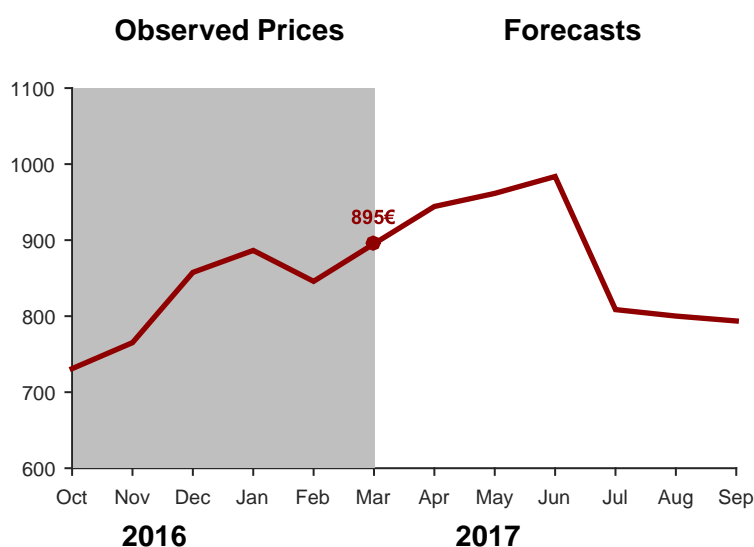


Forecasting the Price of PVC

Commodity	PVC (Spot FOB NW Europe)
Forecast Period	April 2017 – September 2017
Currency	€
Unit	Metric Tonne
Observations	Monthly forecasts of the spot price in the first day of the month



Forecasts



Month/Year	Forecast	Prob. of Raise
Apr. 2017	944€	90 %
May 2017	961€	75 %
Jun. 2017	984€	65 %
Jul. 2017	809€	44 %
Aug. 2017	800€	44 %
Sep. 2017	794€	42 %

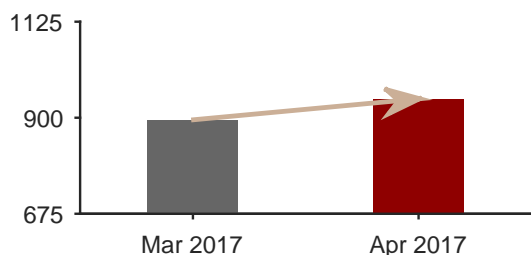
Suggested Action for Procurement

Purchase Limit Month	Suggested Action
April 2017	Buy in March at 895€
May 2017	Buy in March at 895€
June 2017	Buy in March at 895€
July 2017	Buy part of requirements
August 2017	Buy part of requirements
September 2017	Buy part of requirements

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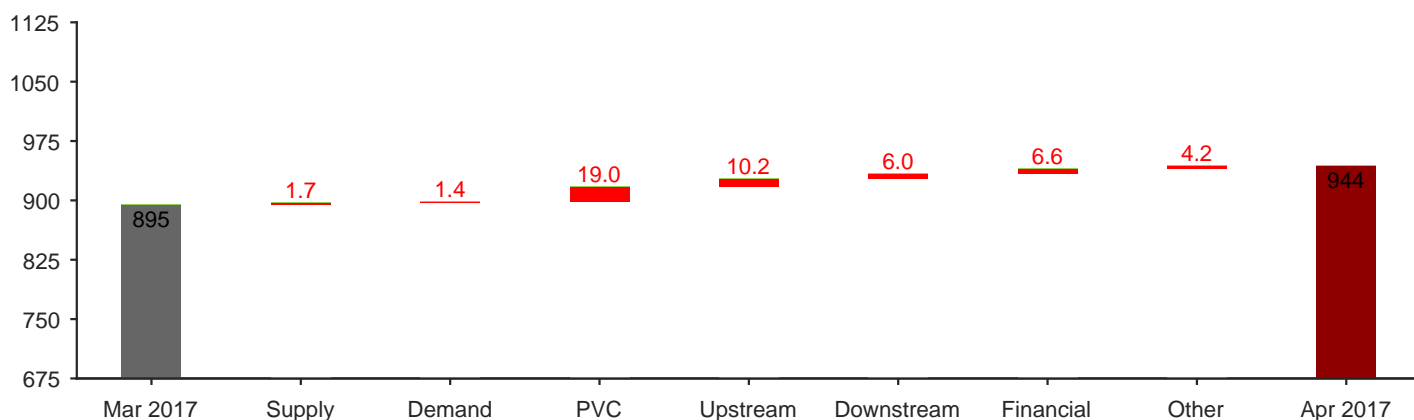
Forecasting the Price of PVC

