

FORECAST OF BRENT OIL PRICE - A DELIBERATION ON USE OF FUTURES CONTRACTS OR/AND OF THE ECONOMETRIC MODELS FORECASTS

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Abstract

The oil price is an essential exogenous variable in the macroeconomic functionality model of a country, therefore the forecast for this variable is an important assumption in the forecast process. Given that most brands of oil are traded at stock exchange, a fast source of forecasts that has demonstrated its functionality in time are the futures contracts. The futures values for long term positions basically can be interpreted as forecasts of oil prices, which reflect the perception of market participants about future developments in line with the known details about the factors of influence. However, there are many opponents of the use of futures contracts long-term positions as forecasts, arguing that the econometric models provide more plausible forecasts, as they are based on historical developments and reflects the maximal correlation with factors influencing the concerned variable. In this paper it's presented three options for Brent oil price forecasting. It is also examined the idea of using combined forecasts, thus ensuring achievement of prognosis as accurate and which includes all the information possible.

Keywords: Brent, USD index, futures contracts, combined forecast

JEL Classification: C18, G13, E30

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1. Introduction

Given the importance of oil prices in providing macroeconomic policy, the accurately forecasting of oil prices is essential for policy makers (Manescu and Van Robays, 2014). Regardless of the level of participation of a country in the production of crude oil, in the consumption process are involved practically all the economies. Although, in the easiest way, the price of oil, as of any other commodities, represent the results of supply and demand counterbalancing, there are other influencing factors that are taken into account in the analysis and forecast of oil prices.

The oil extracted worldwide is not uniform in quality and, consequently, in price. Prices depend on the density, fractions, etc. The standard used for pricing is the Brent Crude oil type (hereinafter Brent), similar by composition with that extracted from the North Sea, and the supply contracts, which are concluded at London Stock Exchange. For a long time, Brent's price was by an average of USD 1 per barrel below the WTI (West Texas Intermediate or Texas light sweet) and by USD 1 per barrel above the price of the so-called "OPEC reference basket". However, in the recent years, this situation changed and the Brent is traded at a premium to WTI, the situation being mainly generated by the disruption of oil supplies from many regions to Europe and by the fill the import reserves with their own by The United States of America (National Bank of Moldova, Inflation Report no. 3, 2012). Another important oil brand is Dubai Fateh which is generally used in the pricing of crude oil exports from the Persian Gulf in Asian countries. Also, given the importance of OPEC (Organization of the Petroleum Exporting Countries), in the analysis and forecast is operating with "OPEC basket", which is an average for crude oil prices from OPEC countries.

As Brent is currently regarded as a world reference standard in determining oil prices, so therefore it is monitored and predicted by many institutions such as central banks, ministries of economics and international organizations. For example, in several bulletins of international organizations, the forecast for oil price is reflected by Brent brand.

Given that most brands of oil are traded at stock exchange, a fast source of forecasts that has demonstrated its functionality in time are the futures contracts. The futures values for long term positions basically can be interpreted as forecasts of oil prices, which reflect the perception of market participants about future developments in line with the known details about the factors of influence.

However, there are many opponents of the use of futures contracts long-term positions as forecasts, arguing that the econometric models provide more plausible forecasts, as they are based on historical developments and reflects the maximal correlation with factors

influencing the concerned variable. Thus, in this paper is tried to draw a simple econometric model that reflects the Brent oil price trajectory.

Another option in forecasting oil price is assuming the forecast data of international organizations such as the International Monetary Fund, World Bank, OPEC etc. There are forecasts on oil prices at the country level. For example, for countries producing or/and exporting oil, the forecast of oil price is essential in estimating the government budget. For the smaller economies, which are net importers of oil derivatives, solution would be to analyse the forecasts of other organizations that are more thorough in this subject and know the particular details about what might happen on the oil market, which make their oil price forecasts to be more plausible.

A compromise in the forecast process is combined forecast. Thus, after the three methods listed above, at the final is developed a combined forecast, thus ensuring the achievement of expected values as accurate and which includes all the information possible.

