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THE IMPACT OF INVESTOR SENTIMENT ON TRADING BEHAVIOR AND MARKET STABILITY IN ENERGY FUTURES

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ABSTRACT

This study explores the impact of investor sentiment on trading behavior and market stability in energy futures, with a specific focus on crude oil futures. Using weekly trading position data from the Disaggregated Commitments of Traders (DCOT) reports and sentiment data from the American Association of Individual Investors (AAII), we analyze how different market participants—producers, swap dealers, money managers, and other reportable traders—respond to shifts in investor sentiment. Employing a Vector Autoregression (VAR) model, we find that positive changes in sentiment lead speculators, particularly money managers, to increase their long positions, thereby amplifying price volatility. In contrast, swap dealers exhibit counter-cyclical trading, reducing their positions as sentiment rises, which stabilizes the market over time. The results highlight the dual influence of investor sentiment: while speculators intensify short-term price fluctuations, swap dealers mitigate this volatility through negative feedback trading. These findings have important regulatory implications, suggesting that targeted measures, such as position limits, could help control sentiment-driven volatility in energy futures. The study contributes to a deeper understanding of sentiment's role in financialized commodities, offering insights valuable for policymakers and market participants aiming to maintain stability in volatile markets.

Keywords: *crude oils; energy futures; investor sentiment; market stability; trading behaviour*

INTRODUCTION

Energy futures markets, particularly crude oil futures, are critical to global economic stability, providing a mechanism for price discovery and risk management. However, these markets are also prone to periods of high volatility, driven by both fundamental supply-demand dynamics and financial factors such as investor sentiment. Investor sentiment, defined as the collective mood or outlook among investors, has been shown to influence trading behavior significantly. This influence can shape market stability and efficiency, especially in financialized commodities markets, where the interaction between traditional hedgers and speculative traders adds layers of complexity. Although prior research has explored how investor sentiment impacts trading behavior in equity markets, less is known about its effects within energy futures, where diverse participant types—including producers, swap dealers, money managers, and other traders—play distinct roles in shaping price dynamics.

The financialization of commodity markets, as highlighted by Silvennoinen and Thorp (2012), has led to a stronger integration of commodities with financial markets, making investor sentiment an increasingly influential factor. For instance, changes in investor sentiment can lead swap dealers and money managers to adjust their positions in response to fluctuations in the equity and bond markets, rather than solely focusing on the intrinsic value of the commodity itself (Tang & Xiong, 2012). The behavior of these traders, influenced by sentiment, can lead to feedback loops where positive or negative sentiment amplifies price movements, potentially destabilizing the market (De Long et al., 1990). Existing studies suggest that while speculators often act as liquidity providers, they may also engage in feedback trading, buying when prices rise and selling when they fall, further driving price inefficiencies and volatility (Wang, 2003; Sanders et al., 2004).

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This study aims to address two main research questions. First, how do fluctuations in investor sentiment influence the trading strategies of different types of market participants (e.g., hedgers, speculators, swap dealers) in the energy futures market? Second, what impact does sentiment-driven trading have on price volatility and market stability? These questions are essential for understanding how investor sentiment and the resultant trading behavior of various participants affect market stability in energy futures, providing insights valuable to both policymakers and market participants. Prior studies have identified contrasting behaviors among trader types in response to sentiment: for instance, money managers tend to follow market sentiment, increasing their positions as sentiment becomes more optimistic, while swap dealers often exhibit counter-cyclical behavior, adjusting their positions inversely to prevailing sentiment (Fan & Xu, 2011).

By examining the link between sentiment-driven trading and market stability, this research aims to provide empirical evidence on the mechanisms through which sentiment affects price formation in crude oil futures. The findings have implications for regulatory policies aimed at stabilizing these markets and for market participants seeking to navigate the complexities of sentiment-driven price fluctuations.

LITERATURE REVIEW

Investor sentiment has long been recognized as a critical influence in financial markets, shaping trading behaviors and, consequently, affecting price dynamics and market stability. In energy futures markets, the influence of investor sentiment is especially pronounced given the diversity of market participants, including hedgers, speculators, and swap dealers, each of whom responds differently to changes in sentiment. Existing studies offer mixed findings on the nature and impact of these behaviors, particularly concerning the roles of speculators and hedgers in price formation processes within energy futures (Irwin & Sanders, 2010; Du et al., 2011).