Impact Analysis: One Month Forecast



Our algorithm forecasts a higher price of PVC in one month: it is expectable that the price increases 5.47% from 895€ to 944€ until the beginning of April.

Indices of Factors



Interpretation

- Slight decrease of Supply: Positive pressure of the Supply index
- Slight increase of Demand: Positive pressure of the Demand index
- **Considerably positive pressure of the index of PVC**
- Positive 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 South Korea, Italy, and Mexico

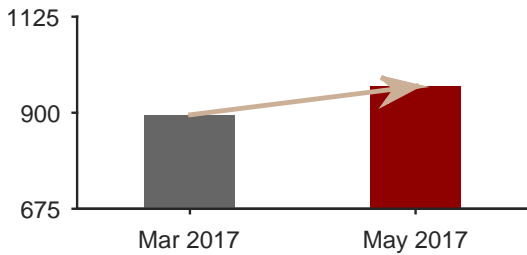
Impact per Country



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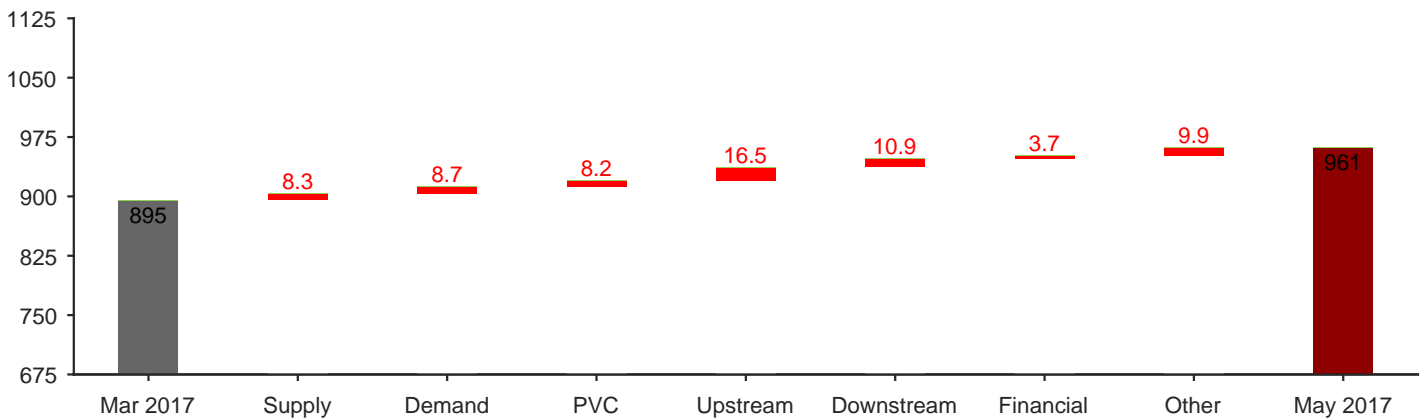
Forecasting the Price of PVC

Impact Analysis: Two Months Forecast



Our algorithm forecasts a higher price of PVC in two months: it is expectable that the price increases 7.40% from 895€ to 961€ until the beginning of May.

