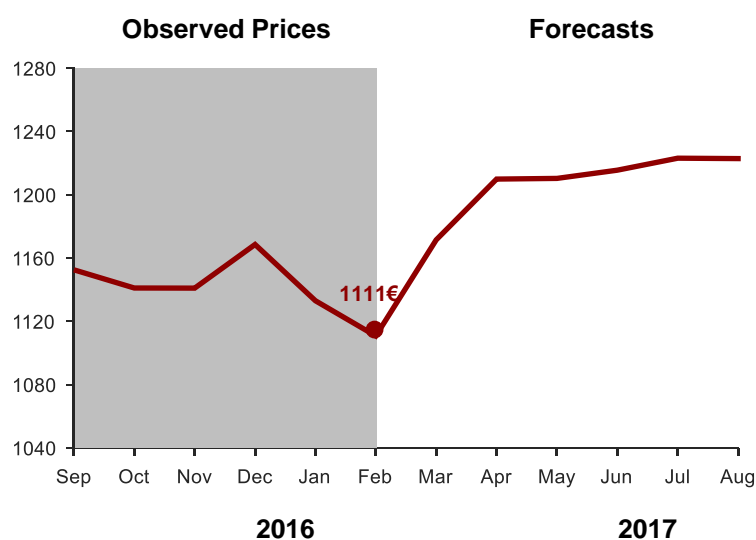


Forecasting the Price of HDPE Inj

Commodity	Polyethylene HDPE Inj. (Spot FOB NW Europe)
Forecast Period	March 2017 – August 2017
Currency	€
Unit	Kilogram
Observations	Monthly forecasts of the spot price in the first day of the month



Forecasts



Month/Year	Forecast	Prob. Of Raise
Mar. 2017	1171€	90%
Abr. 2017	1210€	93%
Mai. 2017	1210€	79%
Jun. 2017	1216€	69%
Jul. 2017	1223€	59%
Aug. 2017	1223€	56%

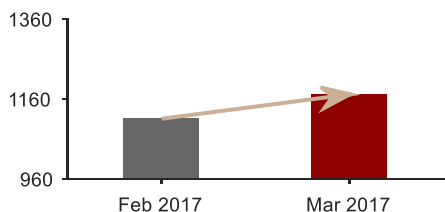
Suggested Action for Procurement

Purchase Limit Month	Suggested Action
March 2017	Buy in February at 1111€
April 2017	Buy in February at 1111€
May 2017	Buy in February at 1111€
June 2017	Buy in February at 1111€
July 2017	Buy in February at 1111€
August 2017	Buy in February at 1111€

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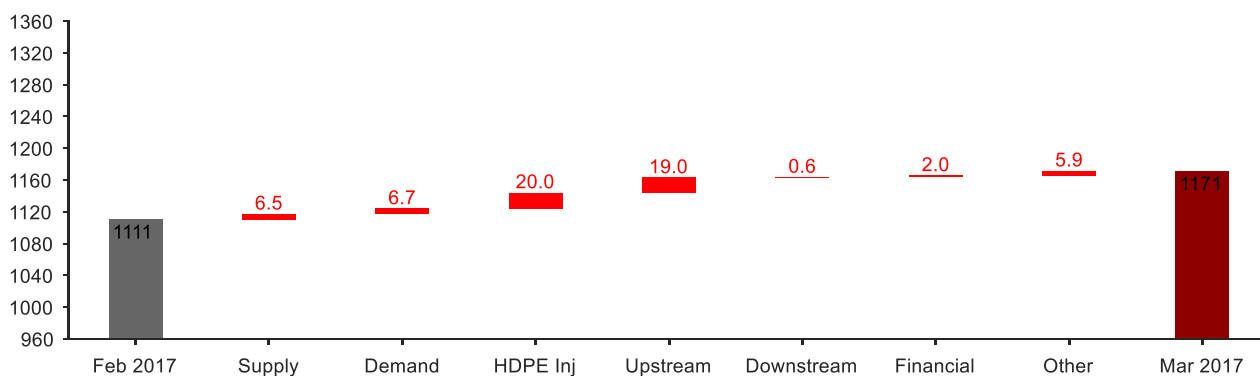
Forecasting the Price of HDPE Inj

Impact Analysis: One Month Forecast



Our algorithm forecasts a higher price of HDPE Inj in one month: it is expectable that the price increases 5,46% from 1111€ to 1171€ until the beginning of March.

