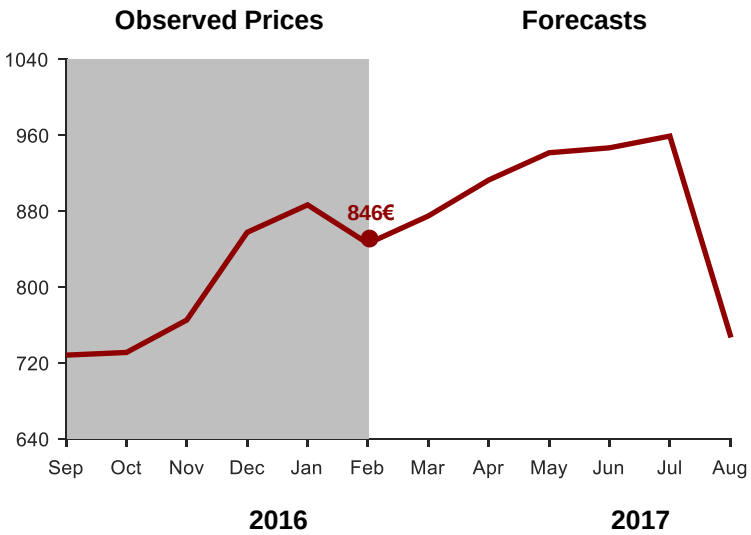
Forecasting the Price of PVC

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

Forecasts



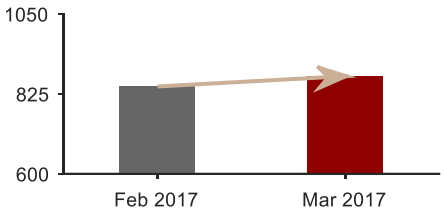
Month/Year	Forecast	Prob. Of Raise
Mar. 2017	875€	58%
Abr. 2017	913€	78%
Mai. 2017	941€	78%
Jun. 2017	947€	63%
Jul. 2017	959€	60%
Aug. 2017	749€	48%

Suggested Action for Procurement

Purchase Limit Month	Suggested Action
March 2017	Buy in February at 846€
April 2017	Buy in February at 846€
May 2017	Buy in February at 846€
June 2017	Buy in February at 846€
July 2017	Buy in February at 846€
August 2017	Buy part of requirements

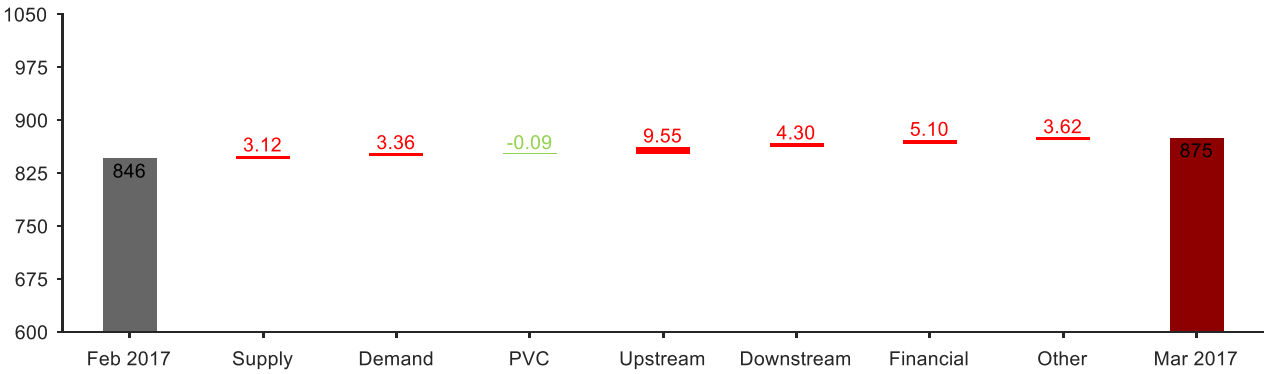
Forecasting the Price of PVC

Impact Analysis: One Month Forecast



Our algorithm forecasts a higher price of PVC in one month: it is expectable that the price increases 3,42% from 846€ to 875€ until the beginning of March.

