully collateralized.

Concurrently during this period, the prices of seemingly unrelated commodities surged upward. Congress investigated these price increases and concluded that they were driven not by changes in fundamentals but rather by commodity index investing [United States Permanent Subcommittee on Investigations, 2009]. While index investors are diversified and are not betting on any particular commodity, it is possible that their actions affect the prices of all index commodities. We investigate this claim and conclude that there is little or no association between the trading of index investors and the prices of commodities (see also Irwin et al. [2009]). The surge in prices appears to be the result of other factors, principally, expectations about inflation and future demand. Commodity futures markets appear to be quite resilient in their ability to absorb the demands of index investors.

In this article, we present the main results from our larger, more comprehensive study, Stoll and Whaley [2010]. To begin, we describe the ways in which investors take positions in commodity indexes and then, using CFTC Commitments of Traders data, we measure the net inflows and outflows of commodity index investment through time. Next, we examine whether these inflows and outflows affect commodity futures prices. Conceivably, with enough demand to buy commodity index portfolios, all commodity prices could move upward to abnormal levels. To test this proposition, we perform three analyses. In the first, we examine the correlation of returns of commodity futures contracts that are in the index. If commodity index investing is a disruptive

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force, the levels of correlation should be high as a result of the simultaneous purchase (or sale) of index contracts. To the contrary, we find that the average level of correlation in daily returns from January 2006–June 2009 is surprisingly low. In the second, we examine futures price movements during the "roll period," when index investors must roll out of the expiring commodity futures contracts into the next contract maturity. We find that futures markets are able to absorb these extraordinary demands without a significant price effect on either the nearby contract being sold or the second nearby contract being bought. In the third, we analyze the effects of the new inflows and outflows from commodity index investment within a Granger causality framework and find no significant price effects.

COMMODITY INDEX INVESTING

Reasons for Commodity Index Investing

Investing in commodities is not new. Managed futures programs have been around for decades. In a typical program, an investor establishes a futures brokerage account with a futures commission merchant (FCM) who holds the futures positions and executes transactions in the account. The investor deposits funds in an account to serve as collateral and specifies the degree of leverage that he or she is willing to assume. The positions are said to be fully collateralized when the amount deposited equals the notional value of the positions.[1] A commodity trading advisor (CTA) manages the futures portfolio and directs trading.

Managed futures programs have not become enormously popular. One reason is that the programs are not cheap. CTAs typically charge annual fees of 2% of notional for management and 20% of upside performance. Another is that many institutional investors, even today, are barred from trading futures. Yet another is that investors may want a passive investment in a diversified commodity index portfolio rather than an active manager trying to beat the market benchmark by identifying under- and over-priced commodities. In response to these issues, financial intermediaries developed two main types of commodity index investments—commodity funds and commodity swaps. Commodity index funds promise to mimic a commodity index. While these were originally introduced as private investment funds for high-net-worth individuals and institutional investors, the market has evolved into one that includes exchange-traded retail products such as commodity ETFs and commodity ETNs. Commodity index swaps promise to pay the rate of return on a specific commodity index and are available in the over-the-counter (OTC) markets. Both funds and swaps are created using fully-collateralized futures positions.

Indexes

Over the past decade, two commodity indexes have emerged as industry benchmarks—the Standard and Poor's–Goldman Sachs Commodity Index (S&P–GSCI) and the Dow Jones–UBS Commodity Index (DJ-UBSCI).[2] The S&P–GSCI is the oldest commodity index with price levels dating back to August 1989. Its weights are determined on the basis of world production of the underlying commodities. Because the index is designed to be "tradable," futures markets representing each particular commodity are deep and liquid. Both the S&P–GSCI and the DJ–UBSCI are reasonably well diversified. Exhibit 1 shows the market value weights of the commodities in the index as of July 2009. The S&P–GSCI weights are actual market value weights as of the close of trading on July 14, 2009. The DJ–UBSCI weights are the target market value weights for the index set by Dow Jones at the beginning of the year. The S&P–GSCI has 24 different commodities included in it, the DJ–UBSCI, 19.

Magnitude of Index Investing

The timeliest source of information regarding commodity positions in the U.S. is the Commitments of Traders (COT) report published weekly by the U.S. Commodity Futures Trading Commission (CFTC).[3] The COT reports contain a breakdown of each Tuesday's open interest for markets in which 20 or more traders hold positions equal to or above the reporting levels established by the CFTC. The data are drawn from the CFTC's Daily Large Trader Reporting System. Each day, reporting firms are required to file reports of the futures and option positions of traders who hold positions above specific reporting levels set by CFTC regulations. If, at the daily market close, a reporting firm has a trader with a position at or above the Commission's reporting level in any single futures month or option expiration, it must report that trader's entire position in all futures

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EXHIBIT 1

Market Value Weights of the Commodities in the S&P-GSCI and DJ-UBSCI Commodity Indexes as of July 2009