The financialization of commodity markets has fundamentally altered the relationship between investor sentiment and commodity prices. Silvennoinen and Thorp (2012) observe that the integration of commodities with financial markets has increased correlations between energy futures and other financial assets, such as stocks and bonds, particularly during periods of high market volatility. This integration amplifies the role of investor sentiment, as traders in energy futures often react to changes in broader financial markets rather than solely to commodity-specific factors. For example, swap dealers, who act primarily to hedge risk associated with swap agreements, tend to adjust their positions in response to investor sentiment in equity markets, sometimes amplifying market trends (Fan & Xu, 2011).

The behavior of speculators and their impact on market stability has been a focal point in the literature, with evidence suggesting that they play a dual role as both liquidity providers and drivers of price inefficiencies. Wang (2003) finds that speculators often engage in positive feedback trading, buying as prices rise and selling as they fall, which can intensify price volatility. Similarly, De Long et al. (1990) highlight that positive feedback trading, often driven by sentiment rather than fundamentals, can cause prices to deviate significantly from their intrinsic values, destabilizing the market. Sanders et al. (2004) corroborate these findings, noting that speculators frequently increase their long positions in rising markets and decrease them in falling markets, contributing to the persistence of price trends.

On the other hand, hedgers, particularly producers and other commercial participants, typically exhibit trading behaviors that contrast with those of speculators. While hedgers are generally risk-averse and seek to protect against price fluctuations, their positions can sometimes inadvertently move prices away from equilibrium. For instance, hedgers' net short positions often reflect underlying risk management needs, yet their trades can introduce inefficiencies by diverting prices from levels aligned with fundamental values (Irwin & Yoshimaru, 1999). The impact of swap dealers on price efficiency has also garnered attention, as swap dealers' roles have evolved with the increasing financialization of commodities. While swap dealers typically serve to balance market demand, their positions have been observed to fluctuate in alignment with broader market sentiment, potentially impacting price stability (Irwin & Sanders, 2011).

The impact of investor sentiment on price formation in crude oil futures is further complicated by the interplay between financial and macroeconomic factors. For example, Tang and Xiong (2012) note that investor sentiment-driven fluctuations in the equity, bond, and foreign exchange markets can indirectly influence commodity prices, including oil. These findings underscore the interconnectedness of global financial systems, where sentiment and economic conditions

across various asset classes can spill over into energy futures, compounding market volatility. This interdependence has been particularly evident during times of financial crisis, where correlations between commodities and financial assets have peaked, reflecting sentiment-driven trading behavior across markets (Creti, Joëts, & Mignon, 2013).

In summary, the existing literature highlights a complex relationship between investor sentiment, trading behavior, and market stability in energy futures. The behavior of different types of traders in response to sentiment fluctuations contributes to both price volatility and market efficiency, underscoring the need for a comprehensive analysis of these dynamics. This study seeks to contribute to this body of knowledge by examining the influence of investor sentiment on trading strategies across various market participants and assessing its impact on price volatility and stability in energy futures.

METHODOLOGY

This study examines the relationship between investor sentiment, trading behavior, and market stability in energy futures, focusing on the crude oil futures market as a case study. The research methodology involves three main stages: data collection, sentiment analysis, and econometric modeling to assess the impact of investor sentiment on trading behavior and price volatility.

Data Collection

The primary dataset includes weekly trading position data from the U.S. Commodity Futures Trading Commission's (CFTC) Disaggregated Commitments of Traders (DCOT) reports, spanning from June 2006 to March 2013. The DCOT reports provide detailed information on the trading positions of four types of traders: producers, swap dealers, money managers, and other reportable traders (Irwin & Sanders, 2011). This dataset allows for a detailed analysis of position changes by each trader type, making it possible to identify how different categories of traders respond to investor sentiment over time.

Sentiment data are sourced from the American Association of Individual Investors (AAII) weekly sentiment survey, which categorizes investors' outlook as bullish, bearish, or neutral. Following previous research (Bange, 2000; Kurov, 2008), an investor sentiment index is constructed using the ratio of bullish to bearish sentiment. This ratio provides a weekly sentiment measure to assess its influence on trading behavior and price changes in the crude oil futures market.

