Returns to Traders and Existence of a Risk Premium in Agricultural Futures Markets

Nicole M. Aulerich,

Scott H. Irwin,

and

Philip Garcia[*]

Paper presented at the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management
St. Louis, Missouri, April 19-20, 2010

[*] Nicole M. Aulerich is a Ph.D. Candidate in the Department of Agricultural and Consumer Economics at the University of Illinois at Urbana-Champaign and a Research Economist at the Commodity Futures Trading Commission (naulerich@cftc.gov). Scott H. Irwin is the Laurence J. Norton Chair of Agricultural Marketing at the University of Illinois at Urbana-Champaign. Philip Garcia is the T.A. Hieronymus Distinguished Chair in Futures Markets at the University of Illinois at Urbana-Champaign. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the U.S. Department of Agriculture or the U.S. Commodity Futures Trading Commission.

Returns to Traders and Existence of a Risk Premium in Agricultural Futures Markets

This paper analyzes the existence of a risk premium following the Keynesian theory of normal backwardation. A natural experiment using actual trading observations of commodity index traders is used to determine if passively holding long positions opposite hedgers earns a risk premium. Daily profits of traders are calculated in 12 markets from 2000-2009 using data from the CFTC internal large trader reporting system. Results show the commodity index traders have negative profits in 9 out of 12 commodities, resulting in an approximate net loss of -$6.9 billion. A measure of monthly return on investment does not show consistent positive profits and on average the return is negative. The evidence does not support the existence of a positive risk premium.

Keywords: commodities, futures markets, index funds, large trader reporting system, risk premium, normal backwardation

Introduction

Important research in futures markets has been performed to assess the distribution and sources of trader returns. The Keynesian theory of normal backwardation was motivated by a desire to determine whether hedgers paid speculators for protection against adverse price movements. If the theory is true, speculators earn a positive return over time and hedgers earn a negative return as they pay speculators to reduce business risk. The risk premium is in the form of a bias in futures prices, whereby, "The quoted forward price, though above the present spot price, must fall below the anticipated future spot price by at least the amount of normal backwardation." (Keynes 1930, pp.144)

Because of its central importance to understanding how markets function, the theory has raised considerable debate in the literature, but has never been convincingly resolved (Telser, 2000). Focusing on calculating trader profitability, most early papers were hampered by infrequent observations and aggregation problems. This forced authors to make highly simplified assumptions about trading behavior. Nevertheless, Houthakker (1957) and Rockwell (1967) conclude that speculators can earn returns if they possess the skill to forecast price movements.

Hartzmark (1987, 1991) made significant contributions to the debate with daily data from 1977 to 1981 in nine markets by calculating the profitability of trader types. He finds no support for the presence of risk premium as commercial traders often obtained positive returns, and later concluded that profits were primarily generated by luck. Leuthold, Garcia, and Lu (1994) followed Hartzmark's work using more recent data from 1982-1990 from the frozen pork belly futures market. Leuthold, et al. also find little evidence of risk premiums, but observed that the distribution of returns is not random. Large reporting traders generate significant profits, speculators are able to forecast profitably, and spreaders had less forecasting ability but are able to consistently identify the direction of market changes. Phillips and Weiner (1994) used a unique data set of forward market participants in the North Sea oil market in which participants face higher barriers to entry in the forward market than in the future markets. Therefore if a risk premium is to be uncovered, it would most likely exist in harder to enter markets rather than in more liquid futures markets in which a risk premium could be eliminated by a large supply of

willing speculators. Results of the study show no evidence of a risk premium, further supporting Hartzmark and Leuthold, Garcia, and Lu's findings. Dewally, Ederington, and Fernando (2009) investigated energy futures markets and find evidence that persistent profits among traders do exist, and that speculator profits are largely due to risk absorption services they provide. Recently, Fishe and Smith (2010) find no evidence that commercial hedgers pay a risk premium to speculators. Their results contradict hedging pressure theory as liquidity demanders tend to be noncommercial traders and liquidity suppliers tend to be commercial firms. The debate continues.