Sector	Commodity	Exchange	Ticker	S&P–GSCI Actual weights	DJ–UBSCI Target weights
Agriculture	Cocoa	CSC	CC	0.40%	
Agriculture	Coffee "C"	CSC	KC	0.76%	2.97%
Agriculture	Corn	CBT	C	3.55%	5.72%
Agriculture	Cotton #2	NYC	CT	1.19%	2.27%
Agriculture	Wheat (Kansas)	KCBT	KW	0.82%	
Agriculture	Soybean oil	CBT	BO		2.88%
Agriculture	Soybeans	CBT	S	2.64%	7.60%
Agriculture	Sugar	CSC	SB	2.33%	2.99%
Agriculture	Wheat (Chicago)	CBT	W	3.90%	4.80%
Energy	Oil (Brent crude)	IPE	LO	13.25%	
Energy	Oil (WTI crude)	NYM	CL	37.51%	13.75%
Energy	Oil (Gas Oil)	IPE	QS	4.54%	
Energy	Oil (#2 Heating)	NYM	HO	4.19%	3.65%
Energy	Natural gas	NYM	NG	4.14%	11.89%
Energy	Oil (RBOB)[1]	NYM	RB	4.75%	3.71%
Industrial metals	Aluminum (High grade primary)	LME	AH	2.33%	7.00%
Industrial metals	Copper	LME	CA	3.22%	7.31%
Industrial metals	Lead	LME	PB	0.45%	
Industrial metals	Nickel	LME	NI	0.78%	2.88%
Industrial metals	Zinc (Special high grade)	LME	ZS	0.60%	3.14%
Livestock	Feeder cattle	CME	FC	0.61%	
Livestock	Lean hogs	CME	LH	1.51%	2.40%
Livestock	Live cattle	CME	LC	3.19%	4.29%
Precious metals	Gold	CMX	GC	3.01%	7.86%
Precious metals	Silver	CMX	SI	0.32%	2.89%
Total weights				**99.99%**	**100.00%**
Total number of commodities				**24**	**19**

Sector	S&P–GSCI Actual weights	DJ–UBSCI Target weights
Agriculture	15.59%	29.23%
Energy	68.38%	33.00%
Industrial metals	7.38%	20.33%
Livestock	5.31%	6.68%
Precious metals	3.33%	10.75%
Total	**99.99%**	**100.00%**

[1]*Both the S&P-GSCI and DJ-UBSCI rolled from the NYM's unleaded gasoline futures contract (HU) to the RBOB gasoline futures contract (RB) in 2006.*

and options expiration months in that commodity, regardless of size. The aggregate of all traders' positions reported to the Commission usually represents 70 to 90 percent of the total open interest in any given market. The reporting levels are adjusted from time to time as the nature of trading in a particular market evolves. The CFTC's current reporting levels are shown in Exhibit 2. In the wheat futures and options contract market, for example, trader positions of 150 contracts or more are reported to the CFTC each day.

Three different COT reports are released every Friday at 3:30 p.m. (eastern standard time). The futures-only reports have the longest history and are available electronically dating back to the beginning of 1986. The futures and options (FO) reports, available electronically since 1995, contain the same fields as the futures-only reports, except that open interest includes not only futures but also futures options contracts.[4] The reports contain a breakdown of the open interest by commodity contract market. First, the report shows the nonreportable positions (assumed to be small traders), which are simply open interest minus the reportable positions (assumed to be positions of large traders). Reportable positions are then broken down by long and short commercial and

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EXHIBIT 2

Reporting Levels of Selected U.S. Futures Contracts as Set by the CFTC as of July 5, 2006

Sector	Commodity	Number of contracts
Agriculture	Cocoa	100
Agriculture	Coffee	50
Agriculture	Corn	250
Agriculture	Cotton	100
Agriculture	Frozen concentrated orange juice	50
Agriculture	Oats	60
Agriculture	Rough rice	50
Agriculture	Soybean meal	200
Agriculture	Soybean oil	200
Agriculture	Soybeans	150
Agriculture	Sugar No. 11	500
Agriculture	Sugar No. 14	100
Agriculture	Wheat	150
Energy	Crude oil, sweet	350
Energy	Natural gas	200
Energy	No. 2 Heating oil	250
Energy	Unleaded gasoline	150
Industrial metals	Copper	100
Industrial metals	Gold	200
Livestock	Feeder cattle	50
Livestock	Lean hogs	100
Livestock	Live cattle	100
Precious metals	Platinum	50
Precious metals	Silver bullion	150

Note: If, at the daily market close, a trader has a position at or above the CFTC's reporting level in any single futures month or option expiration, his/her broker must report the entire position in all futures and options expiration months in that commodity, regardless of size.

noncommercial holdings and spreading. The CFTC staff classifies a trader as commercial or noncommercial when the trader's position first exceeds the commodity's reportable level. A trading entity[5] generally gets classified as commercial if the CFTC Form 40 that it is required to file with the Commission states that the entity is "... commercially engaged in business activities hedged by the use of futures or options markets." In order to ensure that traders are classified with accuracy and consistency, the Commission staff reviews this self-classification and may reclassify a trader if the staff has additional information about the trader's use of the markets. Spreading measures the extent to which each noncommercial trader holds equal long and short futures positions.

Most important, from our standpoint, is the CFTC's Supplemental (S) report. Since 2006, the CFTC has provided, for 12 agricultural and livestock commodity futures,[6] a *different* breakdown of open interest to indicate the holdings of commodity index traders (CIT) separately from those of the standard noncommercial and commercial categories. The S report provides only an aggregate number for commodity index investing, however, and does not specify explicitly from which of the categories the index investor holdings are taken. One can determine the categories by using the breakdown of FO reports in combination with the S report breakdown. We know, for example, that swap dealers are categorized as commercial while commodity funds are categorized as speculative, but we do not know from the S report the size of the swap positions or the fund positions.

Exhibit 3 illustrates the procedure for inferring the composition of commodity index investing from the FO report and the S report. The first column lists the categories into which reported positions may be placed. The second column contains the long-only open interest (expressed in number of contracts) for each of the first four categories reported by the FO report. The FO report treats commodity index funds as noncommercials, a category usually assumed to consist of speculators. It treats swap dealers as commercials, a category usually assumed to consist of hedgers. Spreaders hold hedged positions. Small traders are those participants whose positions fall below the reporting level. The third column contains the positions reported in the S report. The S report puts in a separate category the holdings of commodity index investors. On June 30, 2009, the number of wheat futures contracts held by indexers was 170,256. By comparing the

EXHIBIT 3

Selected Fields from the CFTC's FO and S Reports for the Chicago Board of Trade's (CBT's) Wheat Options and Futures on June 30, 2009

	Long only open interest		
Market participant category	From Futures and Options report (FO)	From Supplemental report (S)	Difference
Noncommercial	80,569	43,416	37,153
Spreaders	97,271	95,240	2,031
Commercials	176,016	44,944	131,072
Small traders	29,532	29,532	0
Commodity indexers		170,256	
Total open interest	**383,387**	**383,387**	**170,256**

Note: Data are obtained from:http://www.cftc.gov/marketreports/commitmentsoftraders/cot_historical.html.

