

[THE ROLE OF INVESTOR SENTIMENT IN THE CONTEMPORANEOUS DYNAMICS IN ENERGY COMMODITY FUTURES PRICES: A DISCRETE WAVELET TRANSFORMATION]

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Overview

Since the modelization of investor sentiment and energy commodity relationship is generally estimated to be nonlinear, it is necessary to consider the information frequency. Therefore, I find it of a huge interest to analyze this previous untreated information. I believe that this analysis will allow more appropriate identification of the changes belonging to various frequencies hidden within time series. The outcome of this work will shed more light on the importance of the investor behavior on commodity markets and the increasing financialization of commodity markets. Wavelet approach combines information about both time and frequency domain. This is the first study to explore the time-frequency co-movements between investor sentiment and crude oil and natural gas using Maximum Overlap Discrete Wavelet Transformation combined with linear and non-linear granger causality tests. On the long term, we point that the financial investors' expectations have the power to drift natural gas and crude oil futures prices in the presence of informational frictions. For crude oil, we find that the investor sentiment effect is also on the middle term where there is no such effect in the natural gas market.

Methods

The methodology used in this paper is based on Maximum Overlap Discrete Wavelets Transformation and a linear and non-linear granger causality tests. It allows the analysis of time series on a variety of time scales, respecting the data length in every frequency decomposition. To analyze dependencies or a contagious effect, the use of time series has become essential to extract knowledge from the data that flows out from commodity domain. However, dealing with this kind of data can easily cause many econometric problems such as; data loss and overlapping. Indeed, Wavelets approaches have the power to cover these kind of shortages, Jia et al (2015). The econometric methodologies are used only to reflect the volatility characteristics of economic time series and data in the time-domain. However, Wavelets can achieve a frequency-domain analysis. It investigates the contagion effect and the interdependence between variables. The majority of econometric tests analyze the data at different time scale separately (daily, weekly, monthly...) which leads to information loss, and overlapping problems, especially when the data contain several structural break.

Results

We tested the causality between energy commodities and investor sentiments in both directions. First, we find that crude oil futures have the power to cause investor sentiment in long and average term. In the short run, there is no significant causality between crude oil and investor sentiment in both directions. This means that, if we observe a change on oil prices, investors start changing their decisions after 32 days; It takes about one month to oil prices to significantly affect investors' sentiment. For natural gas, we also found that no significant causality is registered in the short term (>32 days). In the average time scale, natural gas futures are more powerful and can lead investors' behavior. Indeed, between 32 days and 17 months, investors base their decisions on prices movements. It means that investors strategy refer to demand/supply theory; if the natural gas prices increases, the demand decreases and the supply increases (and vice versa). The investors adjust their behaviors to price volatilities. Consequently, in the long run, the investor sentiment will lead the prices, and that is what explains our findings in the long run. In fact, investor sentiment significantly cause natural gas prices in the long time scale.

Conclusions

Classical economic theory leaves no place to behavioral implications in asset prices. In fact, classical pricing models and investment decisions believe that investor sentiment do not play any role on price movements and vice versa. In this paper, we questioned this issue; we challenged the classical theory by studying the causality between major energy commodities futures prices (Crude oil and Natural gas futures prices) and investor sentiment index in both directions.

In another hand, a large literature in finance studied the evidence related to investor sentiment. The findings are interesting and a significant relationship is registered between investor sentiment and financial market. Based on these findings, investors tend to make profits by exploiting the information provided by investor sentiment proxies; they adjust their decision based on these findings and consequently maximize their profits by taking into consideration this index before taking any buying or selling decision.

Since financial investors hugely grow their interest in commodity assets; we investigate this issue on major energy commodities markets (Natural gas and Crude oil). Furthermore, in order to provide a more effective study, we analyzed the frequency domain causality between commodity futures and investor sentiment using MODWT approach. Consequently, we estimate the significance and the direction of the causality on the long term (low frequency), the average term (average frequency) and the short term (high frequency), without losing any information from a level to another. In this study, we collected data starting from 2002 until the end of 2016. We choose 2002 as a starting date since it reflects the beginning of commodities markets financialization. Starting from this date, trading volume and non-commercial positions dramatically increased. We find that on the short run, the causality is not significant and investor sentiment do not have any role on prices movements. However, in average and long run, crude oil has the power to drive investors sentiments and behaviors. Samely, natural gas prices significantly affect investor sentiment on average term. In the long term, investor sentiments can drive natural gas prices.

Our results have several practical implications. In order to improve the timing of their investments , investors can use our findings to provide the perfect crude oil and natural gas prices forecasts and consequently make better policies. In addition, speculators and individual investors can benefit from these results to optimize their hedging activities and make the right decision in the perfect time. Finally, futures researches may use these insights and add the sentiment index as a new explanatory variable in the models forecasting time frequency returns and price movements.