The purpose of the paper is to contribute to the understanding of the distribution and sources of trader returns in futures markets, focusing on agricultural commodities in a time of changing market participants and price levels. In recent years, agricultural commodity futures markets have experienced extreme changes in price levels and their volatility which should enable us to identify effectively how returns to market participants change in risky situations. More importantly, the emergence of commodity index traders (CITs) into the futures markets during 2004 and 2005 provides a natural experiment to determine if naïvely holding positions opposite of hedgers results in positive profits. By definition, CITs are investors attempting only to gain long side exposure to the futures markets by holding long contracts in the desired commodities. In a related context, a question emerges. Prior research has suggested that large commercial hedgers have traditionally maintained a competitive advantage by possessing proprietary knowledge of the global food economy through a worldwide network of merchandising, processing, shipping, and financial businesses. Has the profitability of large commercial hedgers changed in the presence of the CITs?

This research uses daily dis-aggregated data from the non-public CFTC large trader reporting system from January 2000 to September 2009 for eleven agricultural commodity futures markets (cocoa, coffee, corn, cotton, feeder cattle, lean hogs, live cattle, soybeans, soybean oil, CBOT wheat, KS wheat). Daily profit is calculated for commercial, noncommercial, commodity index traders, and small traders. Findings show little evidence that a risk premium exists in agricultural futures markets. Over the time period from 2000 to 2009, CITs experienced negative profits in 9 out of 12 markets resulting in an approximate net loss of -$6.9 billion. Results are counterintuitive as 8 out of 12 commodities had major price upswings during the period of study which would result in gains for long futures investors, and furthermore if a risk premium existed, elevated volatility over this time period would theoretically induce hedgers to pay more for transfer of higher risk due to price fluctuations. The measure, return on investment, normalizes profit by magnitudes of investment to determine if profitability has changed over time or if the size of invested dollars has changed. Results show monthly profit as a percent of investment notional value is small and fluctuates both above and below zero with the average percent of profitability below zero. No evidence of a risk premium is supported as CITs do not display evidence of earning a risk premium by earning consistent positive returns but rather experience large losses overall.

Database

The data for this study comes from the CFTC large trader reporting system (LTRS), which was designed for surveillance purposes to detect and deter futures and options market manipulation

(Fenton and Martinaitas 2005). Positions must be reported to the CFTC on a daily basis if they meet or exceed reporting levels. The LTRS database contains end-of-day reportable positions for long futures, short futures, long delta-adjusted options, and short delta-adjusted options for each trader ID and contract maturity.[1,2] In recent years about 80 to 90 percent of open interest in commodity futures markets has been reported to the CFTC and included in the LTRS (Sanders, Irwin, and Merrin 2008).

A weekly snapshot of the LTRS data is compiled in aggregate form and released to the general public as the *Commitment of Traders* report (COT). The COT pools traders into two broad categories (commercial and non-commercial), all contract maturities are aggregated into one open interest figure, and the report is released each Friday with the data as of the end-of-day on the preceding Tuesday. The COT report covers over 90 U.S. commodity markets and two versions are published: i) the *Futures-Only Commitments of Traders* report that includes futures market open interest only; and ii) the *Futures-and-Options-Combined Commitments of Traders* report that includes futures market open interest and delta-weighted options market open interest.

In response to industry concerns regarding commodity index fund positions, the CFTC changed the reporting system in 2007 by creating the *Supplemental Commodity Index Trader* (CIT) report that separates commodity index traders from the original commercial and noncommercial COT categories. CFTC staff engaged in a detailed process to identify index traders in the LTRS for inclusion in the new category. The process included screening all traders with large long positions in commodity futures contracts, analyzing futures positions to determine a pattern consistent with index trading, reviewing line of business forms (Form 40) to obtain more detailed information on their use of the market, and conducting an expansive series of phone and in-person interviews with traders. The CFTC acknowledges that the classification procedure was imperfect and that "…some traders assigned to the Index Traders category are engaged in other futures activity that could not be disaggregated….Likewise, the Index Traders category will not include some traders who are engaged in index trading, but for whom it does not represent a substantial part of their overall trading activity" (CFTC 2008a). While recognizing these potential problems, the CIT data are nevertheless widely regarded as providing valuable information about index trader activity in commodity futures markets.