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second and third columns, we can now infer the categories from which these index positions were taken. The fourth column shows that 37,153 contracts of indexers came from noncommercial and 131,072 contracts came from commercial.[7] Thus, swap dealers accounted for a great deal more commodity index investment than commodity funds did—131,072 versus 37,153—at least with respect to the wheat futures contract on this day. Indeed, that is generally the case. Exhibit 4 shows the ratio of swap dealer positions to direct holdings of commodity index funds from January 2006 through June 2009 for the 12 agricultural and livestock commodities in the S report; even though the ratio fell, it remained above 3.

The overall magnitude of commodity indexer holdings grew rapidly in 2007–2008 and fell back in 2009. Exhibit 5 shows the notional value of holdings of the 12 commodities reported in the S report. The average holding of indexers in the 12 commodities is shown in Exhibit 6 for the January 2006–June 2009 time period. The percent of open interest accounted for by indexers is substantial and could, in principal, affect commodity prices. Markets adjust, however. If indexers push up prices, other traders will sell futures so that prices reflect the underlying value. We turn next to examine whether indexers affect prices or, equivalently, whether markets are sufficiently deep and resilient to absorb the trading of indexers.

RELATION BETWEEN COMMODITY INDEX INVESTING AND FUTURES PRICES

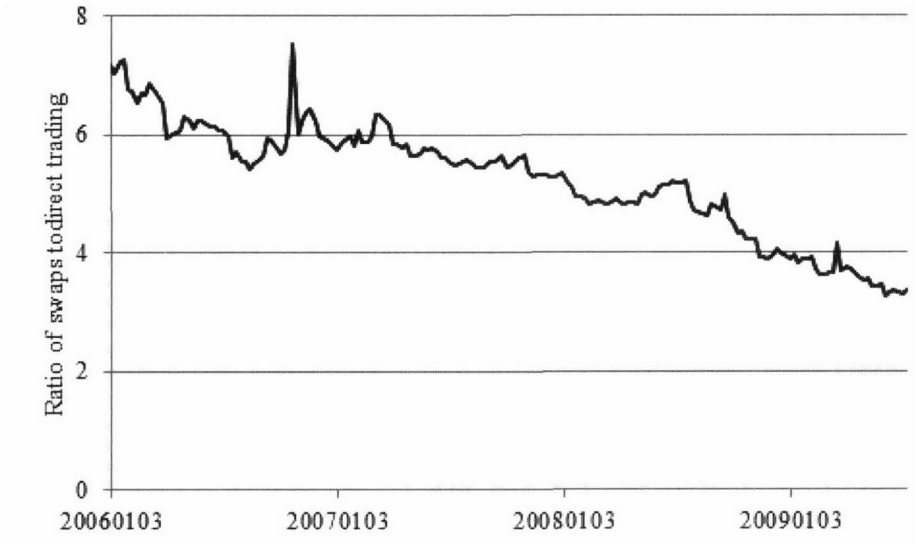
The U.S. Permanent Subcommittee on Investigations report [2009] observes that both the level of commodity prices and the level of commodity index investing surged upward during the 2006–2007 period and concludes that increased commodity index investing caused futures prices to increase. The statistical evidence provided to support such a conclusion, however, is scant. The purpose of this section is to examine the relation between commodity index investing and futures prices. We carry out three types of analyses to determine whether indexers are affecting commodity prices. First, we examine the co-movements of futures prices for commodities. Second, we examine the impact of futures prices resulting from the periodic futures contract rolls that are necessary to mimic well-known commodity indexes. If indexers have a price effect, it should certainly be observed at this time. Third, we examine the relation between changes in commodity futures holdings by indexers and commodity prices.

Price Co-Movements of Index Commodities

Commodity index investing is a mechanical trading strategy based on a set of well-defined and well-known rules. Net funds flowing into commodity index investments are immediately redeployed into the commodity index futures market through the simultaneous purchase of all index commodities. If the commodity index trades are large enough to push prices upward, the prices in all markets should move upward concurrently. Put differently, the returns of all futures contracts used in index replication should be highly correlated.

EXHIBIT 4

Ratio of Commodity Index Investing through Commodity Swaps to Direct Commodity Index Investing during the Period January 2006 through June 2009



Notes: Computed from data in the weekly CFTC Commitments of Trader Option and Futures and Supplemental files and futures prices from the CBT, CME, CSC, KCBT and NYC. Twelve agricultural and livestock commodity futures are tracked. Ratios are computed for each commodity each week, and are averaged across commodities.

