Forecasting the Price of Propylene

Commodity	Propylene (Spot CIF NW Europe)
Forecast Period	August 2017 – January 2018
Currency	£
Unit	Metric Tonne
Observations	Monthly forecasts of the spot price in the first day of the month

Forecasts

Observed Prices   **Forecasts**

680£
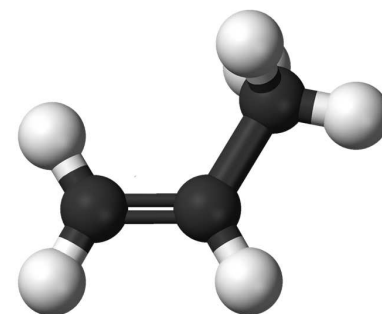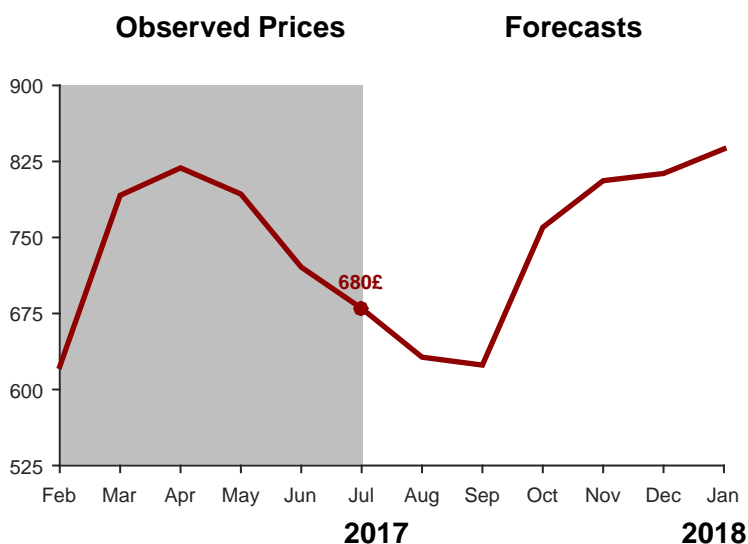
Month/Year	Forecast	Prob. of Raise
Aug. 2017	632£	17 %
Sep. 2017	624£	38 %
Oct. 2017	760£	55 %
Nov. 2017	806£	75 %
Dec. 2017	813£	56 %
Jan. 2018	837£	60 %

Suggested Action for Procurement

| Purchase Limit Month	Suggested Action
August 2017	Buy in August
September 2017	Wait
October 2017	Wait
November 2017	Wait
December 2017	Buy part of requirements
January 2018	Buy part of requirements