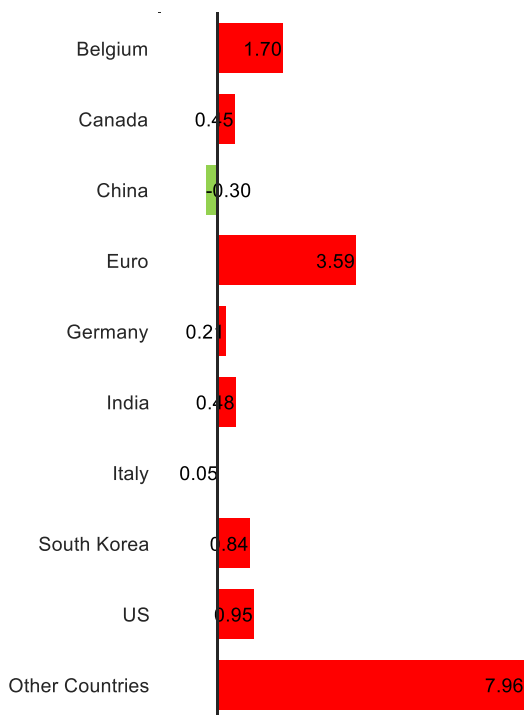
Indices of Factors



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 HDPE Inj**
- **Considerably positive 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, Euro, and Japan

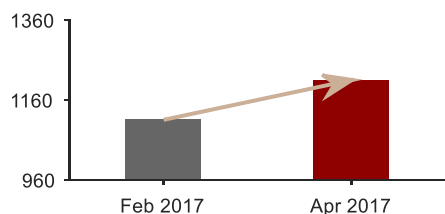
Impact per Country



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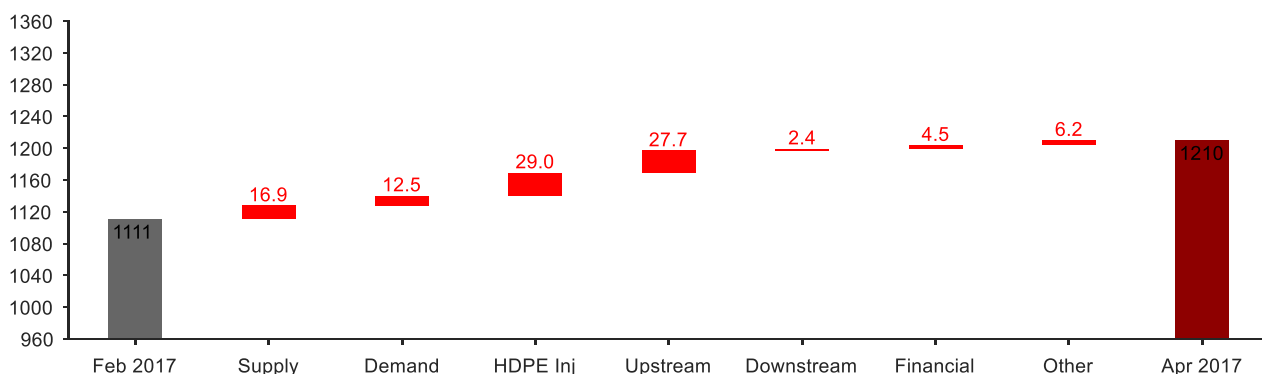
Forecasting the Price of HDPE Inj

Impact Analysis: Two Months Forecast



Our algorithm forecasts a higher price of HDPE Inj in two months: it is expectable that the price increases 8,92% from 1111€ to 1210€ until the beginning of April.