This paper aims to present in a way more accessible, all the options that an analyst or a policy maker can use in the forecasting of a crucial external factor - the price of oil.

2. The use of long term positions of the futures contracts in Brent oil price forecasting process

The formula of the open macroeconomic model of most countries involves a significant dependence of the economic developments on the trajectory of the economic variables of international importance. Accordingly, any macroeconomic forecast at the national and international level is based on the assumptions of variables developments of the external macroeconomic environment, the accuracy of estimated values being crucial to obtain accurate forecasts and with a minimum deviation from the actual values. Among these variables, the following can be mentioned: the oil price, exchange rates for major currencies, international commodities prices, stock indexes, shares value, etc. An advantageous option in the forecasting process is the use of forecasted values for the variables listed above on futures contracts (National Bank of Moldova, Inflation Report no. 4, 2013).

Futures contracts are standardized contracts between two parties to buy or sell a specified asset of standardized quantity and quality for a price agreed upon today (the futures price or the strike price), with delivery and payment occurring at a specified future date (the delivery date). The contracts are traded on stock exchanges, which act as an intermediary between the two parties. Therefore, besides the name of the asset it is often indicated the stock exchange where the asset is quoted, for example ICE Brent Crude Oil - price in USD per barrel of

Brent oil (see Box.1 of Inflation Report no. 3, 2012) quoted on the electronic platform Intercontinental Exchange or CBOT Wheat - price in cents (U.S.) for a bushel of wheat listed on the Chicago Board of Trade. In many cases, the underlying asset to a futures contract may not be traditional commodities, but financial assets, the underlying element being any financial instrument (currency, bonds). The underlying asset can be an intangible asset or reference asset, such as indexes or interest rates (National Bank of Moldova, Inflation Report no. 4, 2013).

When developing macroeconomic forecasts, the need to resort to futures contracts is essential, the primary element being the relatively high frequency of reflection of the listed asset's response to its factors of influence, i.e. every minute during the working day of the stock exchange concerned. The difference with which the indexes of different stock exchanges reflect the change in the action of factors of influence is due the time zone. Thus, it is unnecessary to develop a macroeconomic model for the forecast of oil, metals, grains prices, etc., given that the futures contracts for those assets reflect last-minute changes of supply and demand for those assets. At the same time, in order to obtain comparable forecasts in the future, it is necessary to maintain in the forecast model a certain frequency of use of the futures contracts values (National Bank of Moldova, Inflation Report no. 4, 2013).

There are also disadvantages using long term positions values of futures contracts as forecast data. One is the speculative element that dominates at stock exchanges and which most of time has nothing to do with the evolution of the commodity quoted. Also, a disadvantage is that in the moment of liquidation of certain positions also are recorded fluctuations, which often are strange to the commodity price development. Another argument in detriment of using futures prices as forecasts, is that isn't taken into account history of commodity price evolution, as in the econometric models, thus being omitted many aspects of correlations between factors.

In this analysis, is tried to framing within a short-term forecast, assuming the knowing of historical data till September 2014, and the Brent oil price forecast will be done for the period October - December 2014 by the following principle:

$$Y_t = X_t,$$

where: Y_t – Brent oil price forecast

X_t – the futures contract value for the t month at the end of the $t-1$ month.

The results are in the table 1.

Table no.1: Brent oil price forecast for the period October - December 2014 based on the futures contract close value on 30 September 2014

Period (t)	Y_t
October 2014	94.16
November 2014	94.16
December 2014	94.79

Source: author calculations

To illustrate the evolution of futures contracts values in chart 1 are shown values at the close time of the stock exchange in the last working days of the months from July to September 2014 for the Brent oil price. From the graph it is observed that with the increase / decrease in spot prices, increase / decrease significantly the values for futures contracts for a period of about six months, while the values of futures contracts for longer periods practically reflect no major changes and it is due to reduced long-term risk premium. It also should not be overlooked that from one month to another Brent oil prices have changed significantly, which has an ambiguous interpretation. On the one hand, the situation in the oil market is fully reflected through futures contracts, but fast recording frequency of significant changes involves a high degree of uncertainty on the plausibility of these forecasts.

