The Forecasting Capacity of Futures Contracts for Brent Crude Oil Spot Prices

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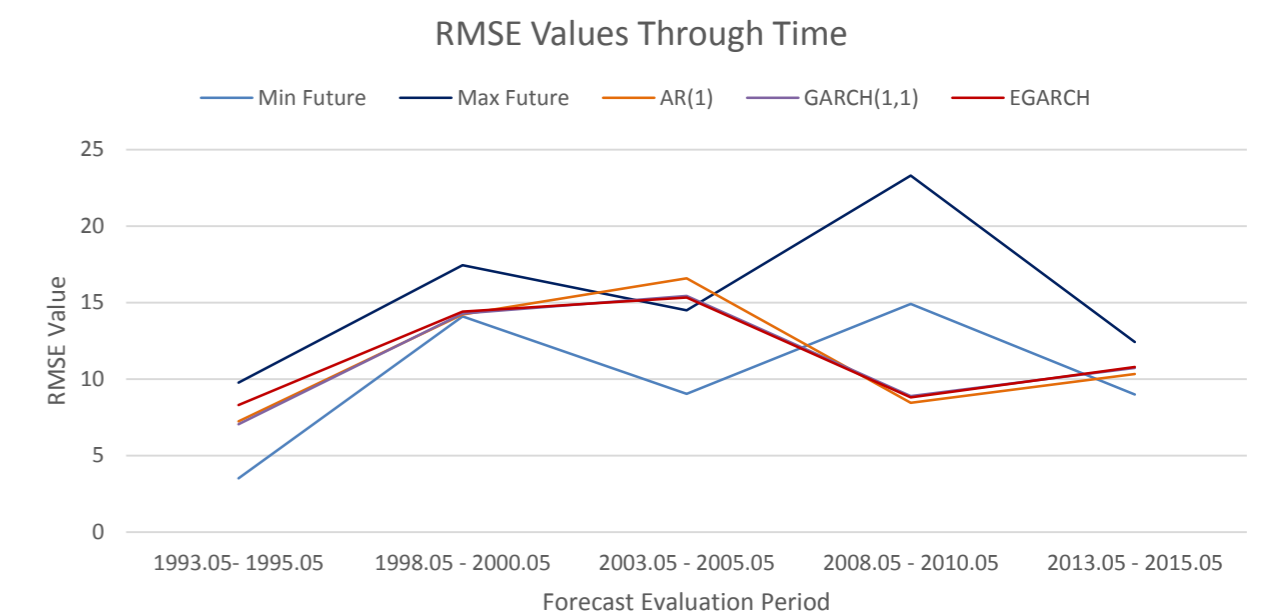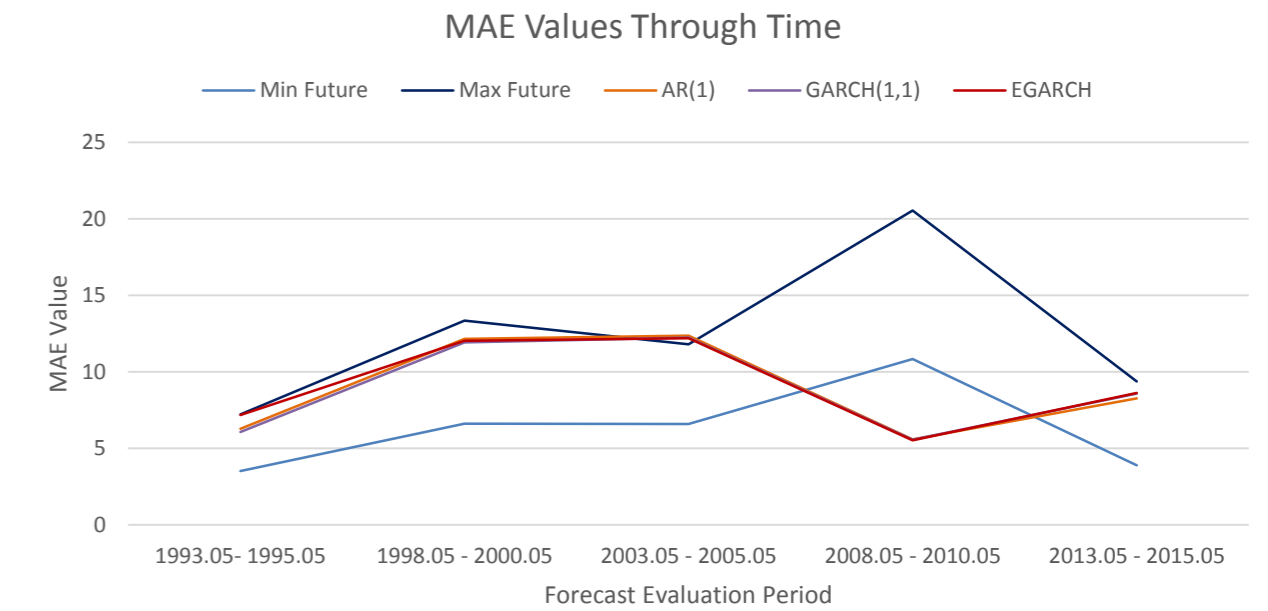
Motivations

- Central banks assume oil price follows the futures curve when setting monthly estimates for GDP growth and inflation.
- There is a split in the literature as to whether this rationale is justified.
- The main body of published work that examines futures contracts as a means for price discovery has a significant bias toward the use of NYMEX futures as opposed to Brent.

Adapted from Nixon and Smith (2012)

Methodology

- Compare the forecasts of futures contracts with those generated by linear and nonlinear econometric models.
- Prediction accuracy is assessed over five, 24-month forecast evaluation periods for horizons of 1-12 months via RMSE and MAE.
- This is then compared with ARMA, GARCH(1,1) and EGARCH out-of-sample forecasts as well as that of a random-walk forecast.