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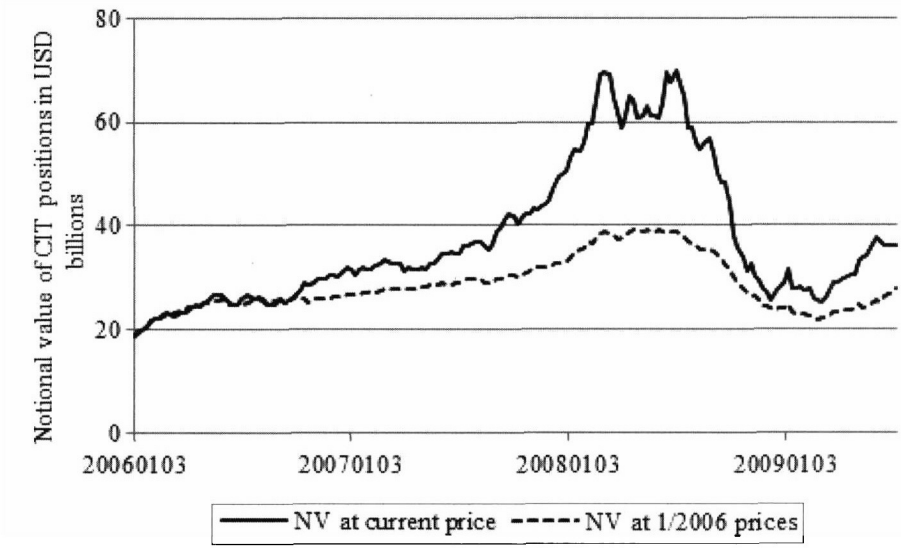
EXHIBIT 5

Notional Value (NV) of Long-Only CIT Open Interest Using Contemporaneous and January 3, 2006, Futures Prices during **the Period January 2006 through June 2009**



Notes: Notional value for each commodity is computed by taking the product of the long-open interest of the long-only commodity index traders reported in the weekly CFTC Commitments of Trader Supplemental report, the contract denomination, and the nearby futures contract price. The notional values are then summed across commodities to determine total notional value of commodity index investing. Twelve agricultural and livestock commodity futures are tracked.

EXHIBIT 6

Percentage of Total Open Interest Held by Long Commodity Index Traders during the 184-Week Period (January 2006–June 2009)

		Percent of open interest held by long commodity index traders		
Commodity	**Exchange**	**Average**	**Minimum**	**Maximum**
Wheat	CBT	41.15%	32.05%	51.78%
Wheat	KCBT	22.03%	12.30%	32.66%
Corn	CBT	22.98%	16.68%	30.07%
Soybeans	CBT	25.31%	19.77%	30.58%
Soybean meal	CBT	23.34%	17.84%	31.70%
Cotton No. 2	NYC	31.59%	21.13%	43.94%
Lean hogs	CME	42.51%	30.89%	51.42%
Live cattle	CME	38.97%	27.24%	47.22%
Feeder cattle	CME	25.08%	14.09%	35.16%
Cocoa	CSC	12.47%	6.19%	19.70%
Sugar No. 11	CSC	27.77%	15.50%	37.69%
Coffee C	CSC	24.21%	18.89%	34.61%

Notes: Data are from weekly CFTC S reports. Twelve agricultural and livestock commodity futures are tracked.

Exhibit 7 contains the contemporaneous correlation matrix computed from the daily returns of 18 commodity futures contracts commonly included in commodity index investing. Surprisingly, the levels of correlation are quite low. Consider the column labeled W, the Chicago Board of Trade's (CBT's) wheat futures contract. This wheat contract accounts for about 4% of well-diversified commodity indexes, such as the S&P–GSCI, and should be highly correlated with other futures that have a high weight in the index,[8] such as natural gas (NG), live cattle (LC), and gold (GC). As seen in Exhibit 7, the correlations are quite low—0.134 (4% of the index), 0.178 (3%), and 0.197 (3%), respectively. The column labeled C, the CBT's corn futures contract, provides similar results. This evidence suggests that either commodity index trades have little effect on futures returns (because they fail to induce contemporaneous price movements) or the commodity return variability is being driven by factors other than commodity index investing.

Exhibit 8 displays the prices of several different agricultural futures that have significant weights in well-diversified commodity indexes. Again, in assessing these exhibits, recall that commodity index investing refers to buying (selling) all of these contracts simultaneously, so, if commodity index investing is responsible for the abnormal price increases, the abnormal price increases should be experienced together. As Exhibit 8 shows, they are not. The price of corn begins its ascent in late 2006, levels off for most of 2007, and then rises quickly to a level nearly 3.5 times its January 2006 price in June 2008. Wheat, like corn, experiences erratic price movements during this period. But, wheat's crisis appears to have started earlier than corn's and reached its maximum price three months earlier. Soybeans, too, seem to have experienced tumultuous times, rising in price by nearly 150% by June 2008. The general pattern of increasing and then decreasing prices during this period of time undoubtedly contributes to the modest positive levels of correlation reported in Exhibit 7—0.602 for wheat versus corn, 0.492 for wheat versus soybeans, and 0.661 for corn

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EXHIBIT 7

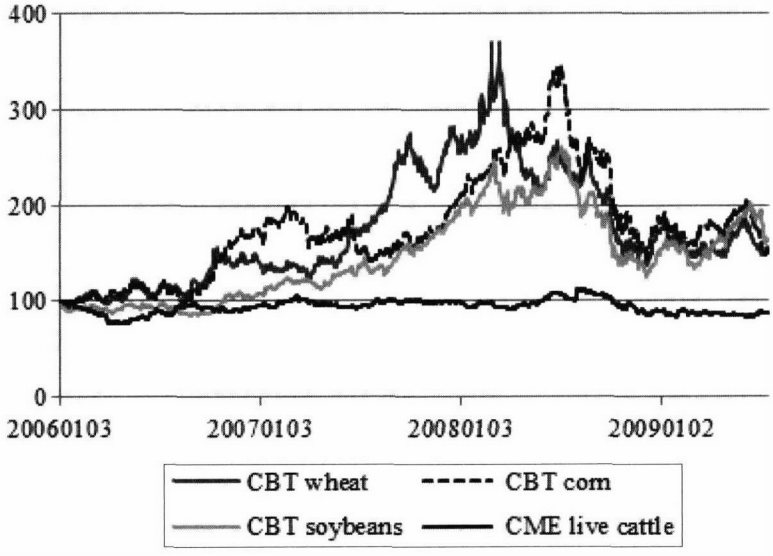
Correlation in Daily Returns of 18 Commodity Futures Included in the S&P-GSCI and DJ-UBSCI (January 2006–July 2009)