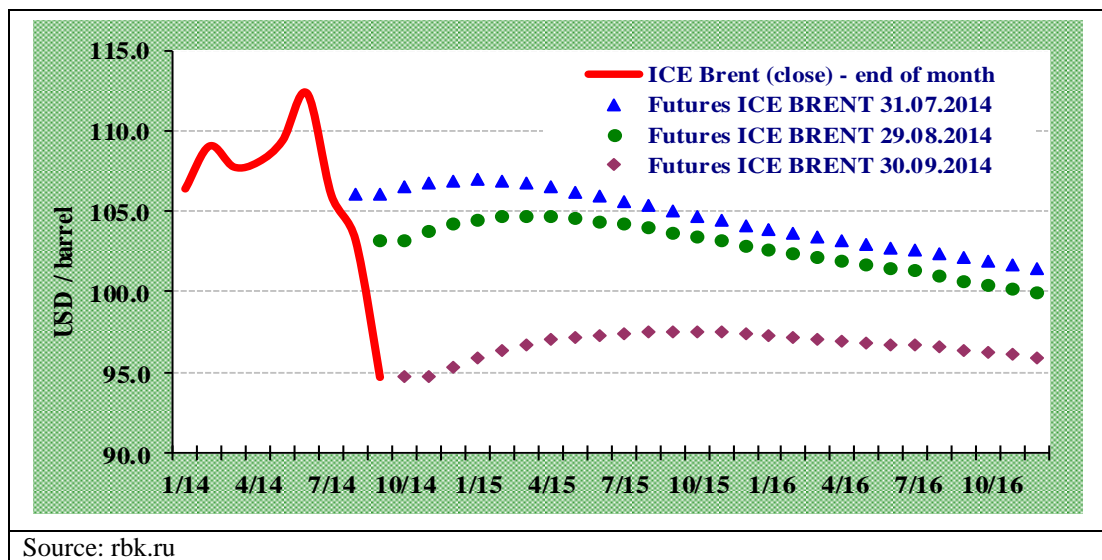


Figure 1. Change in ICE Brent Futures contract value.

However, in the most times is trying to omit the disadvantages of using futures contracts values, many organizations using them in the forecast process. They offer the last minute movements information about the market, which constantly maintain the forecasts actual. Over time Brent oil futures contracts showed an increased intensity of development in all positions, and along with other benefits, is a quick way of obtaining predictions for any user, regardless of knowledge in this particular subject.

3. Brent oil price forecast through econometric modeling

Forecasting based on econometric models is a more complex and somewhat unavailable to everyone. Besides knowledge of the development of econometric models, is required some knowledge about the market of analysed factor. Thus, to develop an econometric model to forecast the Brent oil price, in addition to detailed information about the oil market, in the most cases daily tracking movements in that market determines the modeler to understand the correlation between the factors in a more very deep position.

As mentioned, one of the reasons for forecast oil price based on econometric models is the value on information provided by historical data on the correlation between factors. Although the oil market is very volatile and the influence weight of factors often change, over time, the persistence of factors determined the landing indicators that should not be neglected in analysing and forecasting the oil price. Three basic factors are:

- **USD parity** – the price for the most commodities, including the Brent oil brand is set in US dollars. How ether, US dollar is another way of investment, it is logic the formed rules of the game for these two variables. The US dollar appreciation leads the decrease of Brent oil price, the explanation is attributed to the reduction in demand for the purchase of oil under conditions of decreasing attractiveness of this raw material in the detriment of US dollars. Respectively, vice versa, if the USD depreciate.
- **Oil Supply and oil demand** – in the economic theory the price is the result of counterbalancing of supply and demand. This principle occurs also in the case of oil. The excess on oil market determines the decrease of oil price and oil scarcity increases oil prices. The oil market is a regulated one, OPEC often intervening on the supply of oil to stabilize oil prices at a certain level.
- **Geopolitical tensions** - Geopolitical tensions is another factor of uncertainty in the oil market, especially in the case when these stresses occur in the vicinity of oil fields or near the place of sale (sea ports) and ways of transport (maritime

straits). In recent years, geopolitical tensions have intrigued the oil market, leading to increased oil prices. A special phenomenon is the gradual increase in oil prices in anticipation of an event (for example a particular conflict escalation) and at the time of the event, oil prices crippled react to it.

