Modelling of oil pricing

Note on TAC's methodology

December 2011

TAC
Applied Economic & Financial Research
www.tac-financial.com

Two approaches: short and medium term

- An analysis of oil prices(Brent prices) based on two different methodologies:
  - ***A medium and long-term modelling based on annual data and fundamental factors.*** *This approach relies on a theoretical background to determine the price of finite resources.*
  - ***A short-term modelling based on a « data mining » approach and monthly data.*** *This approach relies on an efficient statistical calibration in terms of advanced indicator of future dynamics.*

Modelling long-term oil prices

First Approach

- **A « structural » model projection in the medium-term.** This model provides yearly average prices of Brent, from a series of relations and economic determinants, without injecting any « political » variable or « dummy ».
- **Estimated over a relatively long period** (since the seventies) and using econometric techniques (using cointegration techniques).
- **Detecting regime changes or structural breaks** in the relationships between variables (Markov Switching models, Cusum tests,…).

Modelling long-term oil prices

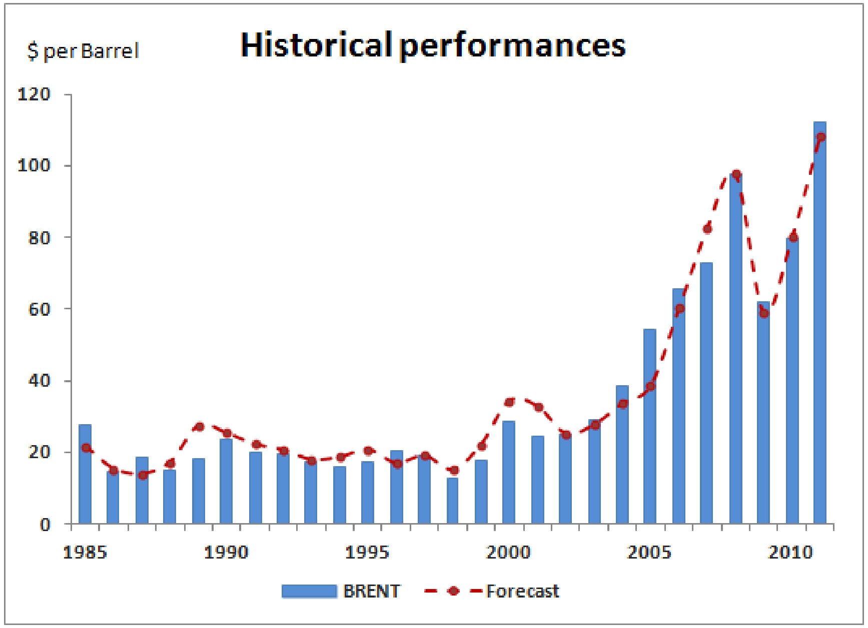
First Approach

- From a conceptual point of view, the model includes three groups of determinants of crude oil prices:
  - ***« Hotelling » variables:*** *a set of variables that captures, for each oil exporter, an optimal strategy of evolution of prices in the long-term depending on its « discount rate », or its degree of preference for present. This discount rate depends on the relationship between proven reserves and the country's population.*
  - ***« Adelman » variables****: a set of variables that captures the substitution effects between energy sources based on prices, and the effects on energy efficiency of economic growth.*
  - ***Business cycle variables:*** *more traditional indicators of economic trends in the global economy (GDP, inflation, interest rates..).*

Modelling long-term oil prices

First Approach

- Excellent performances of the model, even during the most turbulent periods (sharp increase in 2008) or apparent structural breakdown (between 1995 and 2000).
- The average Brent price forecasts are compiled on the basis of a global economic scenario set up by TAC.



	Forecast (1 year in advance)	Observed Average Price
2006	66$	65$
2007	70$	72$
2008	82$	97$
2009	55$	62$
2010	74$	80$