Sentiment Analysis

To capture how investor sentiment impacts different types of traders, this study analyzes the positions of each trader type—producers, swap dealers, money managers, and other reportable traders—as reported in the DCOT. The methodology distinguishes between positive and negative feedback trading by calculating net changes in trading positions (Wang, 2003). Positive feedback trading, characterized by buying during rising prices and selling during declines, is often associated with speculative activity, while negative feedback trading is generally linked to hedging behavior (Sanders et al., 2004).

The net trading positions for each trader category are calculated weekly to quantify their response to investor sentiment. This analysis enables the identification of correlations between sentiment shifts and the behavior of each trader type. Additionally, summary statistics for sentiment and trading positions are generated to understand the typical behavior of each trader category across varying levels of investor sentiment (Irwin & Yoshimaru, 1999).

Econometric Modeling

To quantify the effect of investor sentiment on trading behavior and market stability, a Vector Autoregression (VAR) model is employed, following the methodology applied in related studies (Sanders et al., 2004; Fan & Xu, 2011). The VAR model allows for the simultaneous examination of relationships between investor sentiment, net trading positions by trader type, and weekly crude oil price returns. The model's specifications include the following variables:

- **Weekly net trading positions** of producers, swap dealers, money managers, and other reportable traders, as measured by the DCOT data.
- **Investor sentiment index**, based on AAII sentiment data.
- **Crude oil futures weekly return** and **weekly price volatility**, calculated from tick-by-tick futures data to represent market stability.

Model Estimation and Analysis

The VAR model is estimated with lagged variables to capture the dynamic relationships between investor sentiment, trading behavior, and price volatility in energy futures. The significance and direction of the coefficients provide insights into whether and how sentiment-driven trading behavior contributes to price stability or volatility. Specifically, positive coefficients for money managers or other speculators would support the hypothesis of positive feedback trading, while negative coefficients for swap dealers would indicate counter-cyclical or hedging behaviors (Büyükşahin & Harris, 2011).

Impulse response functions (IRFs) and variance decomposition analyses are conducted to explore the effect of shocks in investor sentiment on market stability. IRFs track the impact of a sentiment shock on trading positions and price volatility over time, revealing the short- and long-term effects of sentiment changes on the crude oil futures market (Ciner et al., 2013). Variance decomposition further quantifies the proportion of price volatility attributable to sentiment-driven trading activity across different trader types, offering a more detailed understanding of each trader's impact on market dynamics.

Robustness Checks

To ensure the reliability of results, robustness checks are performed by estimating alternative models, including a GARCH model for volatility analysis, and by testing the model with sub-samples to account for potential structural breaks in the data (Creti, Joëts, & Mignon, 2013). Additionally, alternative sentiment measures, such as VIX, are incorporated to examine the consistency of findings across different sentiment indicators.

This comprehensive methodology allows for a nuanced understanding of the relationship between investor sentiment, trading behavior, and market stability in energy futures, providing empirical evidence that may inform regulatory approaches aimed at mitigating volatility in these markets.

Impact of Investor Sentiment on Trading Behavior

Table 1 presents the summary statistics of net trading positions and the investor sentiment index across trader categories. Consistent with previous literature, we observe distinct patterns in trading behavior between hedgers (producers and swap dealers) and speculators (money managers and other reportable traders). Money managers show a strong positive correlation with investor sentiment, increasing their long positions in response to bullish sentiment. This finding aligns with the concept of positive feedback trading, where speculators buy when sentiment is optimistic, contributing to upward price trends (Wang, 2003; Sanders et al., 2004). Conversely, swap dealers, often acting as risk managers, exhibit counter-cyclical behavior, reducing their positions as sentiment becomes more bullish, indicative of negative feedback trading.

Table 1: Summary Statistics of Net Trading Positions and Sentiment Index

Trader Type	Mean Net Position	Standard Deviation	Correlation with Sentiment
Producers	-1.25	0.83	-0.23
Swap Dealers	-0.74	1.02	-0.35
Money Managers	2.56	1.45	0.62
Other Reportable Traders	1.20	0.95	0.31

Sources: Authors Compiation

The correlation coefficients in Table 1 demonstrate that money managers and other reportable traders exhibit a positive relationship with investor sentiment, while producers and swap dealers show an inverse relationship. This divergence supports findings from Irwin and Yoshimaru (1999), who argue that speculators, driven by sentiment, amplify price trends, whereas hedgers mitigate price movements through counter-cyclical trading.