	CC	KC	C	CT	KW	BO	S	SB	W	CL	HO	NG	RB	FC	LH	LC	GC	SI
CC	1																	
KC	0.328	1																
C	0.223	0.323	1															
CT	0.217	0.376	0.393	1														
KW	0.231	0.308	0.567	0.343	1													
BO	0.291	0.348	0.587	0.440	0.479	1												
S	0.288	0.353	0.661	0.382	0.493	0.811	1											
SB	0.236	0.305	0.299	0.369	0.281	0.365	0.324	1										
W	0.230	0.308	0.602	0.356	0.943	0.481	0.492	0.292	1									
CL	0.269	0.264	0.335	0.284	0.298	0.532	0.425	0.305	0.303	1								
HO	0.233	0.271	0.337	0.299	0.279	0.539	0.417	0.305	0.287	0.769	1							
NG	0.091	0.119	0.190	0.130	0.116	0.246	0.218	0.173	0.134	0.304	0.352	1						
RB	0.210	0.243	0.328	0.271	0.266	0.527	0.422	0.282	0.274	0.697	0.777	0.300	1					
FC	0.064	0.137	−0.063	0.114	−0.001	0.088	0.063	0.098	0.018	0.140	0.113	0.067	0.162	1				
LH	−0.003	0.157	0.017	0.112	0.073	0.088	0.071	0.023	0.059	0.052	0.023	0.001	0.031	0.197	1			
LC	0.195	0.211	0.157	0.234	0.180	0.195	0.180	0.162	0.178	0.177	0.174	0.088	0.175	0.645	0.102	1		
GC	0.272	0.173	0.238	0.166	0.183	0.317	0.271	0.184	0.197	0.270	0.278	0.098	0.227	−0.022	0.013	0.044	1	
SI	0.313	0.276	0.332	0.258	0.271	0.420	0.379	0.265	0.272	0.314	0.332	0.148	0.280	0.073	0.020	0.153	0.725	1

Note: Ticker symbols: CC, cocoa; KC, coffee; C, corn; CT, cotton; KW, Kansas City wheat; BO, soybean oil; S, soybeans; SB, sugar no. 11; W, Chicago wheat; CL, crude oil; HO, heating oil; NG, natural gas; RB, RBOB oil; FC, feeder cattle; LH, lean hogs; LC, live cattle; GC, gold; and SI silver.

EXHIBIT 8

Daily Index Levels Representing the Nearby Futures Contract Prices of the Agricultural Futures Contracts Traded on the CBT and the CME during the Period January 2006 through July 2009



Note: Futures prices are from CBT and CME.

versus soybeans. But, the fact that the price shifts are not contemporaneous suggests, yet again, that commodity index investing is not the culprit.

Finally, the price behavior of the live cattle (LC) futures contracts is also displayed in Exhibit 8. Relative to the grains, live cattle has little price movement at all over the four-year period. This suggests that whatever was happening in the grains market was specific to the grain market sector and did not carry over into the livestock sector. It also suggests that commodity index investing is unrelated to futures price movements. Live cattle accounts for nearly 4% of the popular commodity indexes. During a period when flows into commodity index funds doubled, the live cattle futures price barely budged.

Analysis of Index Rolls

We have shown that, while prices of index commodity futures contracts should move together, they do not. While the evidence implies that some other factor or set of factors is affecting commodity prices, the analysis would be more powerful if the futures returns were measured

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over an interval in which we know commodity index investing took place. One such period is when commodity index funds and swap dealers must roll their futures positions from the nearby contract to the next nearby contract. In this investigation, we attempt to stack the cards in favor of finding that commodity index investing and futures returns are related. We do so by selecting the eight commodity futures contracts that are in both the S&P–GSCI and DJ–UBSCI and are also followed in the CFTC's S reports. We require the commodity to be in both indexes in order to maximize the amount of index investing over the roll period. Both indexes have investment in the same commodity futures at the same time.[9]

Under the hypothesis that commodity index investing has no effect on the underlying futures prices, the expected return of the nearby contract and of the next nearby contract should be the same. Under the alternative hypothesis that the commodity index roll has price impact in the futures market, the return on the nearby futures contract will be less than the return on the second nearby futures contract because of the selling pressure on the nearby contract and the buying pressure on the second nearby. Assuming the null hypothesis is rejected in favor of the alternative, we should also find that the price impact is larger the greater the amount of commodity index investing during the interval.

Exhibit 9 contains the results of the return tests by commodity. The returns are computed for the specific futures contracts rolled with the S&P–GSCI and DJ–UBSCI indexes. To understand the contents of the Exhibit 9, consider the wheat contract in the first row. Of the wheat futures contract rolls that occurred during the January 2006–July 2009 period, the average return of the nearby futures contract (being rolled from) was 0.03% from the settlement on the fourth business day of the roll month to the settlement on the ninth day. Over the same interval of time, the average return on the second nearby contract (being rolled into) was 0.06%. Thus, the return differential is 0.09%, less than one-tenth of one percent. Scanning down the column of return differentials for the different commodity futures, we find that all but one (soybeans) is positive, and three are significant in the statistical sense. In a practical sense, however, the roll returns and return differentials are not economically meaningful, on order of the typical bid–ask spreads observed in these markets.[10] What is so remarkable about finding little or no price impact in these commodity futures rolls is the sheer size of the futures positions being rolled. To measure the number of contracts being rolled, we use the lesser of (a) the number of nearby contracts sold (i.e., the reduction in the open interest of the nearby contract from the fourth through the ninth business days) and (b) the number of second nearby contracts purchased (i.e., the increase in the open interest of the second nearby contract from the fourth through the ninth business days). We then divide this number by the open interest of the nearby and second nearby futures contracts at the beginning of the roll period and then average the ratios

