# *THE ROLE OF FINANCIAL INVESTORS IN COMMODITY FUTURES RISK PREMIUM, ENERGY CASE*

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## Overview

In this paper, I investigate the impact of financial investors on commodity markets, and energy market particularly, theoretically and empirically. The study is motivated by the synchronization between the sharp increases in the futures positions taken by those investors and the structural changes in the commodity markets. Hence, I study the interaction between commodity and stock markets by combining the functions of different types of agents: inventory holder, processor and financial investor. In equilibrium, I find that the futures risk premium is determined by the hedging pressure and the stock market returns accompanied by commodity-equity correlation. Also, I find that a positive stock returns accompanied by positive (negative) equity-commodity correlation increase (decrease) the commodity futures risk premium. Empirically, I investigate three commodities: crude oil (WTI), natural gas and heating oil by using a dataset covers the period between 1995 and 2015. First, I find that the hedging pressure is an important determinant of the futures risk premium. Second, I show that the stock returns becomes significant effective determinant of the futures risk premium after 2008 crisis.

## Methods

I develop a model in the spirit of Ekeland et al. (2018). My model studies the interaction between commodity, both physical and futures, and the stock markets. The model investigates the integration between four types of agents: inventory holder (storer), processor, financial investor and spot traders. Those agents are interested in one commodity. The storer (physical speculator) has the capacity to store the commodity. He aims to make profit from the changes in the commodity spot prices. He buys the commodity, stores it, and then he sells his inventory at future time. The processor uses the commodity to produce final goods; he uses the commodity in his production process (raw materials). Both of them (storer and processor) operate in both physical and futures markets. They participate in the futures market for hedging reasons. The financial investor holds a stock portfolio and futures contracts. The spot traders operate only in the physical market to meet the immediate demand and supply in the commodity physical market. The model is constructed on two time periods, t and T. The operation in the physical market is at t and T. Meanwhile, the futures contracts are traded at t and be offset at T. We assume that the risk free rate is neglected.

- At time t, the storer locates on the demand side in the physical market, and buys x quantity of the commodity at spot price P(t) to store it. The spot traders appear in both demand and supply sides in the physical market. They supply w(t) of the commodity, and ask for quantity $\mu(t) - mP(t)$; the demand curve. The processor decides the volume of the commodity quantity (y) that he wants to buy at the future (T) at future spot price P(T). The storer and processor hedge their physical positions in the futures market at futures price F(t,T). The storer sells futures position (take short positions), while the processor buys futures positions (takes long positions). The financial investor takes positions in the futures market.
- At time T, the storer sits on the supply side and sells his inventory in the physical market. The processor locates on the demand side and delivers the commodity that he had asked for. The spot traders appear on the demand and supply side of the spot market. They supply w(T), and demand $\mu(T) - mP(T)$. The futures contracts are settled implying a financial profit $P(T) - F(t,T)$. The futures contracts are offset either by cash settlement (agents take the opposite direction of their futures positions), or possibly by physical settlement (by delivery the commodity at the maturity date).

The model prediction states that the futures risk premium of any commodity is determined by the hedging pressure of commercials agents and the stock returns adjusted by commodity-equity correlation. That implies: first, an increase in the net short hedging pressure causes an increase in the futures risk premium. Second, an increase in stock returns, while the commodity-equity correlation is positive, causes an increase in the futures risk premium.

My objective is to test the impact of different factors on the futures risk premium following the theoretical prediction. I will be building regressions mimicking that theoretical giving. I will focus on studying the impact of hedging pressure and the stock returns term on the futures risk premium for three commodities: crude oil (WTI), heating oil and natural gas, which became quite important as a consequence of the financialization.

## Results

I find that hedging pressure is an important determinant of the futures risk premium during different periods and different circumstances. I find that the hedging pressure is positively correlated with the futures risk premium for energy commodities. The positive coefficient of the net short hedging pressure is interpreted by the traditional price pressure hypothesis. This hypothesis states that a net short (long) futures positions related with positive (negative) bias in the futures prices. My results show that the coefficient of the net short hedging pressure decreases when the maturity increases. Therefore, I may induce that the hedging pressure is strong explanatory variable for the short maturities.

My results also show the virtual impact of the stock market appeared after 2008 financial crisis. Thus, I expect that the stock market became a strong explanatory variable after 2008. This result might be interpreted by the dramatically increase in the commodity-equity correlation especially for crude oil and heating oil. The increase in the commodity-equity correlation makes the diversification in commodity markets doubtable. Therefore, the financial investors must be remunerated to their risk bearing in the futures market. The results also show that the impact of stock market overwhelms the impact of hedging pressure for longer maturities of crude oil (WTI) and heating oil.

## Conclusions

I test the futures risk premium in the era of financialization, depending on the theoretical prediction, for three commodities in the energy market: crude oil (WTI), natural gas and heating oil. The sample covers the last two decades, from 1995 to the end of 2015. I regress the futures risk premium on the change in net short hedging pressure and the adjusted stock returns.

First, I confirm empirically that the hedging pressure is a strong explanatory variable for the futures risk premium. I find that the net short hedging pressure is positively correlated with the futures risk premium for all tested commodities. Also, there is a negative relationship between the impact of the hedging pressure and the futures maturity. Second, the impact of stock market became significantly effective on the futures risk premium in the period post- 2008 financial crisis. By that time, the futures risk premium and the adjusted stock returns are positively correlated. This finding confirms the theoretical prediction, which stated that a positive stock returns accompanied by positive commodity-equity correlation increases the futures risk premium. For Crude oil (WTI) and heating oil, the significant impact is accompanied by increases in commodity-equity correlation. That leads us to go in the line with Daskalaki and Skiadopoulos (2011) and Belousova and Dorfleitner (2012), and conclude that the diversification is in doubt. Consequently, financial investors are asking for liquidity instead of providing liquidity to the hedgers (e.g. Cheng et al. (2015)). When the maturity increases, the adjusted stock market returns becomes stronger explanatory than the hedging pressure. This finding confirms Boons et al. (2014) who study the first two maturities. But, it is the opposite for longer maturities. In natural gas case, although the explanatory variables are significant in the period 2008-2015, the futures risk premium should be determined by extra explanatory variables, which is a motivation for further studies to find explanation for this issue.

As a result, the futures risk premium increased significantly after the financial crisis in 2008. Also, this paper contributes to previous literature that emphasizes the impact of financialization on commodity markets such as Henderson et al. (2015), Hamilton and Wu (2015), Singleton (2014) and others.

## References

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