

Modelling and measuring price discovery in commodity markets

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Abstract-

In this paper we present an equilibrium model of commodity spot (st) and futures (ft) prices, with finite elasticity of arbitrage services and convenience yields. By explicitly incorporating and modelling endogenously the convenience yield, our theoretical model is able to capture the existence of backwardation or contango in the long-run spot-futures equilibrium relationship, $st = \beta_2 ft + \beta_3$. When the slope of the cointegrating vector $\beta_2 > 1$ ($\beta_2 < 1$) the market is under long run backwardation (contango). It is the first time in this literature in which the theoretical possibility of finding a cointegrating vector different from the standard $\beta_2 = 1$ is formally considered.

Independent of the value of β_2 , this paper shows that the equilibrium model admits an economically meaningful Error Correction Representation, where the linear combination of (st) and (ft) characterizing the price discovery process in the framework of Garbade and Silber (1983), coincides exactly with the permanent component of the Gonzalo and Granger (1995) Permanent–Transitory decomposition. This linear combination depends on the elasticity of arbitrage services and is determined by the relative liquidity traded in the spot and futures markets. Such outcome not only provides a theoretical justification for this Permanent–Transitory decomposition; but it offers a simple way of detecting which of the two prices is dominant in the price discovery process.

All the results are testable, as can be seen in the application to spot and futures non-ferrous metals prices (Al, Cu, Ni, Pb, Zn) traded in the London Metal Exchange (LME). Most markets are in backwardation and futures prices are “information dominant”; in highly liquid futures markets (Al, Cu, Ni, Zn).

Index Terms- Backwardation; Cointegration; Commodity markets; Contango; Convenience yield; Futures prices; Permanent–Transitory decomposition; Price discovery

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