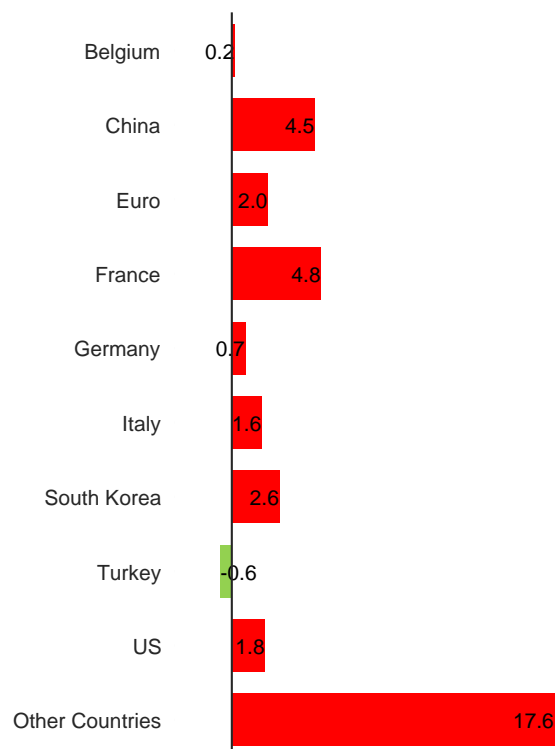
Indices of Factors



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 PVC
- Positive 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, France, and Mexico

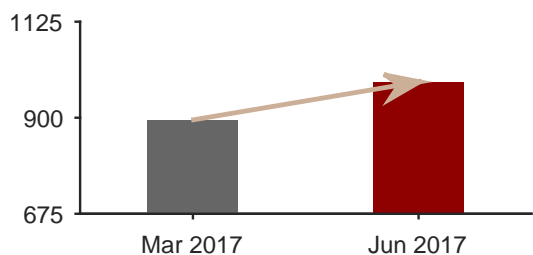
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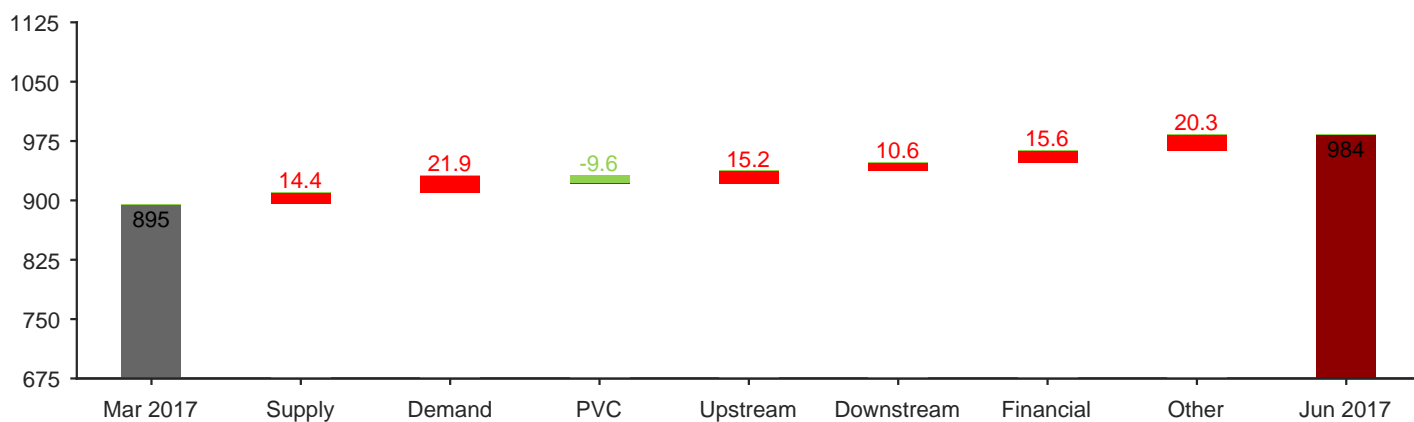
Forecasting the Price of PVC

Impact Analysis: Three Months Forecast



Our algorithm forecasts a higher price of PVC in three months: it is expectable that the price increases 9.87% from 895€ to 984€ until the beginning of June.