EXHIBIT 9

Average Nearby and Second Nearby Futures Contracts Returns on Commodity Index Roll Dates (January 2006–July 2009)

			Futures return			Percent change in OI		
Commodity futures	Ticker symbol	No. of rolls	Nearby contract	Second nearby	Return differential	Nearby contract	Second nearby	Notional value
Wheat	W	48	–0.0003	0.0006	0.0009	–0.2813	0.4664	707,528,382
Corn	C	48	0.0008	0.0020	0.0012*	–0.1806	0.2644	839,694,396
Soybeans	S	48	0.0113	0.0098	–0.0016	–0.1787	0.3138	1,072,256,880
Cotton No. 2	CT	39	–0.0026	–0.0026	0.0000	–0.3089	0.4358	488,603,550
Lean hogs	LH	68	–0.0022	0.0015	0.0037	–0.2446	0.4528	342,776,056
Live cattle	LC	58	–0.0023	–0.0002	0.0021*	–0.2210	0.3759	646,944,744
Sugar No. 11	SB	39	–0.0013	0.0006	0.0019	–0.2759	0.3808	573,820,235
Coffee C	KC	48	–0.0170	–0.0151	0.0019*	–0.2953	0.4500	494,659,947
Average			–0.0017	–0.0004	0.0013	–0.2483	0.3925	645,785,524
Total								**5,166,284,190**

Notes: Returns are computed over the interval from the fourth through the ninth business days each roll month. Futures price data are from the CBT, CME, CSC, and NYC. The return differential is defined as the second nearby return less the nearby futures return. An asterisk (*) denotes that the return differential is significant at the 5% probability level.

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through time to get the results reported in Exhibit 9. Clearly, the futures market has an enormous capacity to absorb commodity index roll activity.

The price impact hypothesis also carries with it an assumption that the greater the amount of index investing, the greater the price impact. To test whether there is a relation between the return differential and the amount of index investing, we regress the return differential on the number of contracts traded as part of the roll, that is,

$$R_t = \alpha_0 + \alpha_1 Roll_{CIT,t} + \varepsilon_t$$

where R_t is the return differential and $Roll_{CIT,t}$ is the number of nearby futures contracts rolled into the second nearby contract. The results are reported in Exhibit 10. As the exhibit shows, the slope coefficients vary randomly around zero and are not significantly different from zero for the eight futures contracts with common contract rolls. For these contracts, the magnitude of commodity index investing, at least as measured by the roll activity of the S&P–GSCI and DJ–UBSCI, appears to have no impact on futures prices. At the same time, the slope coefficient in the crude oil futures regression is positive and significant, indicating that the relative futures price change varies directly with the notional value of the quantity rolled. While this evidence appears to indicate a relation between flows and returns, it is unlikely to be attributable to commodity index investing since the returns of other commodity futures, being rolled at the same time, are unaffected.

EXHIBIT 10

Summary of Results for Regressions of the Return Differential of the Nearby Futures Contracts over the Roll Period on the Number of Contracts Rolled (January 2006–July 2009)

Commodity futures/index	Ticker symbol	No. of rolls	α_0	α_1	Adjusted R^2
Wheat	W	48	0.00053	0.01294	–0.0161
Corn	C	48	0.00088	0.00519	–0.0162
Soybeans	S	48	–0.00336	0.06594	–0.0082
Cotton No. 2	CT	39	0.00179	–0.09844	–0.0185
Lean hogs	LH	68	0.00365	0.00336	–0.0151
Live cattle	LC	58	0.00183	0.01388	–0.0172
Sugar No. 11	SB	39	0.00552	–0.07462	0.0111
Coffee C	KC	48	0.00237*	–0.03208	–0.0034
DJ-UBSCI crude oil	CL	57	–0.00608	0.71844*	0.1829
S&P-GSCI crude oil	CL	115	–0.00473	0.10730*	0.0713

Notes: Regression specification is

$$R_t + \alpha_0 + \alpha_1 Roll_{CIT,t} + \varepsilon_t$$

where R_t is the futures returns and $Roll_{CIT,t}$ is the number of nearby futures contracts rolled into the second nearby contract. For the crude oil futures, the two commodity indexes are listed separately since crude oil futures rolls do not involve the same contract months. Returns are computed over the interval from the fourth through the ninth business days each roll month. Futures price and open interest data are from the CBT, CME, CSC, NYC, and NYME. The return differential is defined as the second nearby return less the nearby futures return. The number of contracts rolled is the lower of the reduction in open interest of the nearby contracts and the increase of the open interest in the second nearby contract expressed in millions of contracts. An asterisk (*) denotes that the return differential is significant at the 5% probability level.

Commodity Flows and Returns

It is important to recognize that the roll-period evidence is based on the rolling of *existing* long-only commodity index investment, not on *new flows* into long-only commodity index investment. Since we can measure flows into commodity index investment using differences in the long-only commodity index trader open interest reported in the CFTC's weekly S report, we have the opportunity to conduct a second analysis, complementary to the first analysis, of whether inflows in commodity index investing "cause" futures prices to rise.

We use the Granger [1969] causality test to determine whether commodity index investing activity (i.e., changes in open interest) causes futures price changes, as the subcommittee report concludes, and/or changes in futures prices cause changes in commodity index investing activity. The data underlying the analysis are the 12 different commodity futures contracts followed in the CFTC's S report.[11] The number of weekly CIT long open interest observations for each of the 12 commodities in the January 2006–July 2009 period is 184.