Modelling short-term oil prices

Second Approach

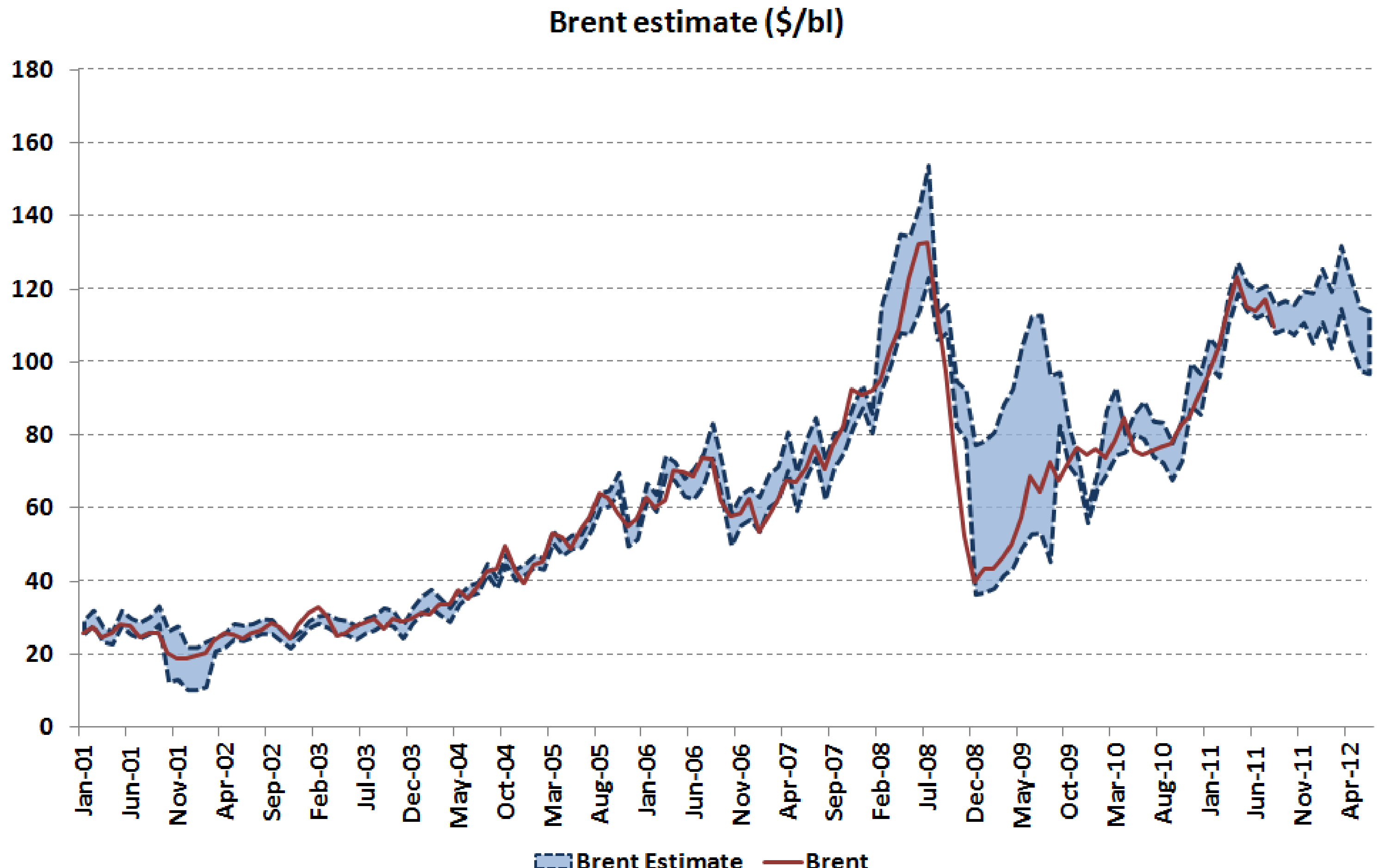
- Purely quantitative goal of the best forecast in the short-term (from 1 to 12 months).
- Fundamental variables combined with market variables (emerging and OECD consumption, stocks, financial tensions, change, recent dynamics,…).
- IEA monthly data since 2000.

Modelling short-term oil prices

Second Approach

- Combine several data mining models: SVM, Recursive Partitioning, Neural Networks, Self Organizing Maps, Random Forest, …
- Each model is estimated over 12 different forecast horizons (from 1 to 12 months) and dozens of times (bootstrapping similar to « sets » of neural networks).
- Forecasts are the result of a « vote » from hundreds of models.
- Models are updated monthly and provided under range of variation of future prices (<-15%, -15%-0, 0-15%, 15%-30%, 40%-50%, 50%-60%, >60%).

Modelling short-term oil prices



Source: TAC

TAC
Applied Economic & Financial Research

Contact us…

Thierry Apoteker
CEO

thierry.apoteker@tac-financial.com

Sylvain Barthélémy
Executive Director, Head of Research

sylvain.barthelemy@tac-financial.com

TAC sas

La Saigeais, 35140 Saint Hilaire des Landes, France

Tél: +33 (0)2 99 39 31 40

www.tac-financial.com

TAC
Applied Economic & Financial Research