The first weekly *Supplemental* report was published in January 2007 and provided aggregate futures and delta-adjusted options positions of CITs in 12 commodity futures markets: corn, soybeans, soybean oil, CBOT wheat, KCBOT wheat, feeder cattle, lean hogs, live cattle, cocoa, cotton, coffee, and sugar. The CIT category was computed retroactively by the CFTC for 2006 to provide context for the initial release of the data in 2007.[3]

For this study, daily futures and delta adjusted positions from the LTRS cover the period from January 2000 to September 2009 for all 12 commodities.[4] The commodities studied are corn, soybeans, soybean oil, and wheat all traded at the Chicago Board of Trade (CBOT), cocoa, coffee, cotton, and sugar traded on the Intercontinental Exchange (ICE), feeder cattle, lean hogs and, live cattle traded at the Chicago Mercantile Exchange (CME), and wheat traded on the Kansas City Board of Trade. The traders are divided into the four categories based on trading motivation; these include commercial, noncommercial, index, and nonreporting. Commercial traders are considered hedgers who have positions in the underlying commodity, noncommercial

traders are speculators consisting of mostly managed money traders and a smaller portion of floor broker/traders, and index traders are predominately swap dealers from the commercial category and various asset managers from the noncommercial category who invest in a long only passive, naïve manner. Nonreporting traders are small traders not required to submit their positions to the LTRS because their holdings are under a pre-specified threshold; these small traders represent residual open interest not reported to the large trader reporting system at the CFTC.

The CIT classifications are applied retroactively from 2000 through 2005 to approximate CIT positions before the official CFTC CIT classifications began in 2006. The retroactive application assumes that traders classified as CITs over 2006-2009 also were CITs previous to this period. Discussions with CFTC staff indicate that CIT designations have changed little since the classification scheme was first constructed in 2006, which provides support for its retroactive application.[5]

Trader Characteristics

Trader characteristics are analyzed to consider the position landscape both through time and across categories. Futures markets are a zero sum game and for every winner there must be a loser and gains equal total losses. The positions of CITs are shown to be net long opposite commercial trader positions and noncommercial trader positions change between net long and net short.

The positions of commercial traders during this time period are net negative for the vast majority of yearly average daily positions with feeder cattle being the one notable exception (table 1, panel A). From 2000 to 2009 the commercial position levels in the 12 commodities became increasingly larger negative positions. The positions of noncommercial traders during this time period fluctuated between net long and net short (table 1, panel B), as noncommercials are speculative in nature and tend to exhibit trend following behavior or employ algorithmic trading strategies (Sanders 2009). Commodity index trader position levels are net long and have increased drastically through the sample period (table 1, panel C) mirroring the increasing levels of net short positions by commercial traders. This key relationship between CITs and commercial traders make the CITs an ideal category to test the risk premium theory.

To determine the magnitude of positions relative to total open interest, the percentage of both long and short open interest for the same groups of traders analyzed in table 1 are shown in tables 2 and 3, respectively. In table 2, commercial traders (panel A) have a decreasing proportion of long open interest but in 2009 still hold 21 percent of long open interest across commodities (down from 41 percent in 2000). Noncommercial traders (panel B) have a fluctuating but relatively steady proportion of long open interest at 31 percent of long open interest across commodities and years. Commodity index traders (panel C) have an increasing proportion of long open interest, consistent with steadily increasing levels of open interest shown in table 1. The commercial traders have increasingly transferred long open interest to CITs thereby decreasing commercial percent of long open interest and increasing CITs proportion.

Table 3 documents the proportion of the market taking the short side opposite of those long side positions shown in table 2. Commercial traders (panel A) are a large and steady proportion of short open interest; indicating commercial traders position levels increase along with open interest. Noncommercial traders (panel B) percentage of short open interest is similar to that in long open interest, both a fluctuating but steady proportion of open interest. The average percent of short open interest held by noncommercial traders over all years and commodities is 27 percent, comparable to the 31 percent of long open interest. CITs in panel C hold an insubstantial portion of short open interest although this has increased slightly in 2008 and 2009 possibly due to swap dealers diversify away from strictly servicing index traders or from the emergence of a greater number of actively managed commodity funds (Meyer 2009).

In conclusion, the commercial traders hold a consistent net short position through the time period of study with a decreasing proportion of long positions. Opposite commercial traders, CITs increased long position levels and account for increased proportion of long open interest in the market. Noncommercial traders hold positions fluctuating between net long and net short with relatively stable proportions of both long and short open interest.