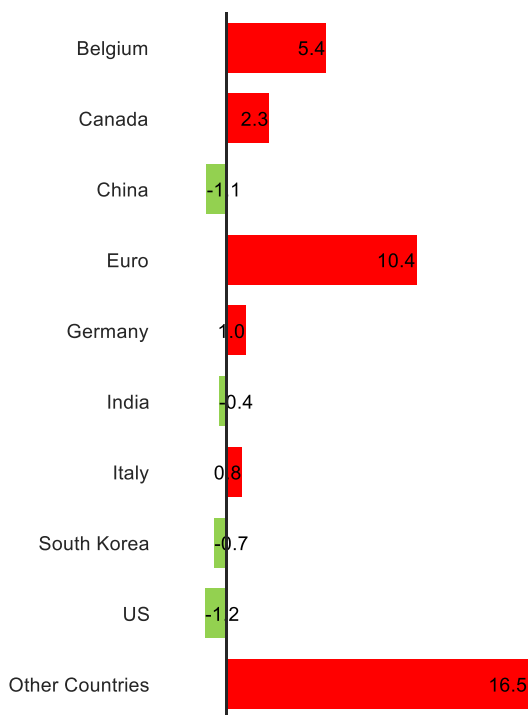
Indices of Factors



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 HDPE Inj**
- Positive 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
- Positive pressure of other commodities and other factors
- Focus on Euro, Japan, and Belgium

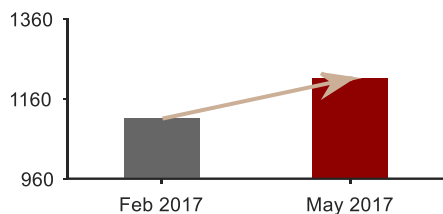
Impact per Country



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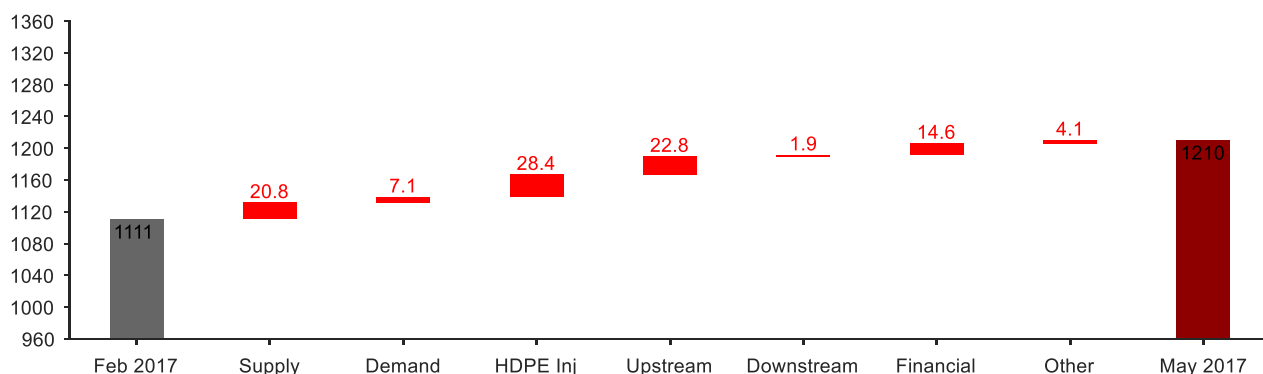
Forecasting the Price of HDPE Inj

Impact Analysis: Three Months Forecast



Our algorithm forecasts a higher price of HDPE Inj in three months: it is expectable that the price increases 8,96% from 1111€ to 1210€ until the beginning of May.

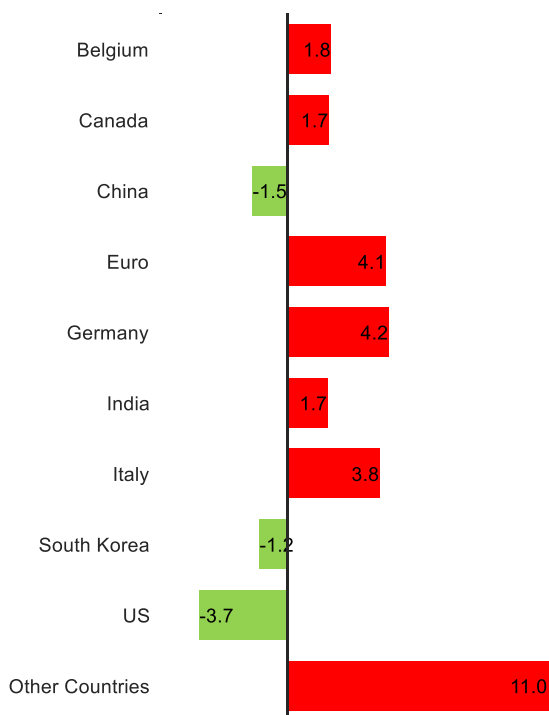
Indices of Factors



Interpretation

- **Decrease of Supply:** Positive pressure of the Supply index
- **Increase of Demand:** Positive pressure of the Demand index
- Positive pressure of the index of HDPE Inj
- Positive 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
- Positive pressure of other commodities and other factors
- Focus on Japan, Singapore, and Thailand