Forecasting the Price of Propylene

Impact Analysis: One Month Forecast
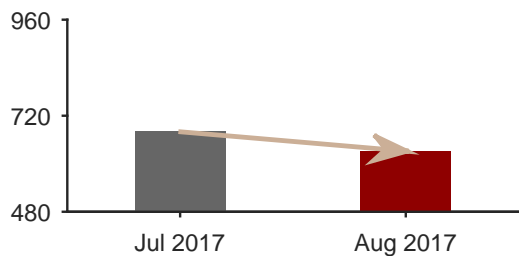
Our algorithm forecasts a lower price of Propylene in one month: it is expectable that the price decreases 7.07% from 680£ to 632£ until the beginning of August.
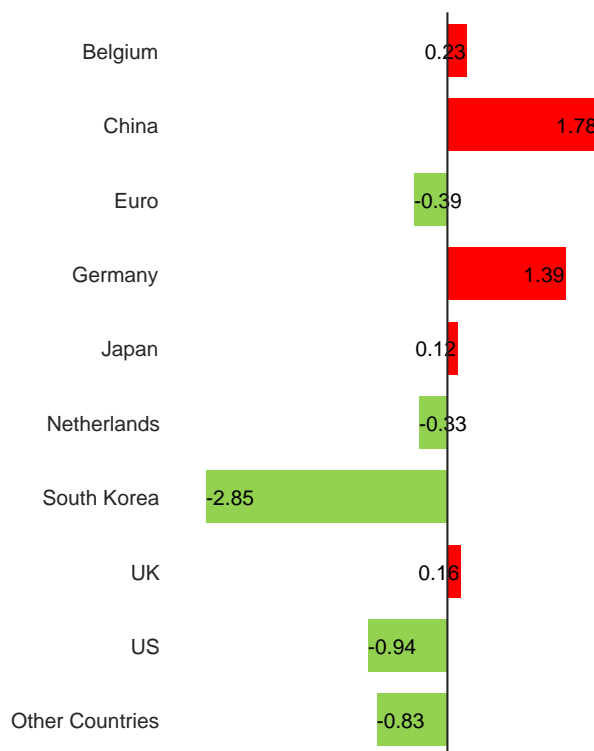
Indices of Factors
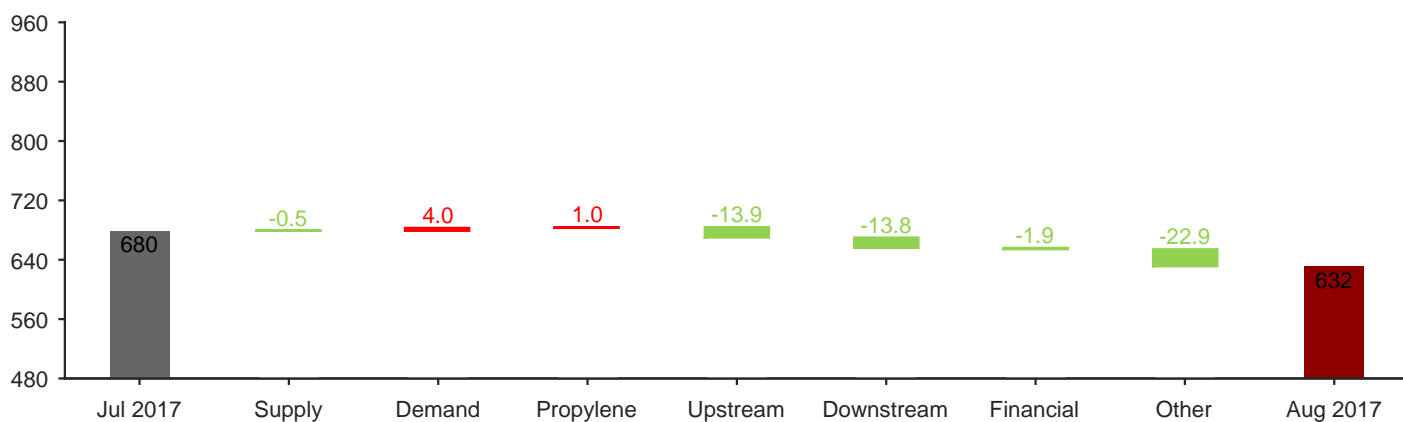
Interpretation

- Slight increase of Supply: Negative pressure of the Supply index
- **Increase of Demand**: Positive pressure of the Demand index
- Slightly positive pressure of the index of Propylene
- Negative pressure of the index of variables representing the market upstream
- Negative pressure of the index of variables representing the market downstream
- Slightly negative pressure of the financial index
- **Considerably negative pressure of other commodities and other factors**
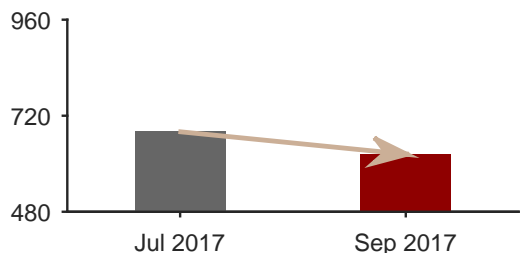- Focus on South Korea, Portugal, and China

Impact per Country

| Country	Value
Belgium	0.23
China	1.78
Euro	-0.39
Germany	1.39
Japan	0.12
Netherlands	-0.33
South Korea	-2.85
UK	0.16
US	-0.94
Other Countries	-0.83