Price Trend Characteristics

The movement of commodity prices during the time period from January 2000 to September 2009 is relevant to the profits and losses methodology due to the nature of trader's positions. For example, a downward trajectory in prices would favor commercial traders who tend to be net short; conversely, an upward movement of prices would favor index traders who are consistently net long. Over the time period of the sample there is no clear demarcation between stable price periods and unstable periods that apply to all commodities, but commodities can be placed into three groupings based on general price patterns.

The first group includes the grains (corn, soybeans, soybean oil, and wheat contracts). Price patterns for this group are relatively stable in the earlier portion of the data and large price increases and subsequent decreased in 2008 and 2009; figure 1 demonstrates this pattern with Chicago Board of Trade wheat. The second group is composed of the livestock commodities (feeder cattle, lean hogs, and live cattle) in addition to cotton. These commodity prices are relatively stable over the time period and fluctuate in a price channel as demonstrated by lean hogs in figure 2. The third group includes the soft commodities (cocoa, coffee, and sugar) except cotton. These prices had substantial and sustained price increases at the end of the sample period without subsequent declines, illustrated by cocoa in figure 3.

Out of the 12 commodities analyzed, 8 had major price upswings of greater than 50 percent during the period of study and only lean hogs experienced a price decline (table 4). From the analysis of price trends and trader positions, expected profits for CITs would be positive since CIT positions are typically net long and profits for commercial firms would be negative due to predominately net short positions. Noncommercial traders expected profits are more difficult to forecast due to the dynamic nature of their trading. These profit expectations are nonscientific and are based on general price and position behavior; to test these generalizations, daily profits are calculated based on actual trader positions and prices over the period of study.

Results

Daily profits for each trader for each contract are calculated by multiplying the end of day positions on day *t* by the settlement price change for the corresponding contract between the current day *t* and the following day *t+1* as shown in equation 1[6],

$$\text{Trader Profit}_{i,t+1} = \text{End Day Position}_{i,t} \times \left(\text{Price}_{t+1} - \text{Price}_{t}\right). \quad (1)$$

The calculation assumes positions held at the end of day *t* are held throughout the trading day *t+1* and all position adjustments occur at the settlement price on *t+1*. Since the data only consists of end of day positions, any profits of day-traders or scalpers who mainly trade intra-day are not included in the analysis. The profits do not account for commissions or margin requirements due to lack of available data and to maintain consistency with previous work.[7] The relative profitability between commodities and types of traders is relatively more appropriate than the level of dollar gains or losses because of the simplifying assumptions.

The profit and losses calculations (table 5) first report the results for all 12 commodities separately and then summarize the profits into the three groups of commodities specified in the *Price Trend Characteristics* section which include (i) row crops, (ii) livestock and cotton, and (iii) softs. Net dollar returns are reported in the first column for commercial, index (CITs), and noncommercial traders which together compose the large traders; profits are also reported for the small nonreporting segment of traders.[8] CITs report negative profits in 9 out of the 12 markets examined with a loss of -$752 million in row crops, -$6,433 million in livestock and cotton, and modest profits of $21 million are reported in softs. This evidence is inconsistent with the existence of a risk premium. The results summarizing all markets show noncommercial traders earn a staggering $7.9 billion dollars; basically amounting to a massive transfer of profits from passive index traders to these active speculative traders.

The positive profits in the softs group are expected due to the increasing price trends in the latter half of the sample period without the subsequent decline in prices; but the losses in the other two groupings (row crops, livestock and cotton) is unexpected because commodities had higher prices at the end of the sample period compared to the beginning (except lean hogs). For these losses to occur, positions must have been smaller during price increases and larger during price decreases. The second and third columns display profits when the trader type is net long or net short, respectively. The CIT's in the row crops and livestock have positive profits when net short, not when net long; counterintuitive to the expected outcome if CITs were earning a risk premium for taking positions opposite hedgers. Furthermore, gross dollar losses and gains in columns four and five are of similar magnitude for CITs providing evidence of the random nature of profits and not lending support for a risk premium. If gross gains are a great deal larger than gross losses then profit distribution is skewed to the left, conversely, if gross losses are larger than gross gains then the distribution is skewed to the right. Regardless of the direction, the skewness would indicate profits may not be random and question the argument against a risk premium.