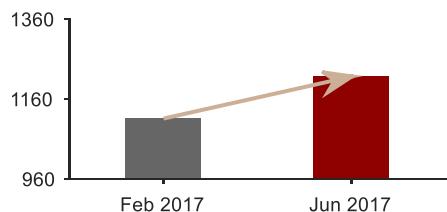
Impact per Country



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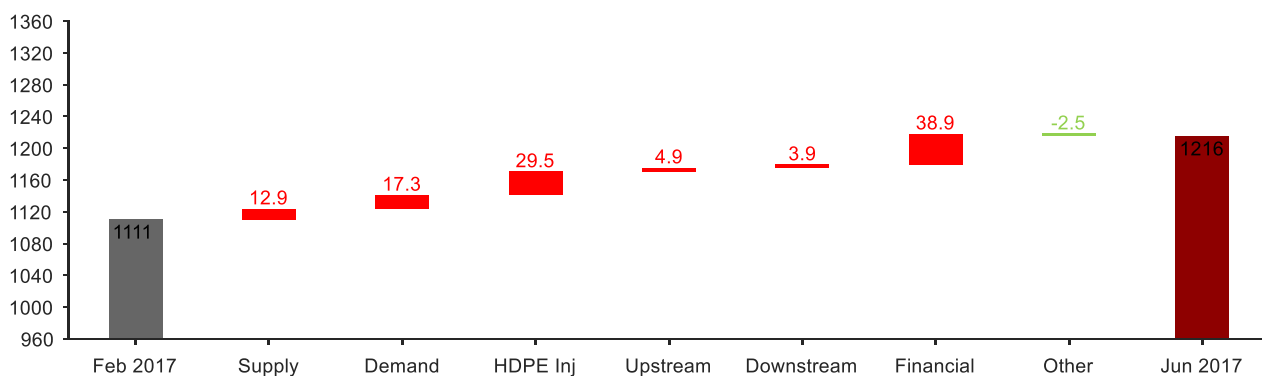
Forecasting the Price of HDPE Inj

Impact Analysis: Four Months Forecast



Our algorithm forecasts a higher price of HDPE Inj in four months: it is expectable that the price increases 9,43% from 1111€ to 1216€ until the beginning of June.

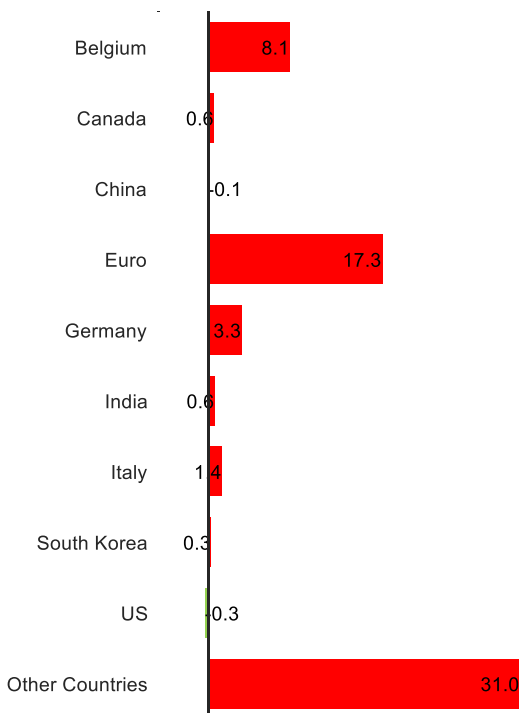
Indices of Factors



Interpretation

- **Decrease of Supply:** Positive pressure of the Supply index
- **Increase of Demand:** Positive pressure of the Demand index
- Positive pressure of the index of HDPE Inj
- Positive pressure of the index of variables representing the market upstream
- Slightly positive pressure of the index of variables representing the market downstream
- **Considerably positive pressure of the financial index**
- Slightly negative pressure of other commodities and other factors
- Focus on Euro, Japan, and Netherlands