Forecasting the Price of Propylene

Impact Analysis: Two Months Forecast

Our algorithm forecasts a lower price of Propylene in two months: it is expectable that the price decreases 8.22% from 680£ to 624£ until the beginning of September.
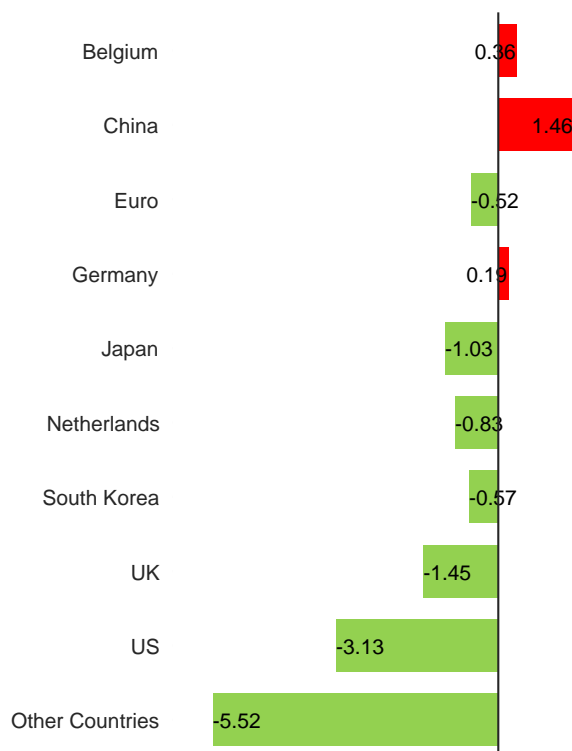
Indices of Factors
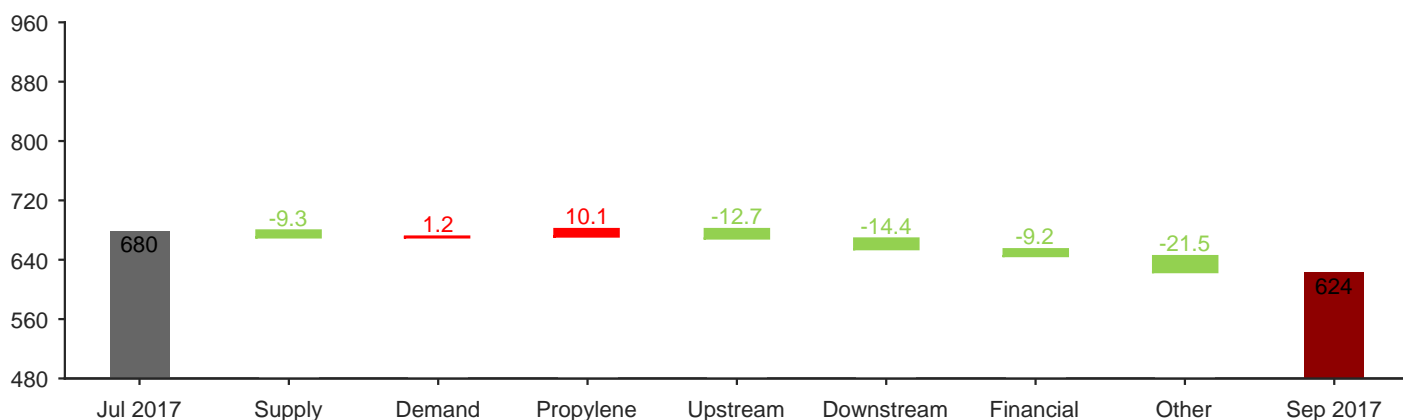
Interpretation

- **Increase of Supply**: Negative pressure of the Supply index

- Slight increase of Demand: Positive pressure of the Demand index

- Positive pressure of the index of Propylene

- Negative pressure of the index of variables representing the market upstream

- Negative pressure of the index of variables representing the market downstream

- Negative pressure of the financial index

- Negative pressure of other commodities and other factors

- Focus on Portugal, US, and France

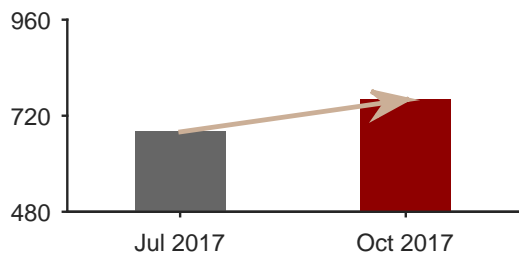### Impact per Country

| Country	Impact
Belgium	0.36
China	1.46
Euro	-0.52
Germany	0.19
Japan	-1.03
Netherlands	-0.83
South Korea	-0.57
UK	-1.45
US	-3.13
Other Countries	-5.52