The counterintuitive profits of CITs spurs the question, how did CITs experience such negative returns? To answer this question two examples will examine detailed activity from the corn and

lean hogs markets. Corn prices increased and decreased substantially in 2008 and 2009 (figure 4, panel A).[9] The positions of the trading groups (panel B) increased for CITs rapidly during 2004 and 2005 while at the same time commercial traders became more net short and noncommercial traders became more net long. When corn prices decrease from the peaks of 2008, the CIT positions also decreased and subsequently the positions of commercial and noncommercial traders reverted to smaller net long and net short positions. The cumulative daily profits (panel C) had the largest flucuation during 2008 prompting a closer look at this time period. Figure 5 focuses in on 2008 corn prices, CIT cumulative profits, and CIT net positions. Positions reached a high of 450,000 contracts in May 2008, less than two months before the corn all time high price of $7.60 per bushel at the beginning of July. The CIT positions were at their highest levels as prices started to decline; as prices rapidly declined, so did positions but over half of the positions rode the prices all the way down to the lows of $3. The CITs profit decreased by approximately $7.5 billion in the five months from July to November 2008. No risk premium appears to be earned by taking long positions opposite hedgers in the corn futures market.

Lean Hogs prices (table 6, panel A) over the sample period were not characterized by a historic price spike, as seen in corn, but CITs still lost -$2.6 billion over the period. The positions of the trading groups (panel B) increased for CITs rapidly from 2004 into 2008 while at the same time commercial traders became more net short. Noncommercial trader positions did not visibly change patterns during the CIT position appreciation. At the end of July 2008 CIT positions peaked at 123,500 contracts and started a precipitous decline which cause an equally as abrupt reversion in commercial traders positions. The cumulative daily profits (panel C) were relatively stable until July 2008 where a divergence in trading group profits occurred. Figure 7 focuses on 2007 to 2009 lean hog prices, CIT cumulative profits, and CIT net positions. CIT positions peaked at the end of May 2008 as prices reach 80 cent/lb levels. When lean hog prices started to decline in late July 2008 positions also began declining but when prices stabilized in November of 2008 positions continued downward as part of a larger reduction of CIT positions in all commodities and CITs did not recoup losses.[10] From 2007 to 2009, CITs profits decreased by -$2.3 billion accounting for over 85 percent of losses during the sample period. No risk premium appears to be earned by taking long positions opposite hedgers in the lean hogs futures market.

The total profit figures from table 5 can be unduly influenced by an influx of commodity index money, such CIT positions reaching maximum levels in 2008. For this reason, a measure of return on investment is created to normalize profits by the magnitude of investment. The cumulative monthly profit is divided by the month's average daily notional value to provide a perspective into profitability over time.[11,12] Return on investment in equation 2 as,

$$\% \text{ Profit}_t = \left(\frac{\text{Total Profit in Month}_t}{\text{Avg Daily Notional Value in Month}_t} \right) \times 100, \tag{2}$$

where the cumulative CIT profit in month t is divided the average daily notional value in month t.[13] Results in figure 8 show that CITs do not make consistent positively monthly returns and the average monthly return on investment over the entire time period is -0.00024 percent. Evidence does not support consistent risk premiums earned by CITs over the sample period. If figure 8 did

have a large amount of losses isolated in one period and gains elsewhere, the random nature of profits and argument against the existence of a risk premium would be called into question

Overall, the theory of Keynesian normal backwardation is rejected when commodity index traders' (CITs) positions and profits are examined as a natural experiment to test for the existence of a risk premium. Despite increasing price trends, CITs experience negative profits in 9 out of 12 commodities and overall profit figure of -$6.9 billion. Return on investment overtime normalizes for money flows and provides further evidence against the Keynesian theory of normal backwardation since CITs do not make consistent positively monthly returns and the average monthly return on investment is negative.

Summary

The debate over the existence of a risk premium is a central idea to understanding the functioning of futures markets. The Keynesian theory of normal backwardation (Keynes 1930) argues speculators earn a positive return over time and hedgers earn a negative return as they pay speculators to reduce business risk. The purpose of this research is to revisit the risk premium debate by employing the profits and losses methodology using Commodity Index Traders (CITs) as a natural experiment.