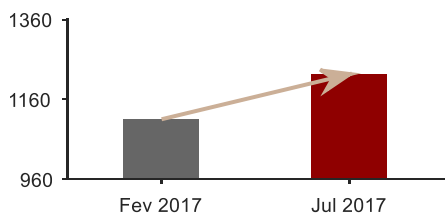
Impact per Country



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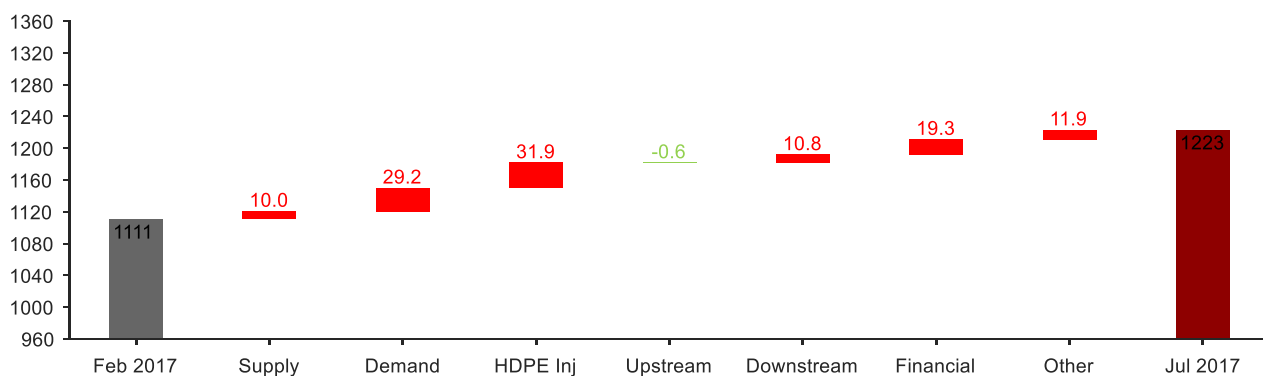
Forecasting the Price of HDPE Inj

Impact Analysis: Five Months Forecast



Our algorithm forecasts a higher price of HDPE Inj in five months: it is expectable that the price increases 10,11% from 1111€ to 1223€ until the beginning of July.

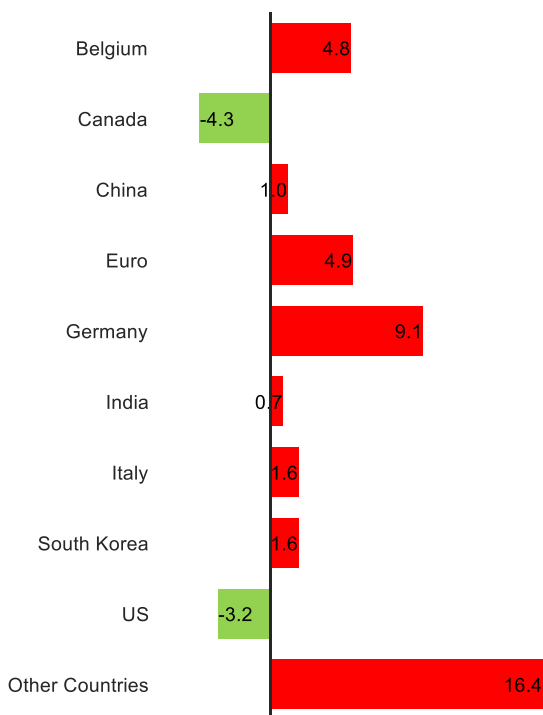
Indices of Factors



Interpretation

- **Decrease of Supply:** Positive pressure of the Supply index
- **Increase of Demand:** Positive pressure of the Demand index
- Positive pressure of the index of HDPE Inj
- Slightly negative pressure of the index of variables representing the market upstream
- Positive pressure of the index of variables representing the market downstream
- Positive pressure of the financial index
- Positive pressure of other commodities and other factors
- Focus on Japan, Mexico, and Netherlands