Forecasting the Price of Propylene

Impact Analysis: Three Months Forecast

Our algorithm forecasts a higher price of Propylene in three months: it is expectable that the price increases 11.76% from 680£ to 760£ until the beginning of October.
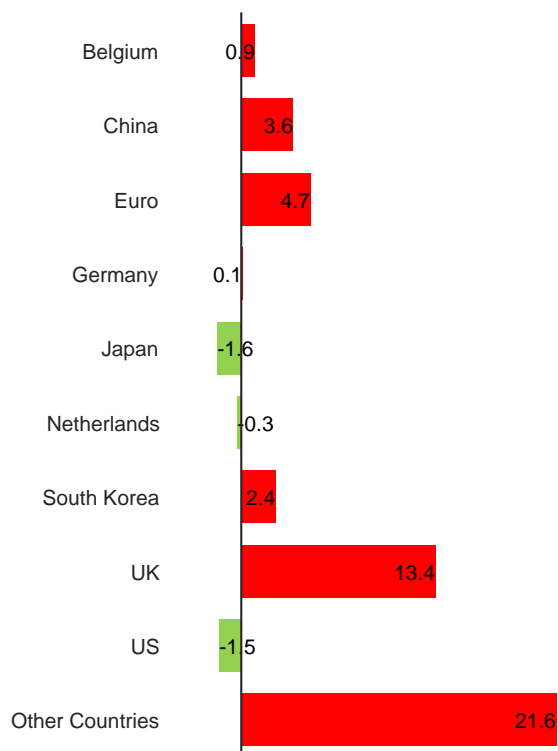
Indices of Factors
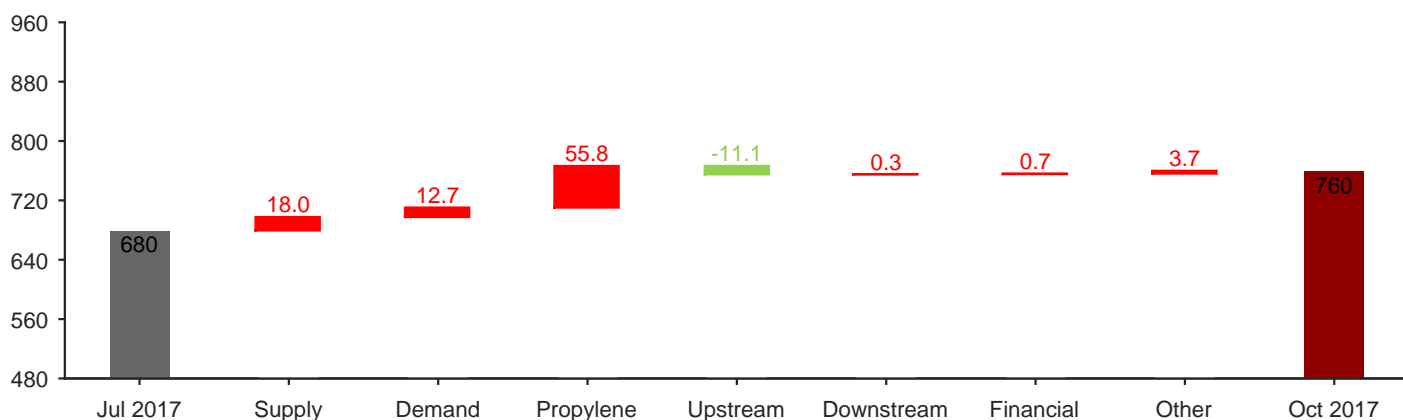
Interpretation

- **Decrease of Supply**: Positive pressure of the Supply index

- **Increase of Demand**: Positive pressure of the Demand index

- **Considerably positive pressure of the index of Propylene**

- Negative pressure of the index of variables representing the market upstream

- Slightly positive pressure of the index of variables representing the market downstream

- Slightly positive pressure of the financial index

- Positive pressure of other commodities and other factors
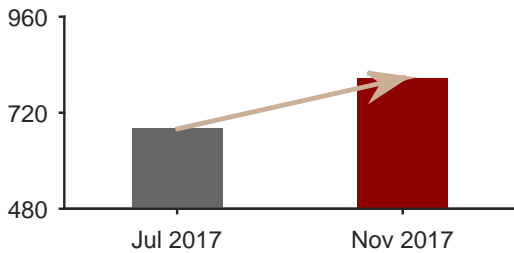
- Focus on UK, France, and Euro

Impact per Country

Forecasting the Price of Propylene

Impact Analysis: Four Months Forecast

Our algorithm forecasts a higher price of Propylene in four months: it is expectable that the price increases 18.53% from 680£ to 806£ until the beginning of November.