CITs are long only investors who purchase a basket of commodities in order to gain exposure to movements in commodity prices. The trading motivations for CITs are both the desire for diversification and the ability to earn a risk premium. Unlike past research that requires assumptions or hypothetical positions to replicate a naïve trading to earn a risk premium separate from skill trading strategies, the CITs offer a natural experiment to actually calculate the profits earned for passively holding futures contracts in an effort to earn a risk premium. The dataset for this study is from the proprietary CFTC large trader reporting system database from January 2000 to September 2009 for 12 commodity futures markets providing one of the most comprehensive and detailed profit calculation studies to date.

Our findings show little evidence that a risk premium exists in the commodity futures market. Results show that over the entire time period of 2000 to 2009 CITs had negative profits in 9 out of 12 markets resulting in an approximate net loss of -$6.9 billion despite price increases in the majority of commodities studied. A return on investment measure normalizes profit by the size of investment to determine if profitability has changed over time. Results show monthly profit as a percentage of investment notional value is small and fluctuates both above and below zero with the average percentage of profitability below zero. No evidence of a risk premium is supported as CITs did not display evidence of earning a risk premium in aggregate or by earning consistent positive returns overtime.

The failure to find support for the Keynesian theory of normal backwardation may be explained by the speculative supply of services being horizontal at a zero return. Thus, the risk premium will be bid to zero and the returns for bearing risk disappear. An alternative theory is that the risk absorbing role is usurped by the liquidity demands of the CITs. Fishe and Smith (2010) show that commercial traders are providers of liquidity, which runs contrary to previous beliefs (Working 1960). Possibly the emergence of CITs has created a change in the market structure

where the liquidity provided by commercials is more valuable to CITs than any risk absorption services offered to commercial traders.

This research argues against the theory of a positive constant or positive time varying risk premium but cannot reject the idea of a time varying risk premium that changes between positive and negative values. Additional questions are raised, specifically, how do noncommercial traders experience substantial profits over the time period? This study rejects the theory of normal backwardation and provides motivation for further research examining the forecasting skill of the noncommercial traders.

References

Aulerich, N.M., Hoffman L.A., and G.E. Plato. 2009. "New Traders in Corn, Soybean, and Wheat Futures Markets Scrutinized." *Economic Research Service Outlook* FDS-09G-01:1-44 [http://www.ers.usda.gov/Publications/FDS/2009/08Aug/FDS09G01/FDS09G01.pdf]

Aulerich, N.M. 2011a. "Evidence on the Relationship between Daily Positions of Index Funds and Price Changes in Agricultural Commodity Futures Markets." Ph.D. dissertation, Agricultural and Consumer Economics, University of Illinois at Urbana Champaign, Urbana, Illinois.

Commodity Futures Trading Commission (CFTC). 2008a."About the Commitments of Traders." Accessed December 2009, available online at http://www.cftc.gov/marketreports/commitmentsoftraders/cot_about.html,

Commodity Futures Trading Commission (CFTC). 2008b."Staff Report on Commodity Swap Dealers & Index Traders with Commission Recommendations." Accessed December 2009, available online at http://www.cftc.gov/stellent/groups/public/@newsroom/documents/file/cftcstaffreportonswapdealers09.pdf.

Dewally, M., Ederington, L., and Fernando, C. "Determinants of Trading Profits of Individual Futures Traders: Risk Premia, Information, and Luck." Working paper, August 2009. [http://cemr.ou.edu/cfs/paper/pdf/Trading%20paper%20Aug09.pdf].

Fenton, J., and G. Martinaitas. 2005. "Large Trader Reporting: The Great Equalizer." *Futures Industry*, July/August, pp. 34-39.

Fishe, P.H. and Smith, A.D. 2010. "Identifying Informed Traders in Futures Markets" Working Paper. [http://www.ace.illinois.edu/pdfs/smith.pdf].

Hartzmark, M. L. 1987. "Returns to Individual Traders of Futures: Aggregate Results." *Journal of Political Economy* 95:1292-1306.

Hartzmark, M.L. 1991. "Luck Versus Forecast Ability: Determinants of Trader Performance in Futures Markets." *Journal of Business* 64:49-74.

Houthakker, H.S. 1957. "Can Speculators Forecast Prices?" *The Review of Economics and Statistics* 39:143-151.

Keynes, John, M., 1930, *A Treatise on Money*, Vol II (MacMillian, London).