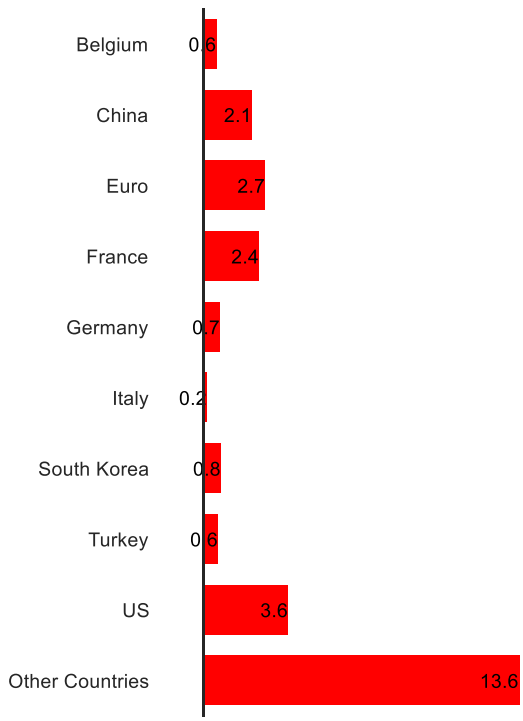
Indices of Factors



Interpretation

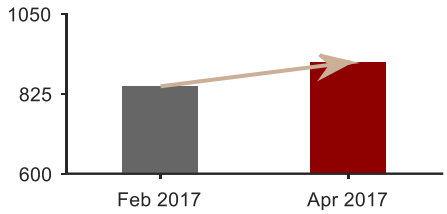
- **Decrease of Supply:** Positive pressure of the Supply index
- **Increase of Demand:** Positive pressure of the Demand index
- Slightly negative pressure of the index of PVC
- **Considerably positive pressure of the index of variables representing the market upstream**
- Positive pressure of the index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

Impact per Country



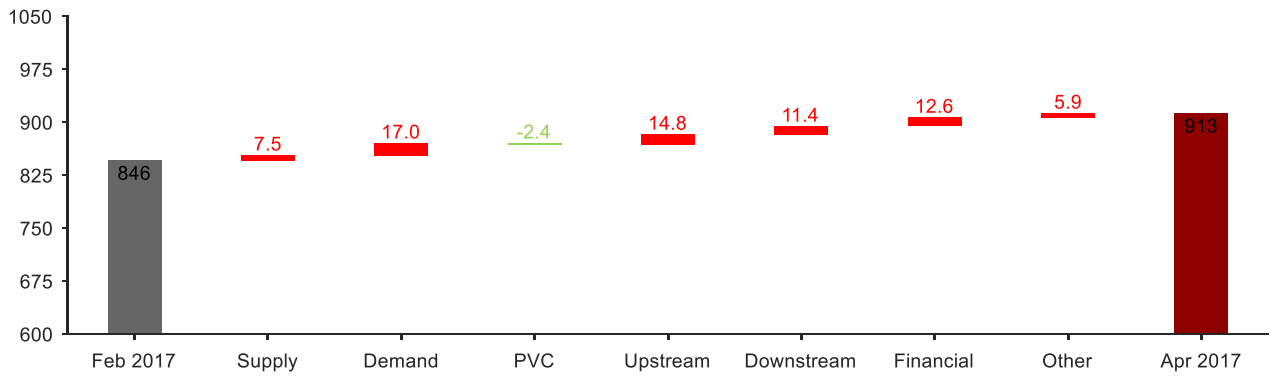
Forecasting the Price of PVC

Impact Analysis: Two Months Forecast



Our algorithm forecasts a higher price of PVC in two months: it is expectable that the price increases 7,90% from 846€ to 913€ until the beginning of April.

