Abstract

Empirical research on oil price dynamics for modeling and forecasting purposes has brought forth several unsettled issues. Indeed, researchers in this field almost unanimously acknowledge heavy tails and structural breaks – in prices or in returns – as stylized facts. Yet the amount of time series models suitable for capturing these features makes model specification daunting. In published works, statistical support is claimed for respect to their fundamental temporal properties. In this paper, we study one such property that is still debated in the literature, namely mean-reversion, with focus on forecast performance. Because of their impact on mean-reversion, we account for non-constancies in the level and in volatility. Three specifications are considered: (i) random-walk models with GARCH and normal or student-*t* innovations, (ii) Poisson-based jump-diffusion models with GARCH and normal or student-*t* innovations, and (iii) mean-reverting models that allow for uncertainty in equilibrium price. The latter specification is driven by a time-varying specification for the convenience yield. We compare forecasts in real time, for 1, 3 and 5 year horizons. For the jump-based models, we rely on numerical methods to approximate forecast errors. Results based on future price data ranging from 1986 to 2007 strongly suggest that imposing the random walk for oil prices has pronounced costs for out-of-sample forecasting. Evidence in favour of price reversion to a continuously evolving mean underscores the importance of adequately modeling the convenience yield.

Key words: Heavy tails; Oil Price; Convenience Yield; Oil Forecasts; Mean Reversion; Structural Stability.

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