Leuthold, R.M., Garcia, P., and Lu R. 1994. "The Returns and Forecasting Ability of Large Traders in the Frozen Pork Bellies Futures Market." *Journal of Business* 67:459-473.

Meyer, G. "Commodity Investors Turn Active." Financial Times. December 23, 2009.

Rockwell, C.S. 1967. “Normal Backwardation, Forecasting, and the Returns to Commodity Futures Traders.” *Food Research Studies* 7:107-130.

Sanders, D.R., S.H. Irwin, and R. Merrin. 2009. “Smart Money? The Forecasting Ability of CFTC Large Traders.” *Journal of Agricultural and Resource Economics* 34:276-296

Sanders, D.R., S.H. Irwin, and R.P. Merrin. 2008. “The Adequacy of Speculation in Agricultural Futures Markets: Too Much of a Good Thing?” Marketing and Outlook Research Report 2008-02, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign.

Telser, L.G. 1958. “Futures Trading and the Storage of Cotton and Wheat.” *The Journal of Political Economy* 66:233-255.

Endnotes

[1] Delta measures the rate of change in option value with respect to changes in the underlying asset price. Adjusting options positions by delta makes options positions comparable to futures positions in terms of price changes.

[2] The data does not include positions of day traders or scalpers since these participants seldom carry positions overnight.

[3] The CFTC released a new weekly Disaggregate COT report on October 20, 2009. The first iteration of the report covers 22 major physical commodity markets; on December 4, 2009, the remaining physical commodity markets were included. The Disaggregated COT report increases transparency from the legacy COT reports by separating traders into the following four categories of traders: Producer/Merchant/Processor/User; Swap Dealers; Managed Money; and Other Reportables. The new Disaggregated COT report does not break out Commodity Index Traders. In addition, the CFTC began another weekly report called Traders in Financial Futures on July 22, 2010. The new report separates large traders in the financial markets into the following four categories: Dealer/Intermediary; Asset Manager/Institutional; Leveraged Funds; and Other Reportables.

[4] Futures positions include delta adjusted option positions.

[5] This assumption does not imply that the number of CIT traders is constant across the sample period. In fact, the number of CIT traders rises over time in parallel with the rise in aggregate CIT positions. For example, the number of CIT traders in corn increases from 7 in 2000 to 31 in 2009. Retroactive application of CIT classifications prior to 2006 could induce two types of misclassification error. First, CITs that traded between 2000 and 2005 but ceased operation sometime before 2006 would be excluded from the CIT category over 2000-2005. Second, traders classified as CITs over 2006-2009 would be incorrectly categorized as CITs over 2000-2006 if they changed their line of business at some point before 2006. Given the stability in CIT classifications over 2006-2009 the likelihood of either type of error is minimal.

[6] The same profit methodology is implemented in Hartzmark (1987, 1991) and Leuthold (1994).

[7] Since commercial traders are more likely to be exchange members (with lower transactions costs), the dollar profits for the noncommercial traders would probably be reduced more than those of commercial traders if it were possible to include these costs (Hartzmark 1987).

[8] Since futures trading is a zero sum game, the nonreporting category is the residual from the large trader profits. Significance at the 5 percent level is indicated using the signed rank test due to the non normal distortion. A * denotes the mean of daily returns are different than zero and ‘ denotes the mean of monthly returns is different than zero.

[9] The three series graphs for all commodities are provided in Appendix A.

[10] Lean hogs futures are typically a smaller portion of the overall commodity index portfolio than commodities with larger futures markets such as corn (Aulerich et al. 2008) and it is therefore not surprising that positions are not strongly correlated with price during the period.

[11] Using notional value is plausible when measuring CIT return on investment because CITs invest in an unleveraged manner. In practice CITs pay the required margin and invest the remaining value in low risk short term investments such as 3 month treasury bonds (Engelke 2008).

[12] CITs are also shown to have positions follow prices (Aulerich 2011a). CITs are characterized as passive long investors but flows into and out of index funds influences open interest in commodities; as prices increase (decrease) investors tend to increase (decrease) investment in the commodity. This is offset by the rebalancing affect where as a price increases (decreases) a commodity become over weighted (under weighted) in the portfolio and open interest must decrease (increase) to maintain the targeted portfolio weights.

[13] Notional value is calculated as CIT open interest multiplied by both the contract size and settlement price summed over all maturities and commodities.