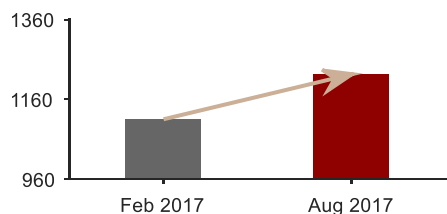
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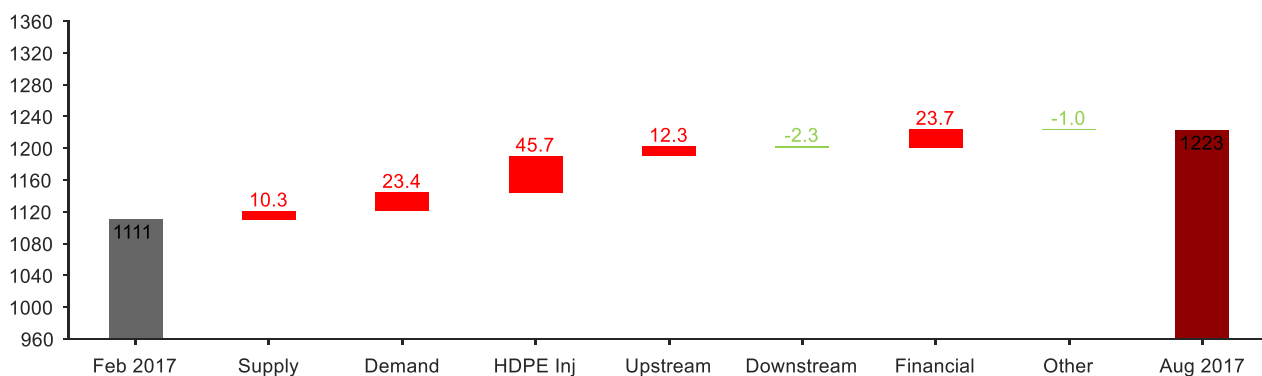
Forecasting the Price of HDPE Inj

Impact Analysis: Six Months Forecast



Our algorithm forecasts a higher price of HDPE Inj in six months: it is expectable that the price increases 10,09% from 1111€ to 1223€ until the beginning of August.

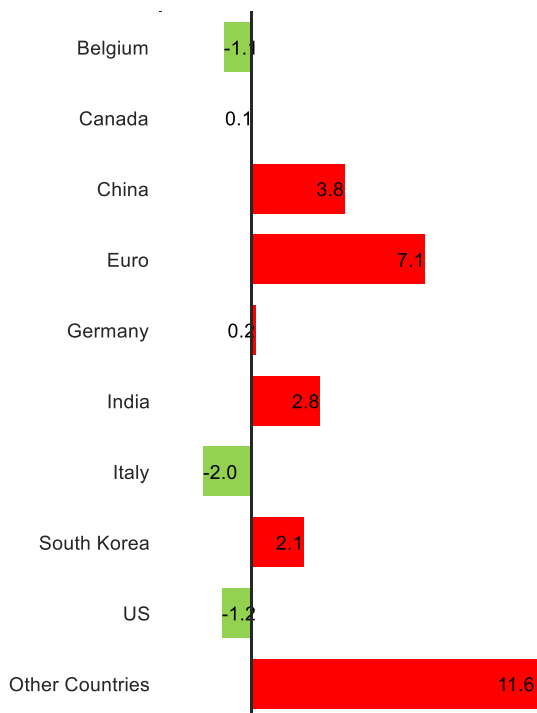
Indices of Factors



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 HDPE Inj**
- Positive pressure of the index of variables representing the market upstream
- Slightly negative pressure of the index of variables representing the market downstream
- Positive pressure of the financial index
- Slightly negative pressure of other commodities and other factors
- Focus on Japan, Netherlands, and UK

Impact per Country



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Forecasting the Price of HDPE Inj

APPENDIX I – 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;

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

Upstream index: composed of variables related to Ethylene, Ethane, Propane 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 Ethylene should (in linear, general, and *ceteris paribus* terms) generate an increase in the price of HDPE Inj;

Forecasting the Price of HDPE Inj

APPENDIX – Technical Explanation of the Impact Analysis

Downstream index: composed of variables related to 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 HDPE Inj;

Financial Variables Index: composed of financial market variables. It includes the share price of companies that produce HDPE Inj. It also includes financial indices related to this sector. For example, a positive change in the share price of a HDPE Inj producer 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 HDPE Inj;

Other Variables Index: composed of variables related to other commodities, such as Oil and other polymers. 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 HDPE Inj, and thus, of the price of HDPE Inj.

Country Indices

Country Indices 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 HDPE Inj.

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.