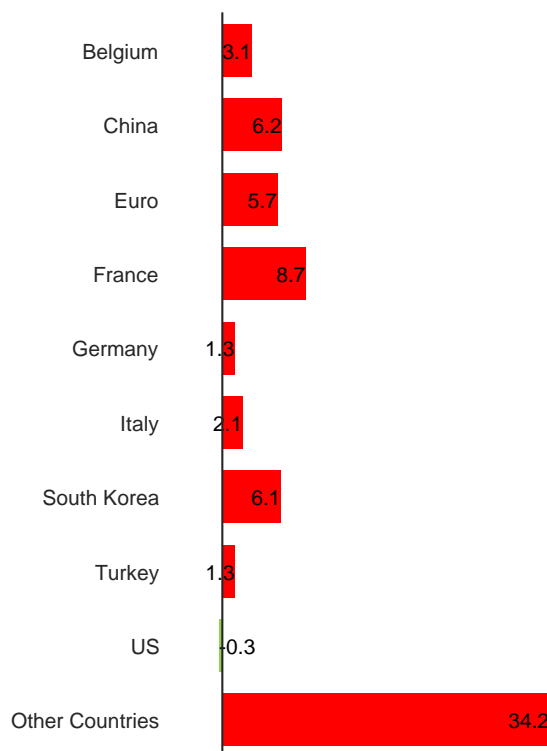
Indices of Factors



Interpretation

- **Decrease of Supply:** Positive pressure of the Supply index
- **Increase of Demand:** Positive pressure of the Demand index
- Negative pressure of the index of PVC
- Positive 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 Mexico, France, and Japan

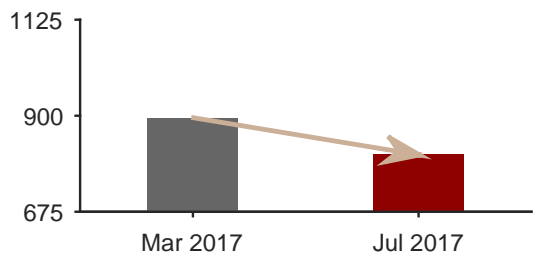
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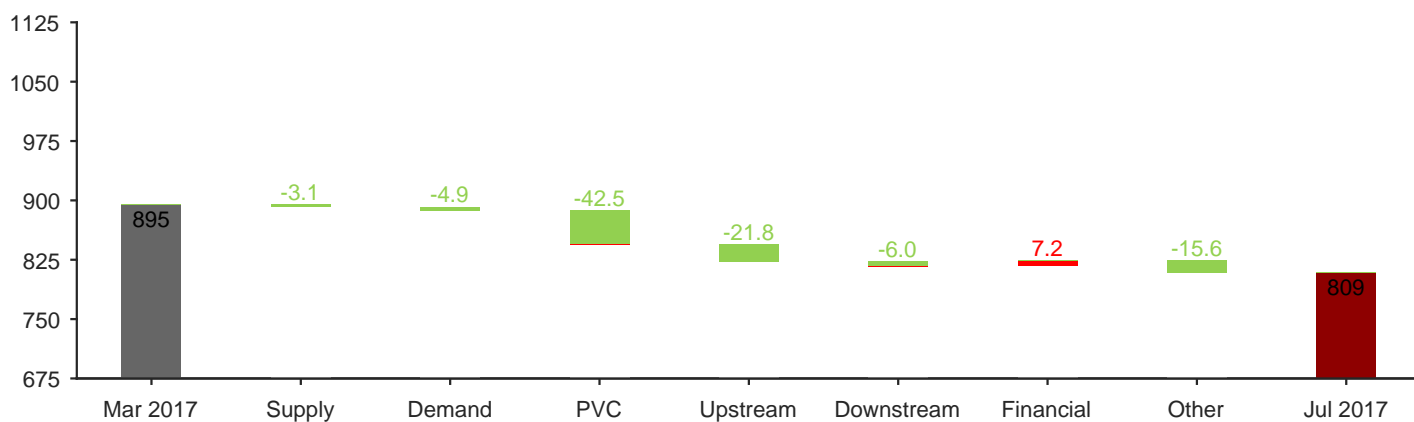
Forecasting the Price of PVC

