Journal of Financial Markets 25 (2015) 1–15

Contents lists available at ScienceDirect

Journal of Financial Markets

journal homepage: www.elsevier.com/locate/finmar

A dynamic model of hedging and speculation in the commodity futures markets

Giulio Cifarelli [a,*], Giovanna Paladino [b]

[a] University of Florence, DISEI, via delle Pandette 9, 50127 Florence, Italy
[b] LUISS University Economics Department and Intesa Sanpaolo, Piazza San Carlo 156, 10156 Torino, Italy

ARTICLE INFO

Article history:
Received 19 April 2011
Received in revised form
28 June 2015
Accepted 6 July 2015
Available online 14 July 2015

JEL classification:
G13
G15
Q47

Keywords:
Commodity spot and futures markets
Dynamic hedging
Speculation
Non-linear GARCH
Markov regime switching

ABSTRACT

Over the 1990–2010 time period, a dynamic interaction between spot and futures returns in five commodity markets (copper, cotton, oil, silver, and soybeans) is empirically validated. An error correction relationship for the cash returns and a non-linear parameterization of the corresponding futures returns are combined with a bivariate CCC-GARCH representation of the conditional variances. Hedgers and speculators are contemporaneously at work in the futures markets, the role of the latter being far from negligible. In order to capture the consequences of the growing turbulence of these markets, a two-state regime-switching model for futures returns is developed. In this way financial traders' time-varying risk appetites are allowed to interact with hedgers' demand in determining both future and spot prices.

1. Introduction

This paper focuses on the two main activities associated with futures trading: hedging and speculation. They do not have to be considered as referring to two separate agents. It may well be that typical hedgers, such as commercial firms, take a view on the market (speculate on price direction). Alternatively, speculators can find it profitable to engage in hedging activities (Stulz, 1996; Irwin, Sanders, and Merrin, 2009).

* Corresponding author. Tel.: +39 0554374598; fax: +39 0554374905.
E-mail addresses: giulio.cifarelli@unifi.it (G. Cifarelli), gpaladino@luiss.it, giovanna.paladino@intesasanpaolo.com (G. Paladino).

http://dx.doi.org/10.1016/j.finmar.2015.07.002
1386-4181/

Consequently, it could be misleading to consider hedgers as pure risk-averse agents and speculators as risk-seekers. The futures' demand functions used in this paper will avoid this simplistic divide.

Futures trading involves an exchange between people with opposite views of the market as to the future behavior of prices and/or a different degree of risk aversion. It allows a shifting of the risk from a party that desires less risk to a party that is willing to accept it in exchange for an expected profit.[1]

Speculation is essential for the smooth functioning of commodity markets as it assures liquidity and assumes the risks laid off by hedgers. Speculators, mainly non-commercial firms or private investors, are ready to take up risks in order to earn profits stemming from expected price changes. No physical delivery is involved in this futures trade and speculation does not intervene directly in the cash market.

The literature on commodity market speculation has followed three main strands. A direct approach, based either on an attempt to micro model simultaneously speculative and hedging behavior, or on an investigation of the interaction between chartists/noise/feedback traders and fundamentalist speculators, and an indirect approach. In the latter, the excess co-movement of commodity prices is analyzed and this evidence is attributed to “herding” behavior. In addition, some recent studies have tried to exploit the information on the commitments of traders.

Johnson (1960) suggests that hedging and speculation in futures markets are interrelated. Speculation is mainly attributed to traders' expectations on future price changes that bring about an increase/decrease of the optimal hedging ratio in a short hedging context. Ward and Fletcher (1971) generalize Johnson's approach to both long and short hedging and find that speculation is associated with optimal futures positions (short or long) that are in excess of the 100% hedging level. Westerhoff and Reitz (2005) and Reitz and Westerhoff (2007), building on Frankel and Froot (1986), Cutler, Poterba, and Summers (1990), and De Long et al. (1990), among others, attribute commodity price fluctuations to the non-linear interaction between noise traders and fundamentalist speculators. (Their approach is further adapted to the basic tenets of behavioral price setting dynamics by ter Ellen and Zwinkels (2010).)

A different strand of analysis on speculation in the commodity markets focuses on the presence of excess (with respect to a component explained by fundamentals) co-movement of returns of unrelated commodities (Pyndick and Rotemberg, 1990). Subsequent research (e.g., Cashin, McDermott, and Scott, 1999; Ai, Chatrath, and Song, 2006; Lescaroux, 2009) challenged the excess co-movement hypothesis on both empirical and methodological grounds. The overall results are mixed and could indeed depend on the selection of the estimation techniques and/or of the information set (Le Pen and Sévi, 2010).

In recent years, the availability of data on the Commitments of Traders Reports, provided by the Commodity Futures Trading Commission, has generated a large body of papers as researchers use it to assess the impact of speculation on commodity prices, measuring speculative positions in terms of open interest. The weekly open interest of each commodity is broken down, according to the purposes of traders, into long and short reporting of commercial hedging, long and short speculation by reporting non-commercial firms, and positions of non-reporting traders. The empirical results, however, are mixed (e.g., Fagan and Gencay, 2008; Sanders and Irwin, 2011).

In the 1960s, optimal hedging behavior was identified by Stein (1961) and McKinnon (1967). They associated it with the minimization of the variance of the return of the portfolio of a hedger, constructed with cash and futures contracts. This approach allows to compute an optimal cover ratio β (the minimum variance hedge ratio or MVH ratio), defined as the percentage of cash contracts matched by futures positions that minimizes the variance of the hedged portfolio. It owes its popularity to its simplicity, since β, given by the ratio between the covariance of cash and futures returns and the variance of futures returns, can be easily estimated.

The MVH strategy focuses on the variance of the hedged portfolio and pays no attention to its expected return. Subsequent improvements include strategies based on hedged portfolio return mean

[1] Fagan and Gencay (2008) find that hedgers and speculators are often counterparties, since they tend to take opposing positions. Their respective long positions exhibit a strong negative correlation.