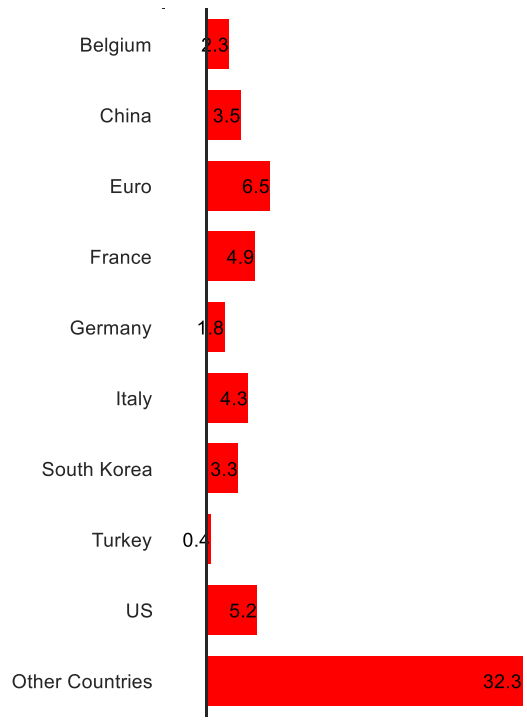
Indices of Factors



Interpretation

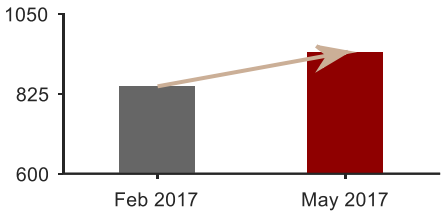
- **Decrease of Supply:** Positive pressure of the Supply index
- **Increase of Demand:** Positive pressure of the Demand index
- Slightly negative pressure of the index of PVC
- Positive pressure of the index of variables representing the market upstream
- Positive pressure of the index of variables representing the market downstream
- Positive pressure of the financial index
- Positive pressure of other commodities and other factors
- Focus on Euro, UK, and US

Impact per Country



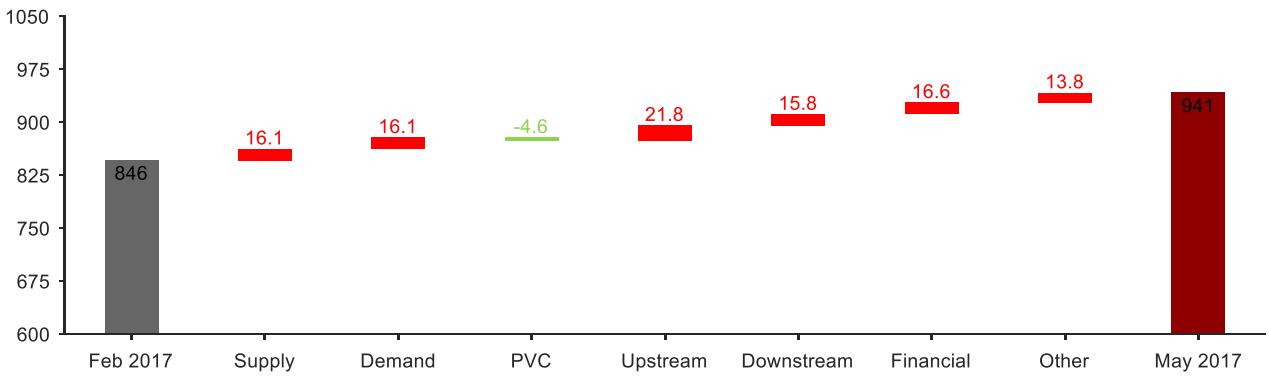
Forecasting the Price of PVC

Impact Analysis: Three Months Forecast



Our algorithm forecasts a higher price of PVC in three months: it is expectable that the price increases 11,30% from 846€ to 941€ until the beginning of May.