To determine whether inflows into commodity index investment "Granger-causes" futures returns, we perform two regressions. In the first, we regress futures returns on lagged futures returns, that is,

$$R_t = \alpha_0 + \alpha_1 R_{t-1} + \alpha_2 R_{t-2} + \varepsilon_t$$

and, in the second, we regress futures returns on lagged futures returns and lagged flows into commodity index investment, that is,

$$R_t = \alpha_0 + \alpha_1 R_{t-1} + \alpha_2 R_{t-2} + \alpha_3 Flow_{CIT,t-1} + \alpha_4 Flow_{CIT,t-2} + \varepsilon_t$$

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where R_t is the return of the futures contract and $Flow_{CIT,t}$ is the flow into commodity index investment in week t. If the addition of the lagged flow variables adds explanatory power, the flow variable Granger-causes the futures return.

Then, to determine whether futures returns Granger-cause flows into commodity index investment, we perform two additional regressions. In the first, we regress commodity index investment flows on lagged flows, that is,

$$Flow_{CIT,t} = \alpha_0 + \alpha_1 Flow_{CIT,t-1} + \alpha_2 Flow_{CIT,t-2} + \varepsilon_t$$

and in the second, commodity index investment flows on lagged flows and lagged futures returns, that is,

$$Flow_{CIT,t} = \alpha_0 + \alpha_1 Flow_{CIT,t-1} + \alpha_2 Flow_{CIT,t-2} + \alpha_3 R_{t-1} + \alpha_4 R_{t-2} + \varepsilon_t$$

If the addition of the lagged futures returns adds explanatory power, the futures returns Granger-cause flows into commodity index investment.

The results of the Granger-causality tests are reported in Exhibit 11. Reported in the table are F-statistics (and their associated probability levels) corresponding to the hypothesis that commodity index investment flows Granger-cause futures returns and the hypothesis that futures returns Granger-cause commodity index investment flows. A probability level of less than 5% denotes Granger-causality. As the results indicate, there is scant evidence of causality in either direction. The only commodity for which commodity index investment flows Granger-cause futures returns is for cotton. But the importance of this result is offset by the fact that, for Kansas City wheat, futures returns Granger-cause commodity index investment flows. Overall, the results of Exhibit 11 refute the notion that investment flows affect futures prices.

SUMMARY AND CONCLUSIONS

Commodity index investing has been described as speculation and has been blamed for the upward surge in commodity prices in 2007 and 2008, largely because it grew over the period. This study shows that the ascribed blame is baseless.

EXHIBIT 11

Granger Causality Tests of Commodity Index Investing and Futures Returns Using Weekly Changes in Long Open Interest of S Reports (January 2006–July 2009)

Commodity futures	Ticker symbol	Flows to commodity index investment "Granger-cause" futures returns		Futures returns "Granger-cause" flows to commodity index investment	
		F-statistic	Probability	*F*-statistic	Probability
CBT wheat	W	0.1701	0.844	0.5231	0.594
KCBT wheat	KW	0.1591	0.853	3.1552	0.045*
Corn	C	2.0958	0.126	2.0731	0.129
Soybeans	S	2.7465	0.067	2.4341	0.091
Soybean oil	BO	2.6072	0.077	0.5804	0.561
Cotton	CT	5.8921	0.003*	0.2688	0.765
Live hogs	LH	1.8891	0.154	0.3461	0.708
Live cattle	LC	1.2080	0.301	0.2827	0.754
Feeder cattle	FC	0.3767	0.687	0.2532	0.777
Cocoa	CC	1.8098	0.167	1.3481	0.262
Sugar	SB	0.1582	0.854	0.7935	0.454
Cotton	KC	0.3346	0.716	0.5083	0.602

Notes: Long open interest from COT includes all open interest in any commodity index strategy on a weekly basis. Futures price data are from the CBT, KCBT, CME, CSC, and NYC. An asterisk (*) denotes significance at the 5% probability level.

In review, commodity index investing is not speculation, as has been suggested in the press and elsewhere. Commodity index investors hold diversified portfolios of commodities with prescribed index weights. Rather than holding the underlying commodity directly, they take long-only positions in futures contracts, either directly or indirectly. Because arbitrage between the cash market and the futures market keeps the two markets closely linked, a fully collateralized position in the futures portfolio has the same return–risk attributes as a cash position in the underlying commodity index portfolio. In contrast, speculators a) take long *or short* positions, depending on the direction of the anticipated price move, b) invest in individual commodities rather than diversified portfolios, and c) generally use highly levered rather than fully collateralized futures positions.

Using the CFTC's COT reports (including the recent supplements on index trading), we confirm that index trading has grown and is an important component of open interest. Within the index-trading category, swap dealer positions, which are established to hedge their obligations to the swap counterparty, far exceed index

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positions of commodity funds, which hold commodities to meet their obligations to fund shareholders.

Our analysis of the relation between index investing and the prices of commodities does not indicate that indexing has distorted commodity prices. If indexers were to affect price, the prices of different commodities should move together, and they do not. A time when indexers trade heavily is when positions in an expiring futures contract must be rolled over to the next maturity. If indexers have a price effect, it would be observed at this time, when hundreds of millions of dollars are traded. We examine the price and volume data and conclude that the effect is small and economically insignificant. Finally, we examine the relation between prices and inflows and outflows from commodities using the Granger causality approach. We conclude that commodity flow cannot be said to Granger-cause price changes.

ENDNOTES

This research was supported by a grant from Gresham Investment Management LLC.

[1]See Chance [1994] for a description and analysis of managed futures.

[2]This index was formerly known as the Dow Jones–AIG Commodity Index (DJ–AIGCI).

[3]Other research that uses COT data includes Briese [2008] and the CFTC [2006, 2008].

[4]In aggregating across open positions, option open interest is converted to a futures-equivalent basis using delta factors supplied by the exchanges.

[5]Note that it is the trader that is classified, not each individual transaction.

[6]See CFTC [2006, pp. 9-10].