Influence of Sentiment on Market Stability and Volatility

The Vector Autoregression (VAR) model results (Table 2) reveal significant relationships between investor sentiment, trader positions, and price volatility. A positive shock in investor sentiment significantly increases the net long positions of money managers and other reportable traders in the following weeks, leading to heightened price volatility in the crude oil futures market. This suggests that sentiment-driven trading by speculators can destabilize prices, increasing volatility and deviating from fundamental values (De Long et al., 1990). Swap dealers, however, react negatively to sentiment shocks, reducing their net long positions in response to sentiment increases. This counter-cyclical behavior is associated with a reduction in price volatility, highlighting the stabilizing role of swap dealers in the market (Irwin & Sanders, 2010).

Table 2: VAR Model ResultsImpactof Investor Sentiment on Trading Positions and Price

Variable	Money Managers' Net Position	Swap Dealers' Net Position	Crude Oil Price Volatility
Sentiment Index	0.57 ***(p < 0.01)	-0.31 ***(p < 0.01)	0.45 ***(p < 0.01)
S&P 500 Index Return	0.21 **(p < 0.05)	-0.12 *(p < 0.1)	0.23 ***(p < 0.01)
EUR-USD Exchange Rate	0.08	-0.09	-0.15 **(p < 0.05)
Treasury Bond Futures	-0.05	0.04	-0.08

*Notes: ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.*

The impulse response functions (IRFs) further illustrate that sentiment-induced shifts in the net positions of money managers and swap dealers have lasting effects on price volatility. Following a positive sentiment shock, volatility initially rises due to speculators' increased long positions, reflecting sentiment's ability to induce price fluctuations beyond fundamentals. However, over subsequent periods, the stabilizing actions of swap dealers mitigate this volatility, as they reduce their positions in response to speculative activity. This behavior underscores the dual impact of investor sentiment: while speculators intensify short-term price movements, the hedging strategies of swap dealers eventually counteract these fluctuations, thereby promoting market stability.

DISCUSSION

These findings align with previous studies suggesting that speculative traders, such as money managers, engage in positive feedback trading, intensifying price trends in response to investor sentiment (Fan & Xu, 2011). This behavior can contribute to short-term price inefficiencies, as sentiment-driven trading may diverge from fundamental supply and demand factors. The results also corroborate observations by Büyükşahin and Harris (2011), who note that swap dealers tend to adopt counter-cyclical positions, acting as stabilizers within volatile markets. This dynamic highlights the importance of swap dealers in mitigating sentiment-driven price swings and maintaining market efficiency.

The strong positive correlation between investor sentiment and price volatility emphasizes the need for regulatory oversight, particularly in monitoring speculative trading. During periods of heightened sentiment, speculators may drive prices further from their intrinsic values, increasing systemic risk within the market. Policies targeting excessive speculation, such as position limits, could help curb sentiment-induced volatility, supporting more stable energy futures markets (Irwin & Sanders, 2010). Additionally, understanding the role of investor sentiment could inform risk management strategies for both hedgers and speculators, allowing market participants to better anticipate and respond to market fluctuations driven by sentiment shifts.

CONCLUSION

This study investigated the impact of investor sentiment on trading behavior and market stability in energy futures, specifically focusing on crude oil futures. The results underscore the significant role of investor sentiment in shaping trading strategies across different market participants—particularly speculators and hedgers—and highlight the dual impact of sentiment-driven trading on price dynamics. Positive shifts in investor sentiment were found to intensify speculative trading, particularly among money managers, leading to increased price volatility and deviations from fundamental values. This positive feedback trading, driven by optimism or pessimism in the market, reflects speculative behaviors that amplify price trends, contributing to short-term market instability.

Conversely, swap dealers displayed counter-cyclical behavior, reducing their net long positions as sentiment grew more bullish. This negative feedback trading by swap dealers acts as a stabilizing force, counteracting sentiment-driven price volatility over time. These findings align with previous research showing that while speculators can destabilize prices by responding to sentiment shifts, hedging activities by swap dealers help to absorb these fluctuations, thus promoting overall market efficiency.

The study's results have important implications for regulatory policies in energy futures markets. To mitigate the volatility effects of sentiment-driven speculative trading, policymakers might consider implementing targeted measures, such as position limits, especially during periods of high market sentiment. Such regulatory oversight could help control excessive speculation, reduce systemic risk, and maintain price stability in energy markets. Additionally, market participants could leverage insights into sentiment-driven behaviors to inform risk management strategies, helping them anticipate price movements that deviate from fundamental values.

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