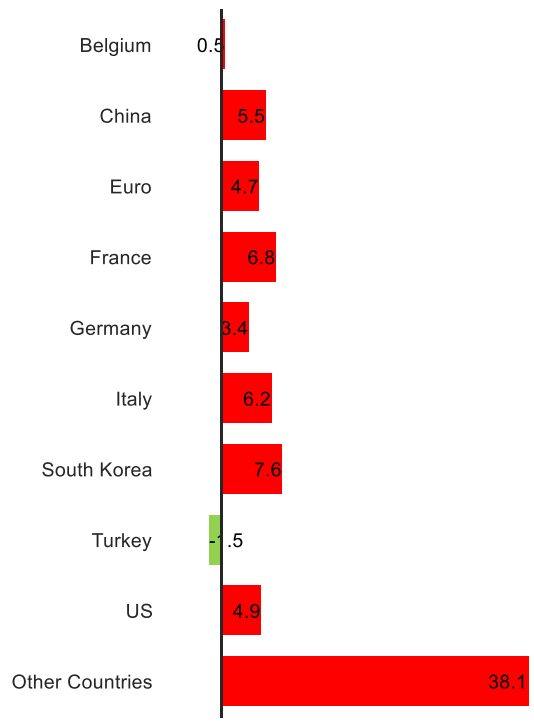
Indices of Factors



Interpretation

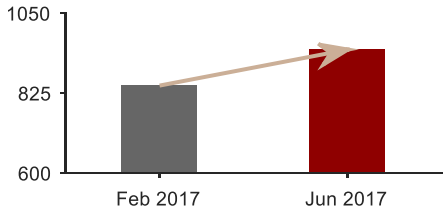
- **Decrease of Supply:** Positive pressure of the Supply index
- **Increase of Demand:** Positive pressure of the Demand index
- Negative pressure of the index of PVC
- Positive pressure of the index of variables representing the market upstream
- Positive pressure of the index of variables representing the market downstream
- Positive pressure of the financial index
- Positive pressure of other commodities and other factors
- Focus on Japan, South Korea, and France

Impact per Country



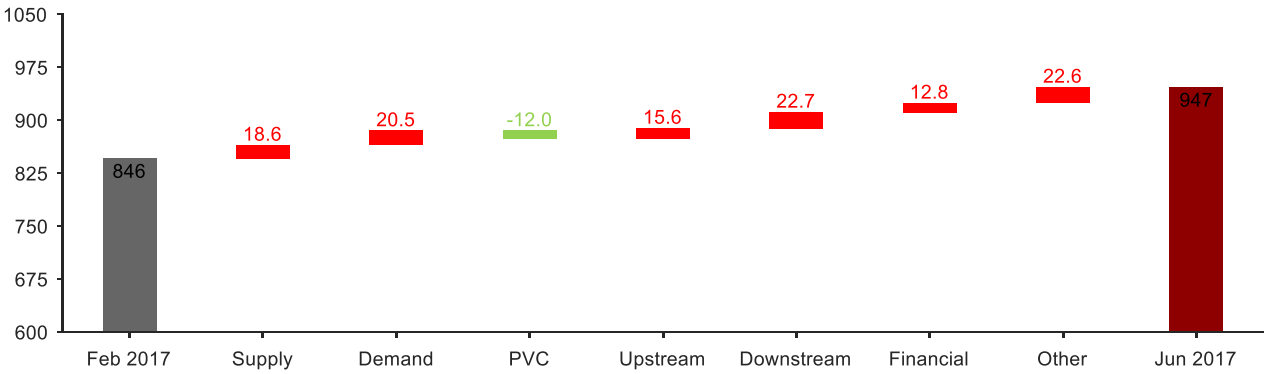
Forecasting the Price of PVC

Impact Analysis: Four Months Forecast



Our algorithm forecasts a higher price of PVC in four months: it is expectable that the price increases 11,91% from 846€ to 947€ until the beginning of June.