Indices of Factors
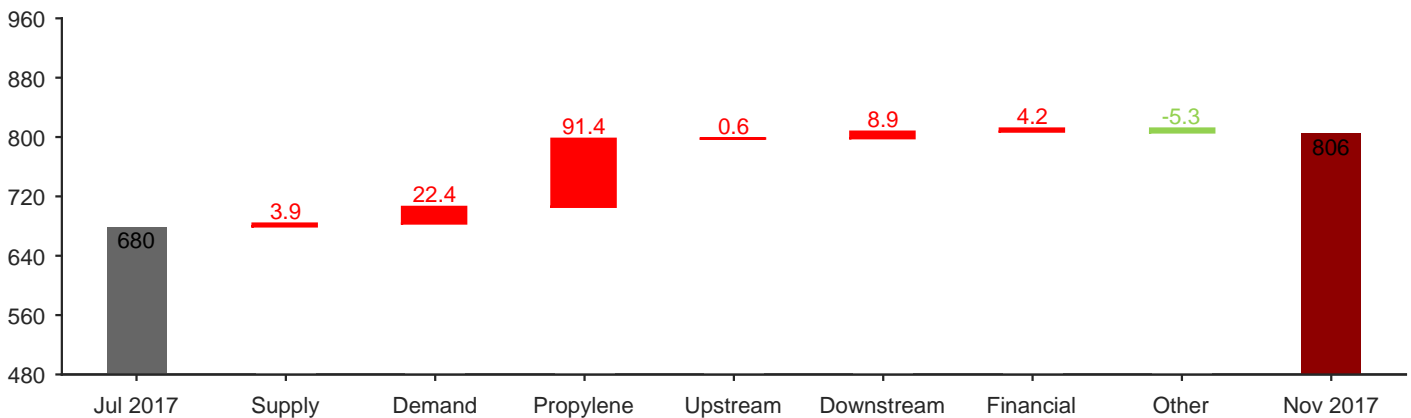
Interpretation

- Slight decrease of Supply: Positive pressure of the Supply index

- **Increase of Demand**: Positive pressure of the Demand index

- **Considerably positive pressure of the index of Propylene**

- Slightly positive pressure of the index of variables representing the market upstream

- Positive pressure of the index of variables representing the market downstream

- Slightly positive pressure of the financial index

- Negative pressure of other commodities and other factors

- Focus on Japan, Indonesia, and India

Impact per Country

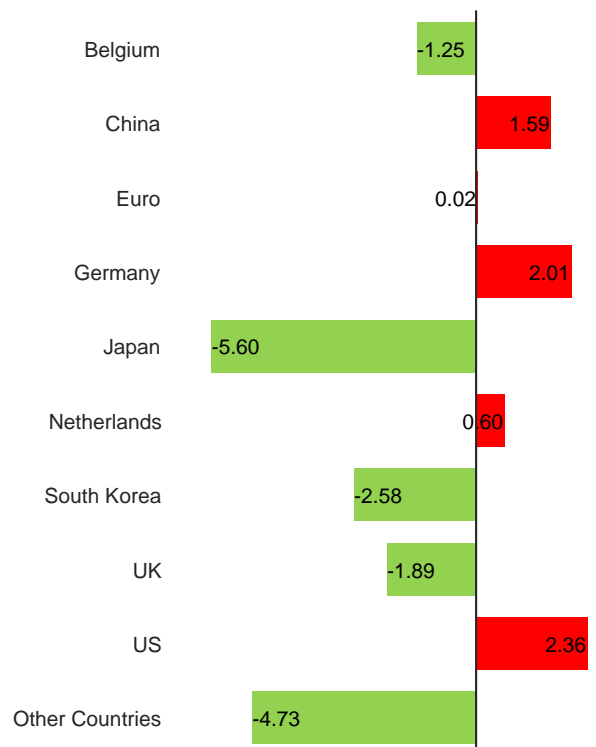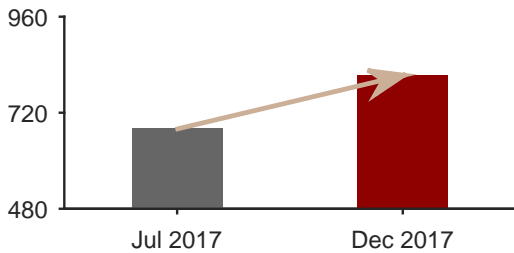| Country	Value
Belgium	-1.25
China	1.59
Euro	0.02
Germany	2.01
Japan	-5.60
Netherlands	0.60
South Korea	-2.58
UK	-1.89
US	2.36
Other Countries	-4.73