Impact Analysis: Four Months Forecast



Our algorithm forecasts a lower price of PVC in four months: it is expectable that the price decreases 9.67% from 895€ to 809€ until the beginning of July.

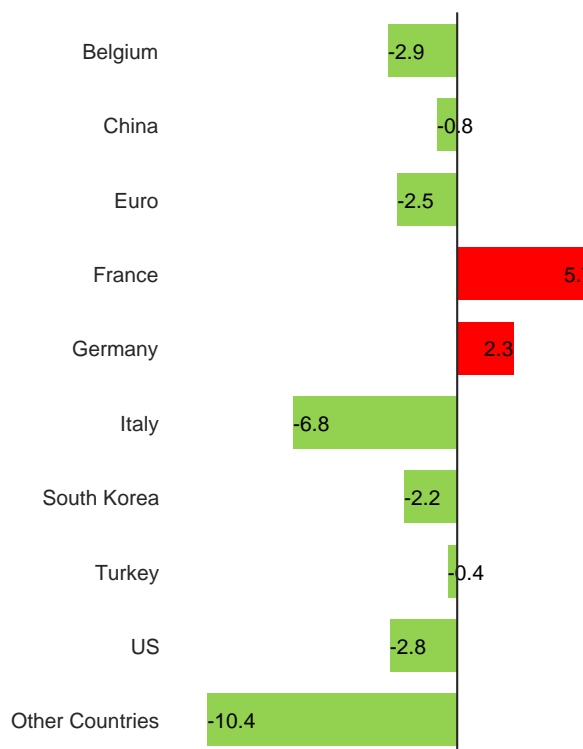
Indices of Factors



Interpretation

- Slight increase of Supply: Negative pressure of the Supply index
- **Decrease of Demand:** Negative pressure of the Demand index
- **Considerably negative pressure of the index of PVC**
- 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 Japan, Italy, and UK

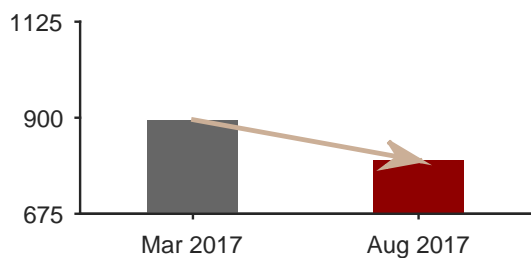
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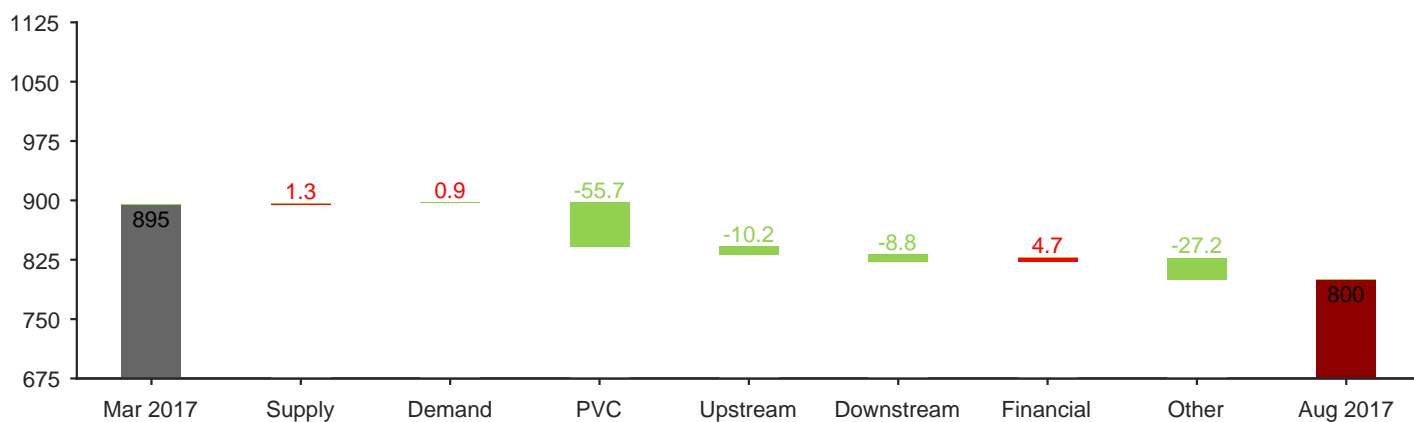
Forecasting the Price of PVC