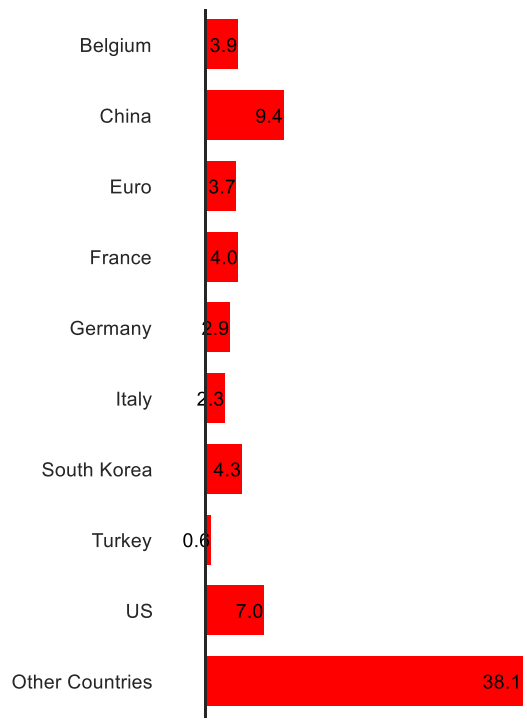
Indices of Factors



Interpretation

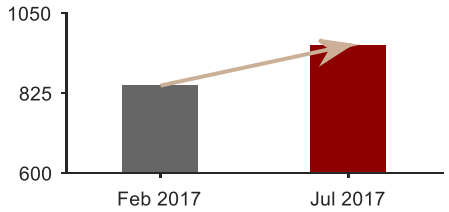
- **Decrease of Supply:** Positive pressure of the Supply index
- **Increase of Demand:** Positive pressure of the Demand index
- Negative pressure of the index of PVC
- Positive pressure of the index of variables representing the market upstream
- Positive pressure of the index of variables representing the market downstream
- Positive pressure of the financial index
- Positive pressure of other commodities and other factors
- Focus on Mexico, Japan, and China

Impact per Country



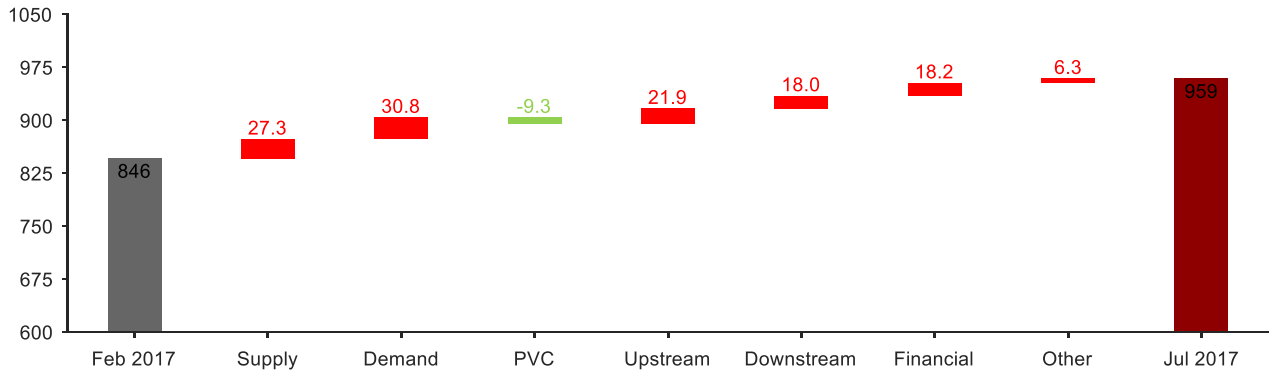
Forecasting the Price of PVC

Impact Analysis: Five Months Forecast



Our algorithm forecasts a higher price of PVC in five months: it is expectable that the price increases 13,37% from 846€ to 959€ until the beginning of July.

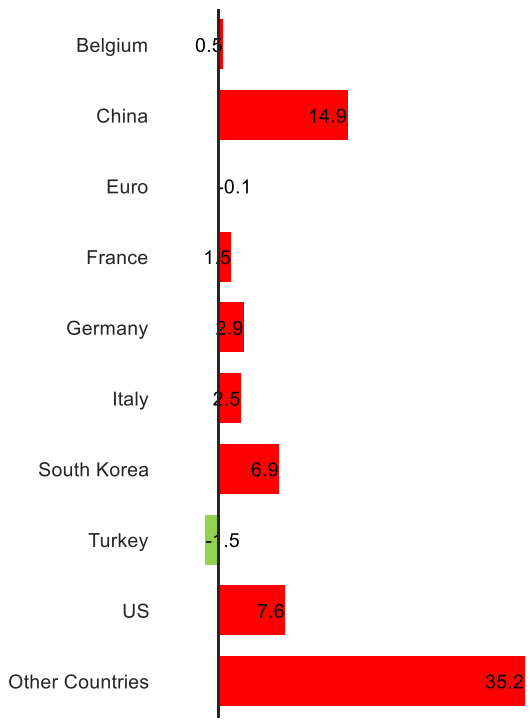
Indices of Factors



Interpretation

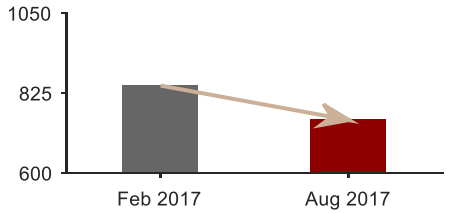
- **Considerable decrease of Supply:** Positive pressure of the Supply index
- **Considerable increase of Demand:** Positive pressure of the Demand index
- Negative pressure of the index of PVC
- Positive pressure of the index of variables representing the market upstream
- Positive pressure of the index of variables representing the market downstream
- Positive pressure of the financial index
- Positive pressure of other commodities and other factors
- Focus on Japan, Mexico, and China