Forecasting the Price of Propylene

Impact Analysis: Five Months Forecast

Our algorithm forecasts a higher price of Propylene in five months: it is expectable that the price increases 19.57% from 680£ to 813£ until the beginning of December.

Indices of Factors
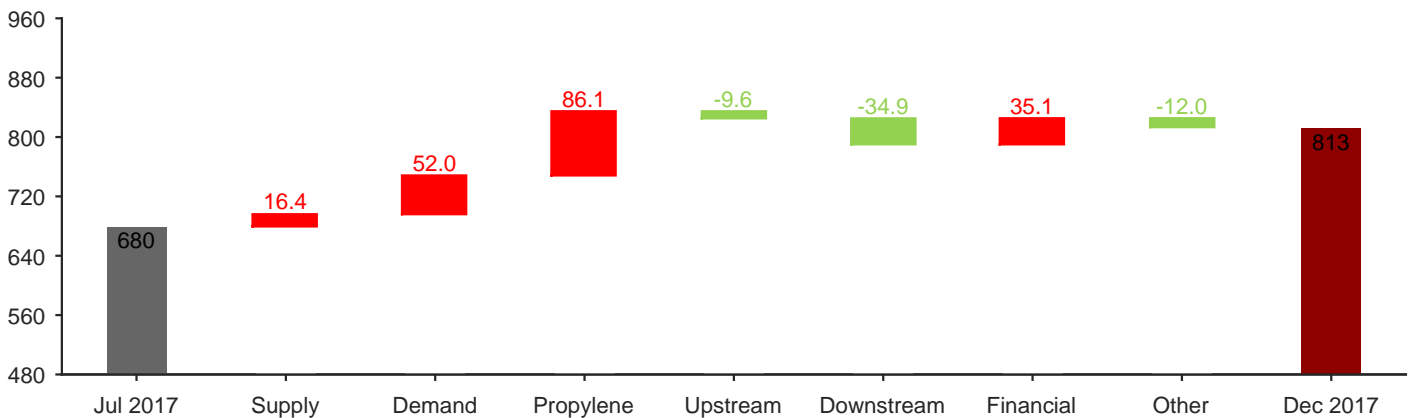
Interpretation

- **Decrease of Supply**: Positive pressure of the Supply index
- **Considerable increase of Demand**: Positive pressure of the Demand index
- **Considerably positive pressure of the index of Propylene**
- Negative pressure of the index of variables representing the market upstream
- Negative pressure of the index of variables representing the market downstream
- Positive pressure of the financial index
- Negative pressure of other commodities and other factors
- Focus on Euro, France, and Indonesia