Factors listed above, form the initiation basis of an OLS econometric model:

$$Y_t = f(\text{USD, oil supply} - \text{oil demand, geopolitical risks})$$

Quantification of these factors is reflected in the following indicators:

- **USD Index** - an index on the USD against a basket of currencies (Japanese yen, British pound, Canadian dollar, Swedish krona and Swiss franc. Calculation method is based on the weighted mean.
- **Global supply of oil** - given the significant correlation between demand and supply of oil and in order to avoid multicollinearity in the econometric model, in this case we decided to use oil supply as a factor of influence.
- **OVX** – Oil volatility index – is an index that measures volatility in the oil market in terms of existing risks.

In the process of developing the model, we identified the presence of autocorrelation of second degree in the Brent time series of, which has led to the identification of a model OLS with autoregression elements:

$$\text{Brent} = c(1) + c(2) * \text{USD_index} + c(3) * \text{OIL_supply} + c(4) * \text{OVX}(-1) + c(5) * \text{OVX}(+1) + c(6) * \text{Brent}(-1) + c(7) * \text{Brent}(-2)$$

In correspondence with the available data, the model was developed for 57 observations (on monthly basis) for the period January 2010 - September 2014 and the results are included in table2.

Except for one indicator, all coefficients are statistically significant and the model parameters are relatively acceptable, allowing the forecast for the period October-December 2014.

Table no. 2. OLS model results

Dependent Variable: BRENT				
Method: Least Squares				
Date: 10/15/14 Time: 17:13				
Sample (adjusted): 2010M01 2014M09				
Included observations: 57 after adjustments				
BRENT=C(1)+C(2)*USD_INDEX+C(3)*OIL_SUPPLY+C(4)*OVX(-1) +C(5)*OVX(+1)+C(6)*BRENT(-1)+C(7)*BRENT(-2)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	2.654782	49.25848	0.053895	0.9572
C(2)	-0.921697	0.268808	-3.428826	0.0012
C(3)	1.047902	0.576122	1.818888	0.0749
C(4)	0.241232	0.109150	2.210096	0.0317
C(5)	-0.231245	0.106075	-2.180020	0.0340
C(6)	1.042073	0.128898	8.084488	0.0000
C(7)	-0.259612	0.121043	-2.144793	0.0369
R-squared	0.915171	Mean dependent var		103.4402
Adjusted R-squared	0.904992	S.D. dependent var		13.77414
S.E. of regression	4.245652	Akaike info criterion		5.844254
Sum squared resid	901.2780	Schwarz criterion		6.095155
Log likelihood	-159.5612	Hannan-Quinn criter.		5.941762
F-statistic	89.90405	Durbin-Watson stat		1.993188
Prob(F-statistic)	0.000000			

Source: calculations by EViews 7.0

Table no. 3. Brent oil price forecast for the period October - December 2014 based on the econometric model

Period (t)	Y _t
October 2014	98.67
November 2014	90.67
December 2014	81.54

Source: author calculations

4. Assuming forecast for Brent oil price

An option in forecasting oil price is the analysis of forecast data of international organizations such as the International Monetary Fund, World Bank, OPEC etc. There are forecasts on oil prices at the country level. For example, for countries producing and/or exporting oil, the forecast of oil price is essential in estimating the government budget. For the smaller economies, which are net importers of oil derivatives, solution would be to analyse the forecasts of other organizations that are more thorough in this subject and know the particular details about what might happen on the oil market, which make their oil price forecasts to be more plausible.