Impact Analysis: Five Months Forecast



Our algorithm forecasts a lower price of PVC in five months: it is expectable that the price decreases 10.62% from 895€ to 800€ until the beginning of August.

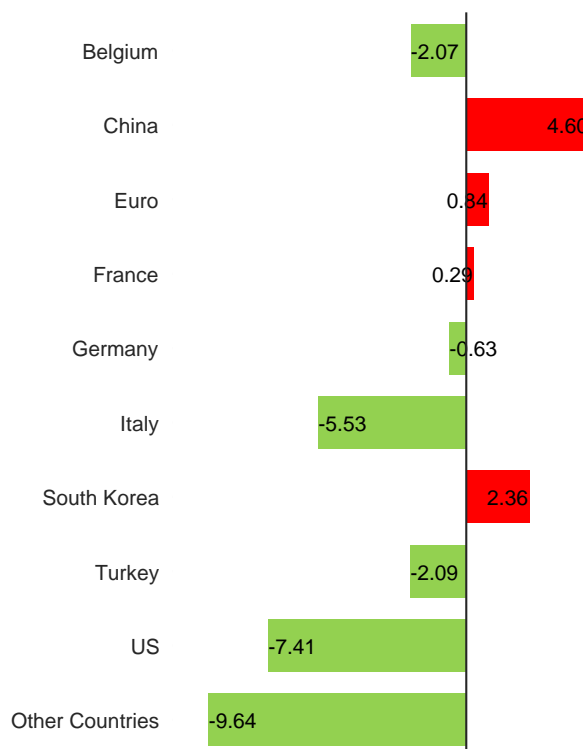
Indices of Factors



Interpretation

- Slight decrease of Supply: Positive pressure of the Supply index
- Slight increase of Demand: Positive pressure of the Demand index
- **Considerably negative pressure of the index of PVC**
- 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 UK, US, and Mexico