Impact per Country

Forecasting the Price of Propylene

Impact Analysis: Six Months Forecast
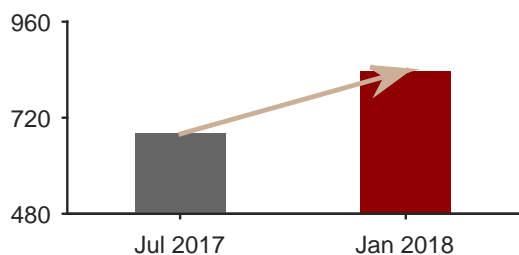
Our algorithm forecasts a higher price of Propylene in six months: it is expectable that the price increases 23.13% from 680£ to 837£ until the beginning of January.
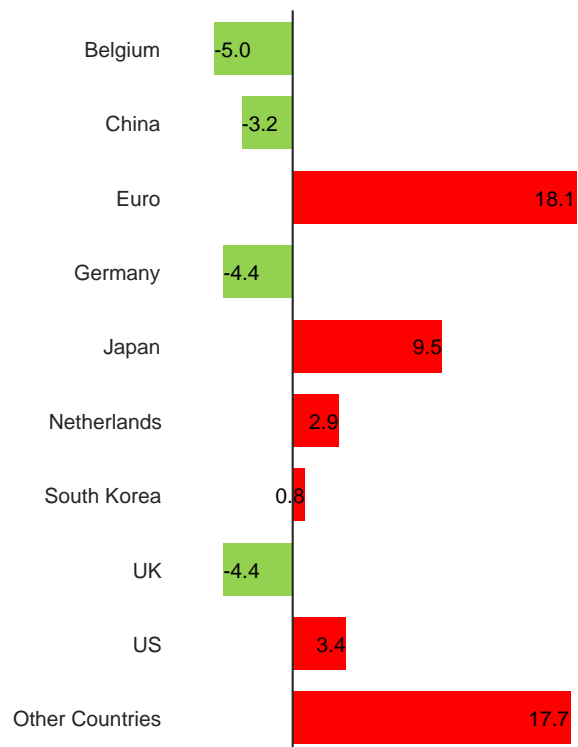
Indices of Factors
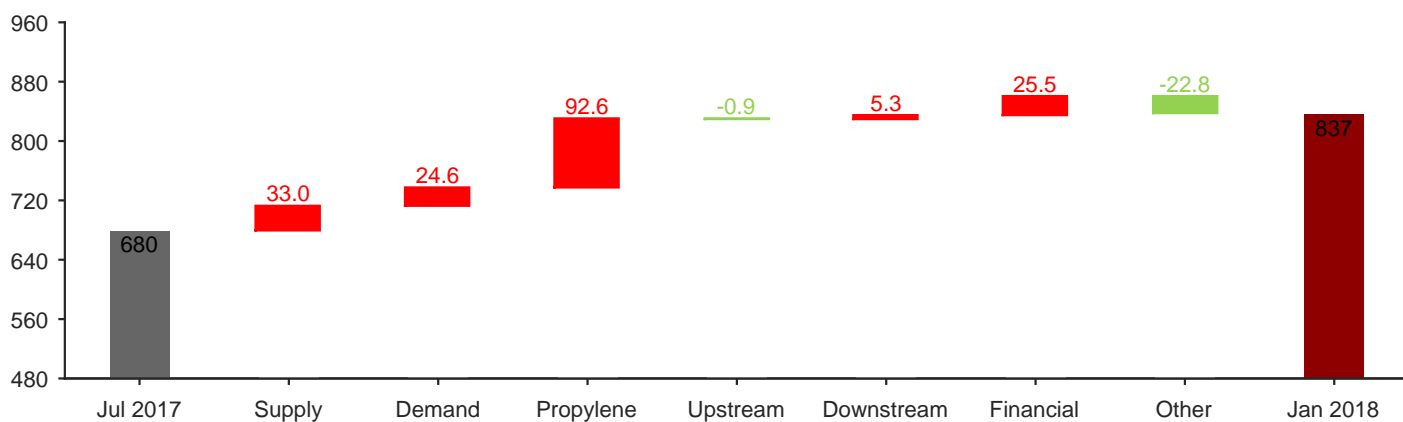
Interpretation

- **Decrease of Supply**: Positive pressure of the Supply index

- **Increase of Demand**: Positive pressure of the Demand index

- **Considerably positive pressure of the index of Propylene**

- Slightly negative pressure of the index of variables representing the market upstream

- Slightly positive pressure of the index of variables representing the market downstream