Main Results

- The futures-based forecast is the superior performer.
- Futures as an entity in themselves are successful in minimising the error values in four out of the five evaluation periods considered.
- Only in P4 (2008.05 – 2010.05) was the futures forecast the worst predictor. This may be explained by the financial turmoil experienced during this period
- No futures horizon was the outright 'winner' although latter horizons up to ~2005 were superior relative to imminent horizons. Since 2008, more immediate horizons have performed better.
- A secondary analysis of the results it was observed that nonlinear models tend to outperform the linear.

Forecast	P1: MSPE (recorded value)	P2: MSPE (recorded value)	P3: MSPE (recorded value)	P4: MSPE (recorded value)	P5: MSPE (recorded value)
No-change	95.8072	432.6176	348.1895	329.1032	92.1655
F^1	0.5551 (53.1852)	0.4677 (202.3446)	0.5570 (193.9351)	0.6748 (222.0836)	0.8784 (80.9546)
F^2	0.7030 (67.3495)	0.5606 (242.5139)	0.5570 (193.9351)	1.1625 (382.5873)	0.8784 (80.9546)
F^3	0.6562 (62.8715)	0.6367 (275.4324)	0.5400 (188.0088)	1.0693 (351.9190)	1.5277 (140.7971)
F^4	0.9968 (95.4960)	0.5838 (252.5768)	0.6033 (210.0637)	1.3768 (453.1147)	1.0794 (99.4820)
F^5	0.9088 (87.0661)	0.7027 (304.0208)	0.3376 (117.5365)	1.5203 (500.3369)	1.6765 (154.5157)
F^6	0.5649 (54.1239)	0.4597 (198.8800)	0.2757 (96.0103)	1.8755 (617.2371)	1.5358 (141.5487)
F^7	0.6791 (65.0607)	0.6284 (271.8420)	0.5729 (199.4810)	1.2753 (419.6910)	1.1405 (105.1178)
F^8	0.7192 (68.8997)	0.5973 (258.4055)	0.4221 (146.9592)	1.6499 (542.9881)	1.0137 (93.4263)
F^9	0.6094 (58.3815)	0.5823 (251.8964)	0.4997 (174.0003)	1.3477 (443.5158)	0.8971 (82.6862)
F^{10}	120.2747 (11523.1868)	0.5455 (235.9957)	0.4503 (156.7763)	1.1933 (392.7103)	1.0060 (92.7150)
F^{11}	0.2687 (25.7389)	0.5022 (217.2447)	0.2343 (81.5664)	1.0370 (341.2776)	0.9705 (89.4508)
F^{12}	0.1285 (12.3097)	0.5498 (237.8625)	0.4614 (160.6635)	0.0578 (19.0076)	0.9195 (84.7483)

error   Futures forecast mean squared prediction relative to the no-change forecast.
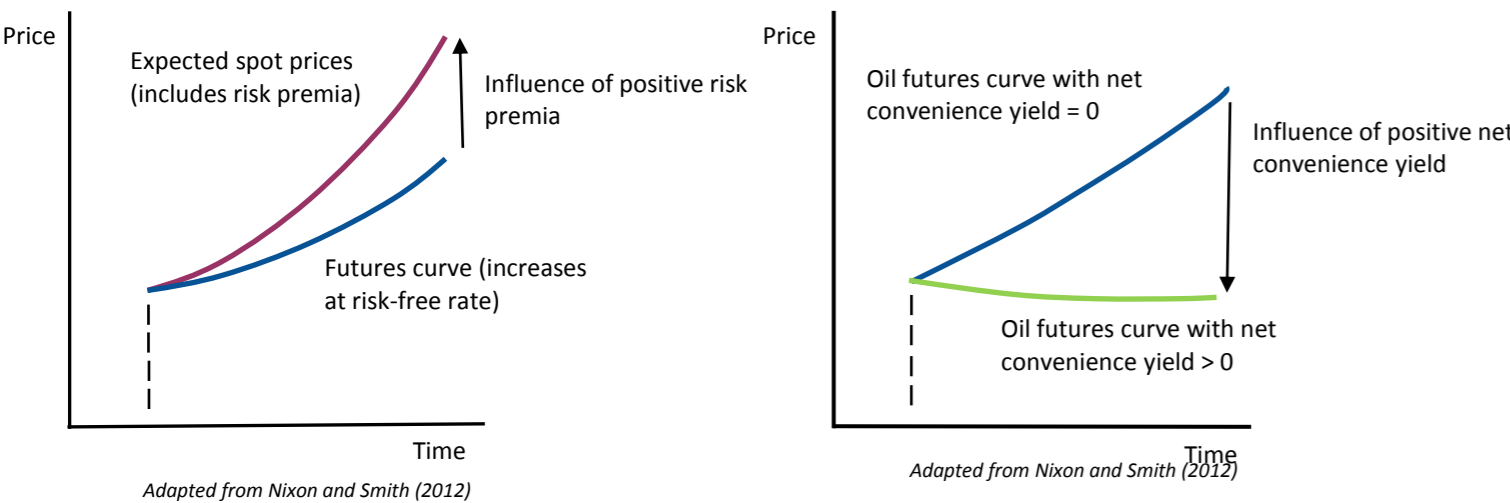

Conclusions

- The use of futures contracts as a means for price discovery is justified in terms of their simplicity and the inability for the econometric models considered to consistently outperform it.
- However, the linear and nonlinear models are simple.
- Furthermore, whether or not the improvements relative to a no-change forecast are statistically significant remains to be seen. Future research could test this via a Diebold-Mariano (1995) test.

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