[7]The traditional interpretation of commercials as "speculators" and noncommercials as "hedgers" is misleading when applied to commodity indexers. Commodity index funds, classified as noncommercial, are not speculators; they hold diversified portfolios of commodity futures. Swap dealers, classified as commercial, do exactly the same thing; that is, they hold diversified portfolios to back up their obligation under the swap.

[8]Recall the index weights given in Exhibit 1.

[9]For other commodity futures contracts, for example, the metal contracts traded on the London Metals Exchange, contract months are not always the same.

[10]On average, a cost of one-half of the bid–ask spread unwinding the nearby futures contract and one-half the bid–ask spread buying the second nearby futures contract is expected on each roll.

[11]The significance of Granger's work is attested to by the fact he received the Nobel Prize in economics in 2003.

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Market Distress

The Role of Speculators During Times of Financial Distress 10

Naomi E. Boyd, Jeffrey H. Harris, and Arkadiusz Nowak

One of the best-known and largest hedge fund failures was the 2006 failure of Amaranth Advisors, LLC. The authors use detailed, trader-level data to examine the role of speculators during times of financial distress—in this case, the failure of Amaranth. They find that speculators served as a stabilizing force during the period by maintaining or increasing long positions, even while prices fell. The authors develop two testable propositions regarding liquidation versus transfer of positions and conclude that the probability of transfer was more likely for distant contract expirations and for contracts more dominantly held by the distressed trader. The article also examines the role of speculators in providing liquidity and mitigating the effects of liquidity risk by evaluating the change in the number of traders, the size and time between trades, and a Herfindahl measure of speculative trader concentration during the crisis period.

Market Manipulation

Squeeze Play: *The Dynamics of the Manipulation End Game* 26

Craig Pirrong

This article considers one of the most significant regulatory concerns facing derivatives markets: the case of market manipulation by means of a corner, or "squeeze." There are many famous examples of squeezes dating back to the very origins of derivatives trading and extending to the present day. These manipulations distort prices by moving them away from the supply- and demand-driven equilibrium, which limits the effectiveness of the market as a venue for price discovery and effective hedging. Unfortunately, the dynamics of trading as a contract nears expiration have not been modeled extensively. As a result, the existing literature cannot capture many of the interesting actions and interactions observed during actual squeezes. This article fills that void by examining the effects of asymmetrical information on the trading strategies of large longs and shorts as a contract approaches expiration. It provides insight into the mechanism of real-world corners and squeezes and the associated price movements around expiration that are not driven by supply and demand.

Impact of Index Funds

The Impact of Index Funds in Commodity Futures Markets: *A Systems Approach* 40

Dwight R. Sanders and Scott H. Irwin

This article addresses the debate regarding the role of index funds in commodity futures markets. Many have argued that index funds are speculators that are responsible for bubbles in commodity futures prices. The argument is based on the premise that the sheer size of index investment can overwhelm the normal functioning of these markets. Importantly, an empirical linkage must be made between commodity index fund positions and prices, or there is no obvious mechanism by which a bubble can form. The authors' empirical analysis uses new data from the U.S. Commodity Futures Trading Commission contained in the "Disaggregated Commitments of Traders" report. Granger-style causality regressions provide no convincing evidence that positions held by swap dealers impact market returns. Surprisingly, the results do suggest that larger commodity index positions are associated with declining market volatility, although these results may be market specific.

Commodity Index Investing: *Speculation or Diversification?* 50

Hans R. Stoll and Robert E. Whaley

A number of seemingly unrelated commodities experienced simultaneous price spikes in 2007 and 2008. Congress

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investigated the increase in prices and concluded that the price increases were attributable not to supply and demand fundamentals but rather excessive speculation from commodity index investing. In this article, the authors evaluate whether commodity index investing is a disruptive force in commodity futures markets. Using the U.S. Commodity Futures Trading Commission's Commitments of Traders reports, the authors conclude that because of its passive, long-only nature, commodity index investing is not speculation. In addition, the authors conclude that commodity index flows, whether due to rolling over existing futures positions or establishing new ones, have little impact on futures prices.

PERSPECTIVES

EXAMINING THE ROLE OF FINANCIAL INVESTORS AND SPECULATION IN OIL MARKETS 61

DENIS BABUSIAUX, AXEL PIERRU, AND FRÉDÉRIC LASSERRE

Repeated oil-price spikes have generated a great deal of controversy about the role played by speculation in derivatives markets. A number of analysts have suggested that the speculative positions of financial investors played a major part in the 2008 oil-price hike. In contrast, some economists claim that oil inventories did not increase sufficiently for speculation to be the cause of the run up in oil prices. This article presents these two apparently contradictory arguments and attempts to reconcile them by emphasizing the inertia of the world oil–demand response to price variations. The authors present a number of factors that help reconcile these beliefs, including incomplete oil inventory statistics, increased ground storage, the use of inventories for current production, and the impact of a "focal price" that is inconsistent with the immediate market fundamentals.

DEFINING SPECULATION: *The First Step toward a Rational Dialogue* 75

EDWARD SZADO

The meaning attributed to a particular financial term can have a significant impact on the way one considers issues in the marketplace. The purpose of this articleis to offer one perspective on how to properly define speculation and to offer a broad view of how and why different understandings of the term have led to the debate as to how, and to what degree, to control the activities of speculators. For instance, the view of what constitutes speculation and its impact on market processes varies widely among academics, politicians, the media, and the general public. Academics generally view speculators as a group of individuals who trade primarily based on an individual asset's standalone, expected risk–reward trade-off. In contrast, in the public, the mass media, and the political arena, speculators are often considered less important or less noble than other market participants who trade financial futures or commodities only as an indirect (e.g., hedging) part of their ordinary business activities. Whatever the separation between hedging and speculation, the primary concern is the degree to which either hedgers or speculators have direct influence on market prices above and beyond their primary market functions.

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