- Positive pressure of the financial index

- Negative pressure of other commodities and other factors

- Focus on Euro, US, and Indonesia

Impact per Country
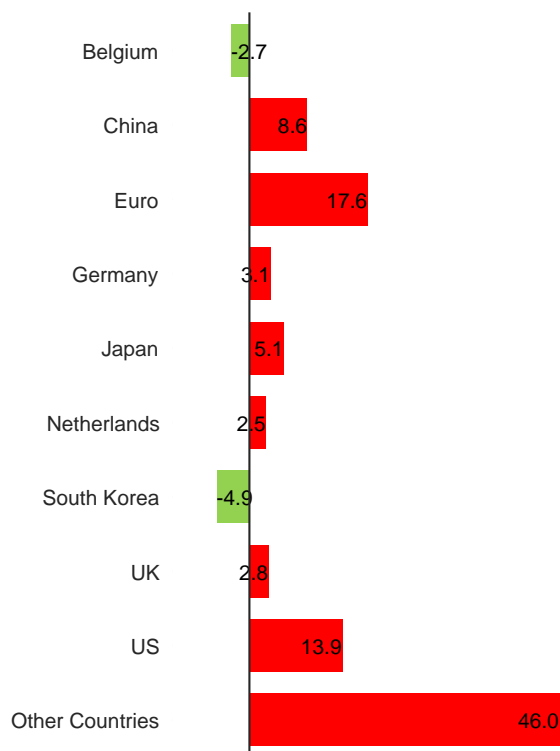
Forecasting the Price of Propylene

APPENDIX – Technical Explanation of the Impact Analysis

In this appendix, we explain the impact analysis of the factors that most contribute for our forecasts.

This Impact Analysis is conducted individually for **each time horizon**, allowing for a distinction between the indices of variables that contribute for our forecasts at short and medium run.

For each time horizon, our analysis has **two components**: first, we present the impact of variables grouped by **indices of factors**; second we present the impact of variables grouped by **indices of countries**.

Indices of Factors

Indices of factors are indices of the weighted contributions of the variables grouped in those factors.

Supply Index: composed of macroeconomic variables of the producing and exporting countries. It includes variables such as production, exchange rates, inflation, monetary policy, and wages. For example, an increase in wages implies higher production costs which should (in linear, general, and ceteris paribus terms) generate an incentive to increase prices;

Demand index: composed of macroeconomic variables of the consuming and importing countries. It includes variables such as production, exchange rates, inflation, monetary policy, and wages. For example, a decrease in a consumer confidence index should (in linear, general, and ceteris paribus terms) increase savings and decrease demand, leading to lower prices;

Propylene Index: composed of variables related to Propylene. It includes variables such as the price of Propylene in different regions of the world and exports, imports, and producer prices of Propylene in some countries. For example, an increase in the price of Propylene in other region may imply an increase in the price of Propylene in Europe due to arbitrage movements;

Upstream index: composed of variables related to Oil and Natural Gas. It includes variables such as the price and exports, imports, and producer prices of the inputs in some countries. For example, an increase in the price of Oil should (in linear, general, and ceteris paribus terms) generate an increase in the price of Propylene;

Forecasting the Price of Propylene

APPENDIX – Technical Explanation of the Impact Analysis (II)

Downstream index: composed of variables related to Polypropylene and downstream industries, such as Packaging. It includes variables such as the exports, imports, and producer prices of the Plastic Industry in some countries. For example, an increase in the demand of Plastic should (in linear, general, and ceteris paribus terms) generate an increase in the price of Propylene;

Financial Variables Index: composed of financial market variables. It includes the share price of companies that produce Propylene. It also includes financial indices related to this sector. For example, a positive change in the share price of a producer of Propylene should (in linear, general, and ceteris paribus terms) imply an increase in expected profitability of the firm. This may signal an expectation of increase in the price of Propylene;

Other Variables Index: composed of variables related to other monomers, such as Ethylene and Styrene. It includes the price, exports, and imports of these commodities. For example, a positive change in the price of a substitute commodity, should (in linear, general, and ceteris paribus terms) imply an increase of demand of Propylene, and thus, of the price of Propylene.

Indices of Countries

Indices of Countries: are indices of the weighted contributions of the macroeconomic variables of each country. The countries we present are the most relevant countries in the production, consumption, and international commerce of Propylene.

Interpretation Warning

It is important to note that the contribution of individual variables and indices of variables is not linear. The interaction between variables and between variables of different factors may not be neglectable, which means that the importance of each variable and indices of variables is determined together with the importance of all other variables.

Furthermore, the analysis of changes in variables is not linear. This means that the same variable with the same change in different moments of time may have different impacts given its previous evolution. For example, the algorithm contrasts the change in a variable with its expected change. A positive change but inferior to the expected change may originate an effect of price correction.