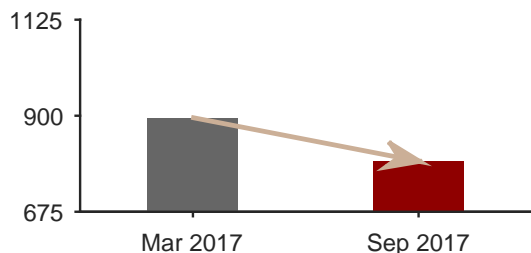
Impact per Country



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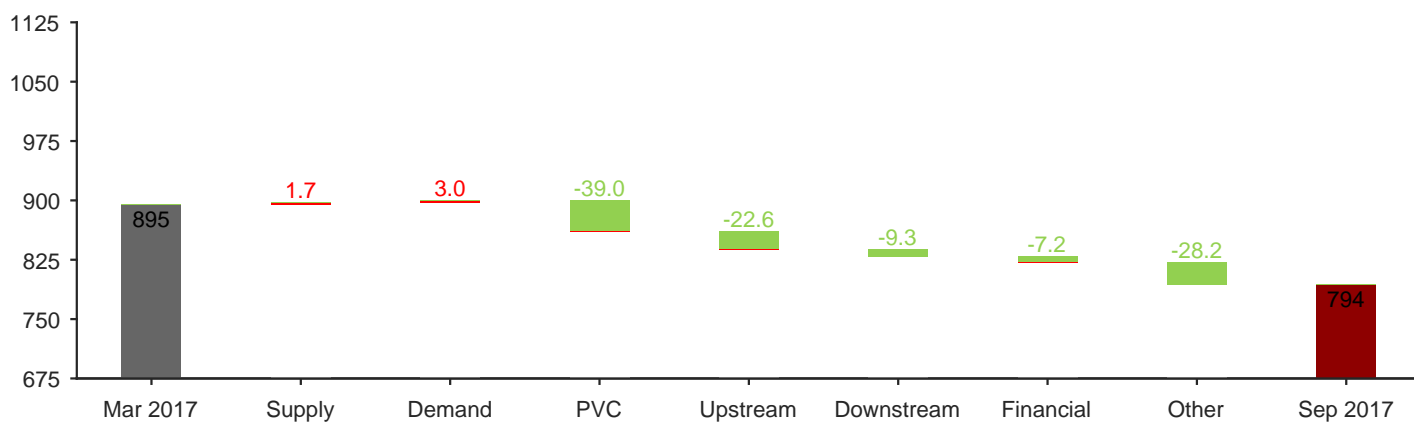
Forecasting the Price of PVC

Impact Analysis: Six Months Forecast



Our algorithm forecasts a lower price of PVC in six months: it is expectable that the price decreases 11.34% from 895€ to 794€ until the beginning of September.

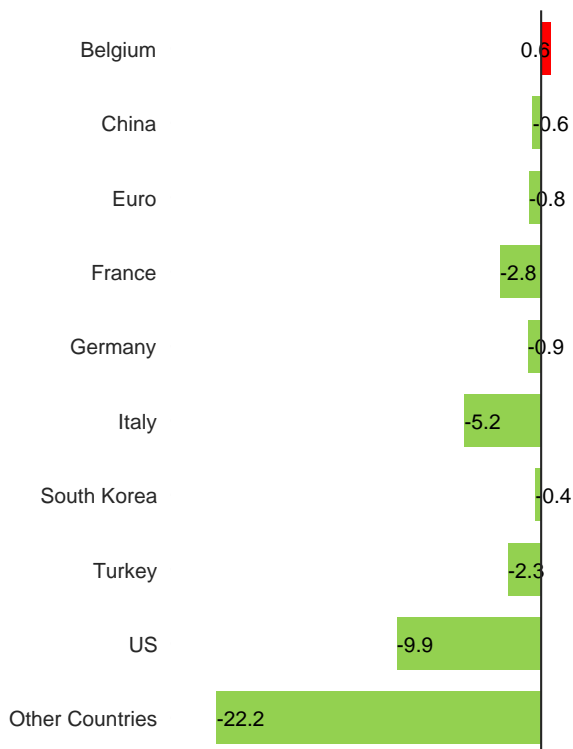
Indices of Factors



Interpretation

- Slight decrease of Supply: Positive pressure of the Supply index
- Slight increase of Demand: Positive pressure of the Demand index
- **Considerably negative pressure of the index of PVC**
- 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 US, Japan, and Italy

Impact per Country



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Forecasting the Price of PVC

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;

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

Upstream index: composed of variables related to Ethylene, VCM, and Caustic Soda. 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 PVC;

Forecasting the Price of PVC

APPENDIX – Technical Explanation of the Impact Analysis (II)

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

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

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

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 PVC.

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.