References

- Antoniou et al (1998). The effect of stock index futures trading on stock index volatility: an analysis of the asymmetric response of volatility to news. *Journal of Futures Markets*, 18, 151-166.
- Baker, M., and Stein, J. (2004). Market liquidity as a sentiment indicator. *Journal of Financial Markets*, 7, 271-299.
- Baker, M., Wurgler, J. (2006). Investor sentiment and the cross-section of stock returns. *Journal of Finance*, 61, 1645-1680.
- Baker, M., Wurgler, J. (2007). Investor sentiment in the stock market. *Journal of Economic Perspect.* 21 , 129–151.
- Barberis, N et al (1998). A model of investor sentiment. *Journal of Financial Economics*, 49, 307-343.
- Borensztein, E., Reinhart, C.M. (1994). The macroeconomic determinants of commodity prices. IMF Staff Papers.
- Buyuksahin, B., Robe, M.A. (2011). Fundamentals, trader activity and derivative pricing. SSRN Working Paper.
- Chan, Y., (2014). How does retail sentiment affect IPO returns? Evidence from the internet bubble period. *International Review of Economics and Finance*, 29, 235-248.
- Corredor, P et al (2013). Investor sentiment effect on stock markets: stock characteristics or country specific factor? *International Review of Economics and Finance*, 27, 572-591.
- Chen, Y.-C., Rogoff, K., Rossi, B. (2010). Can exchange rates forecast commodity prices? *Quarterly Journal of Economics*. 125, 1145–1194.
- Chou, R., Lin, C. B., & Wang, G. (2015). Investor Sentiment and Price Discovery: Evidence from the Pricing Dynamics between the Futures and Spot Markets.
- Domanski, D., Heath, A. (2007). Financial investors and commodity markets. *BIS Q. Rev.* 53–67.
- Han, B. (2008). Investor sentiment and option prices. *Review of Financial Studies*. 21, 387–414.

- Huang, D., Jiang, F., Tu, J., Zhou, G. (2015). Investor sentiment aligned: A powerful predictor of stock returns. *Review of Financial Studies*, 28, 791–837.
- Hulshof, D., van der Maat, J. P., & Mulder, M. (2016). Market fundamentals, competition and natural-gas prices. *Energy Policy*, 94, 480-491.
- Ji, Q., Zhang, H. Y., & Geng, J. B. (2018). What drives natural gas prices in the United States?—A directed acyclic graph approach. *Energy Economics*, 69, 79-88.
- Kaplanski, G., Levy, H., Veld, C., & Veld-Merkoulova, Y. (2015). Do happy people make optimistic investors?. *Journal of Financial and Quantitative Analysis*, 50(1-2), 145-168.
- Keynes, J.M. (1923). Some aspects of commodity markets. *Manchester Guardian Commercial*. 13, 784–786.
- Lee, C., Shleifer, A., Thaler, R. (1991). Investor sentiment and the closed-end fund puzzle. *Journal of Finance*. 46, 75–109.
- Lee, W.Y., Jiang, C.X., Indro, D.C. (2002). Stock market volatility, excess returns, and the role of investor sentiment. *Journal of Banking and Finance*. 26, 2277–2299.
- Lee, W.Y., et al (2002). Spot market volatility, excess returns and the role of investor sentiment. *Journal of Banking and Finance*. 26, 2277-2299.
- Lin Gao and Stephan Suss (2015). Market sentiment in commodity futures returns. *Journal of Empirical Finance*, 33, 84-103.
- Manera, M., Nicolini, M., & Vignati, I. (2016). Modelling futures price volatility in energy markets: Is there a role for financial speculation?. *Energy Economics*, 53, 220-229.
- Mou, Y. (2011). Limits to arbitrage and commodity index investment: Front-running the Goldman roll. Working Paper.
- Neal, R., Wheatley, S. (1998). Do measures of investor sentiment predict returns? *Journal of Finance and Quantitative Analysis*. 33, 523–548.
- Pastor, L., & Veronesi, P. (2012). Uncertainty about government policy and stock prices. *The Journal of Finance*, 67(4), 1219-1264.
- Pilar, C., et al . (2015). Sentiment-prone investors and volatility dynamics between spot and futures markets. *International Review of Economics and Finance*, 35, 180-196.
- Schmeling, M. (2009). Investor sentiment and stock returns: Some international evidence. *Journal of empirical finance*, 16(3), 394-408.
- Tang, K., Xiong, W. (2012). Index investment and financialization of commodities. *Journal of Financial Analysis*. 68 (6), 54–74.
- Tetlock, P.C. (2007). Giving content to investor sentiment. *Journal of Finance*. 62 (3), 1139–1168.
- Yang, C. and Cai, C. (2014). Higher order expectations in sentiment asset pricing model. *Economic Modelling*, 39, 95-100.
- Yang, C. and Li, J. (2013). Investor sentiment, information and asset pricing model. *Economic Modelling*, 35, 436-442.
- Yu, J, and Yuan, Y. (2011). Investor sentiment and the mean-variance relation. *Journal of Financial Economics*, 100, 367-381.