Recently, the International Monetary Fund has published a new report on the global economy development. Thus, in the World Economic Outlook from October 2014 stated that the average price for several brands of oil will be reduced in 2014 by an average of 1.3 percent compared with 2013 values. Knowing the Brent oil price for the first 9 months of 2014, and the average price for 2013, through the mathematical calculations the forecasted annual data can be distributed for finding monthly forecasted values for the period October-December 2014. Table 4 shows the results of this exercise, and can be observed that the trend are different from the two previous forecasts.

Table no. 4. Brent oil price forecast for the period October - December 2014 based on the distribution calculations of IMF forecasts for 2014

Period (t)	Y_t
October 2014	103.22
November 2014	109.12
December 2014	115.01

Source: author calculations

5. Combined forecast of Brent oil price

A compromise in the forecast process is combined forecast. Thus, after the three methods listed above, at the final is developed s combined forecast, thus ensuring the achievement of expected values as accurate and includes all the information possible. Combined forecast reduces the errors of the individual forecast and includes information known by several

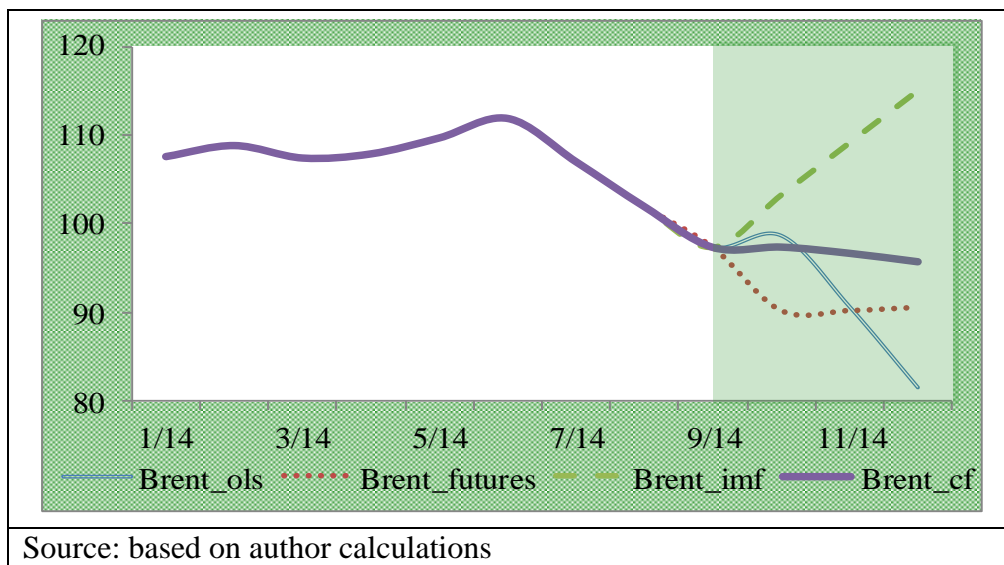
participants in the forecasting process. In our case, different forecast, provide differentiated value trajectories, respectively, thus obtaining an average for the forecast is a functional option.

Table no 5. Combined forecast for Brent oil price for the period October to December 2014

Period (t)	Y_t
October 2014	97.37
November 2014	96.66
December 2014	95.71

Source: author calculations

Also from the graph, we can see that not only short-term, but also long-term combination forecast provides a plausible average for Brent oil price forecast values.



Source: based on author calculations

Figure 2. Brent oil price different forecasts.

6. Conclusion

Forecasting models are numerous, as the errors that they may contain. Combination forecast is a good choice if we operate with several models that may be no enough significant

or contain certain deficiencies. However, the combined forecast sometimes eliminates the initial errors – these from the formulation of the model, which contains a degree of subjectivity of the author. In this paper was attempted to forecast Brent oil prices because oil is an external variable indispensable in the forecasting process related to macroeconomic policies models of an economy. Using futures contracts is a fast and convenient option. On the other hand forecast based on econometric models provide a stronger correlation between influence factors of oil prices. Also combined forecast, remains a compromise alternative, thus ensuring obtain plausible prognosis.

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