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Efficient estimation and testing of oil futures contracts in a mutual offset system

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Abstract

With the globalization of financial and commodity markets, it is becoming increasingly important to recognize price linkages between markets beyond national boundaries. Models of futures pricing that incorporate such price linkages into the information set can be expected to be superior empirically. Test results obtained in the paper support this proposition strongly in the case of Brent crude oil futures contracts traded in a mutual offset system between the Singapore International Monetary Exchange (SIMEX) and the International Petroleum Exchange (IPE). Augmented models of SIMEX Brent futures contracts are obtained by incorporating the previous day's IPE Brent futures price into the equation system for the unbiased expectations and the cost-of-carry hypotheses, whereas augmented models of IPE Brent futures contracts are obtained by incorporating the same day's SIMEX Brent futures price in the system for the two hypotheses. On the basis of tests of zero restrictions, the system for the augmented

unbiased expectations hypothesis is found to be superior empirically to the system for the standard Unbiased Expectations hypothesis, and the augmented cost-of-carry system is also found to be superior empirically to the standard cost-of-carry system for both SIMEX Brent futures and IPE Brent futures contracts.

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Notes

Cointegration has been well explored in the literature, with a comprehensive coverage of the literature given in Engle and Granger (1991)and Banerjee et al. (1993). The basic insight into cointegration analysis is that, although many economic time series are non-stationary, groups of such non-stationary variables may move together in the long run.

Many financial time series, such as those examined in this paper, contain stochastic trends, and are denoted as I (1) in the time series literature (a scalar time series, y_t, has a stochastic trend if its first difference, $y_t - y_{t-1}$, has a stationary invertible ARMA representation plus a deterministic component).

Hakkio (1981) applied the certainty equivalence theory of the term structure of interest rates and the hypothesis of interest rate parity to obtain a simple expression relating the six-month forward premium to the expected future one-month forward premium. His proposed theory, however, imposes non-linear cross-equation restrictions on the parameters of the model. Clark (1973), on the other hand, constructed a continuous time series of prices and volumes, and defined a contract that matured a fixed distance into the future. This fixed distance was taken to be the average time to maturity of all futures in the market. To define an average future, Clark constructed a weight function

W(τ), where τ is the time distance between the current period and the maturity of existing contracts.

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