Impact per Country



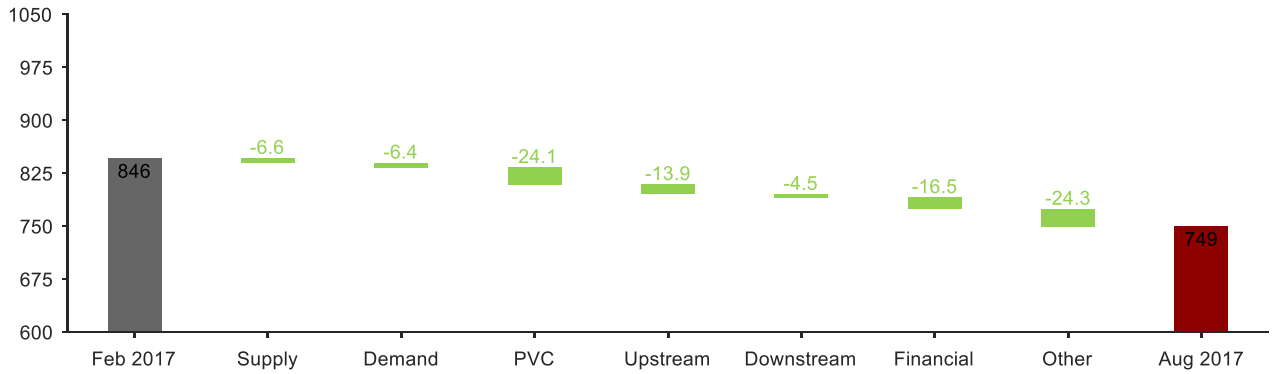
Forecasting the Price of PVC

Impact Analysis: Six Months Forecast



Our algorithm forecasts a lower price of PVC in six months: it is expectable that the price decreases 11,39% from 846€ to 749€ until the beginning of August.

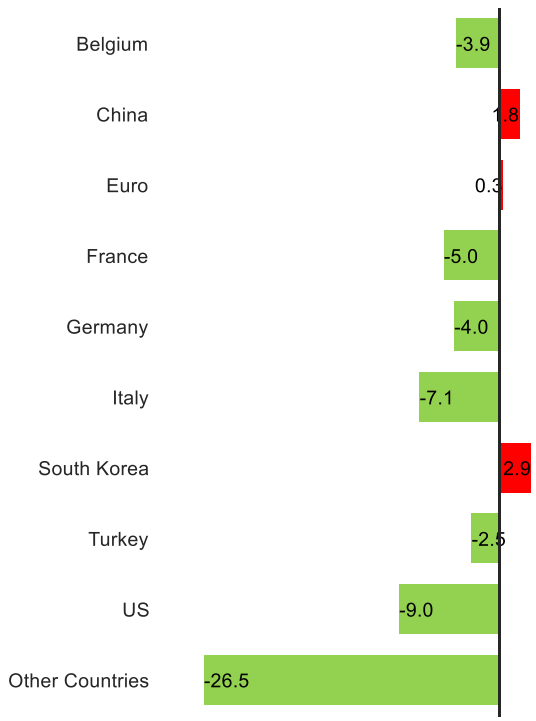
Indices of Factors



Interpretation

- **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
- Negative pressure of the financial index
- **Considerably negative pressure of other commodities and other factors**
- Focus on US, UK, and Italy

Impact per Country



Forecasting the Price of PVC

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;

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 Oil, Propylene, Natural Gas, and Naphtha. 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 Propylene 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

Downstream index: composed of variables related to downstream industries, such as Packaging. It includes variables such as the exports, imports, and producer prices of 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 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 PVC 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 PVC;

Other Variables Index: composed of variables related to other commodities, such as Ethylene and Benzene. 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.

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 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.