PRICE FORECASTING: WHO NEEDS THAT?

Common wisdom says that any price forecast is already wrong the moment it is published. I can only smile and agree with this. If people were able to predict the price of anything, they would be billionaires and very well known by now.

I'd like to hold this thought about price forecasts for a moment and talk about something we all know about: weather forecasts.

Weather Forecasting

Historians tell us that Babylonians in 650 BC predicted the weather from cloud patterns. Around 300 BC, Indian astronomers developed weather-prediction methods. It was only in 904 AD that Wahshiyya, an Iraqi alchemist, began forecasting weather based on observed patterns of events called pattern recognition. The publication of *written* weather forecasts did not begin until August 1st, 1861 by Admiral Robert Fitzroy (in *The Times* of London). That means official weather forecasting turns 152 years old today.

Fitzroy started studying weather forecasting for a good reason. In 1859, a steam clipper named the Royal Charter was lost in a terrible storm with at least 450 killed. For years he published the forecasts despite strong criticism that they could not possibly be accurate. After much debate, his public forecasts ended in 1866.

From the BBC, "You have to admire Fitzroy for trying. He saw the big picture and walked the first few steps along a very hard path. Even now, when we have a sky full of satellites and enormous computational weather models, we don't always get it right."

Today, we all use weather forecasts to prepare for future events. From air and marine traffic, to crop reports and outdoor weddings, we all rely on accurate data to guide decisions on our safety, business, and social lives. And despite our best technology, we still sometimes get it wrong.

Those criticisms of inaccuracy with weather forecasting most certainly apply to our earlier topic of price forecasting. However, for the savvy user, price forecasting can be an invaluable weapon in the Purchasing arsenal. Let's see how.

Futures Markets

Many companies already use futures markets in currencies, grains, metals, and energy, trading over US$1.5 trillion a year. Commodity prices are volatile according to the balance of supply and demand. To mitigate this volatility, a futures contract is an agreement to buy and sell an asset at a certain date at a certain price. That is, Investor A may make a contract with Farmer B in which A agrees to buy so many bushels of B's corn at $15 per bushel. This contract must be honored whether the price of corn goes to $1 or $100 per bushel.

Futures contracts can add stability to certain markets, but they contain the risks inherent to all speculative investing. Here, then, is a prime use of price forecasting.

Price Forecasting

Purchasing function deals with prices every day for diverse categories like Raw Materials, Logistics, MRO, Capital, Packaging, Labor, and other products and services. Some categories already have price forecasts done by well-respected companies like ICIS (for petrochemicals, energy, and fertilizer), IHS Global Insight (for country and industry forecasts), and many others in specific fields.

Many collect opinions from hundreds of experts to understand the trends and cost drivers to publish their forecasted prices. Others have developed mathematical models to predict future prices. To be sure, both methods incur inaccurate predictions, however if trends are identified, Purchasing can take a reasoned position about buying more or less, according to their perceived needs.

Models

Experts in price forecasting identify two kinds of models: Univariate and Multivariate.

- **Univariate** modeling is based solely on the history of the variable being forecast itself, using trends, seasonality, and cycles. It is used for short-term forecasts.
- **Multivariate** modeling is based on the history of variables and drivers like GDP, PPI, inflation, raw materials, etc. It is used for longer time horizons. Best practices say that each year of forecast requires four years of historical data.

Development Process

The eight steps below are based on my own experience at Fortune 500 companies where we developed models for Raw Materials, Logistics, and MRO, totaling US$12 billion of spend.

1. Define with category leader the product families to be forecasted based on their priorities and business needs. The definition must include the region and the lowest level of granularity as possible.
2. Using Mind Map, interview the purchasing expert to capture and visually outline the information about cost drivers. You must understand what affects the price of your product or service in each region.
3. Collect the external historic macro-economic data of all the cost drivers you are able to find. To maximize certainty, collect four years of data.
4. Collect the historic internal data of the product or service you want to forecast. Again, it is best to collect four years of data.
5. Using specific software from SAS (Statistical Analysis System), compare both internal and external historic data. The software is able to show which 3-5 external variables are most correlated with internal data by calculating the R-square for each variable (where higher is better).

6. Develop the forecast models where each variable participates in such proportion and time lag effect. For example, if the model is driven by GDP, PPI, and Raw Material X, the model may have a proportion of 3X, 2 PPI, and 1 GDP effect; it also includes the time lag like GDP 3 months in the future, with one month ahead for PPI and Raw Material X.

7. For each model, the software calculates the Mean Absolute Percent Error (MAPE), where below five is considered excellent.

8. Once all models are developed, one person from the category is able to update the recent historical data monthly or quarterly, run the model with the help of an Excel add-in, and publish the graph forecast to users and business clients. Each update adds one time horizon, keeping a 12- or 18-month horizon.

MAPE on History: 3.58   MAPE on test data: 2.67
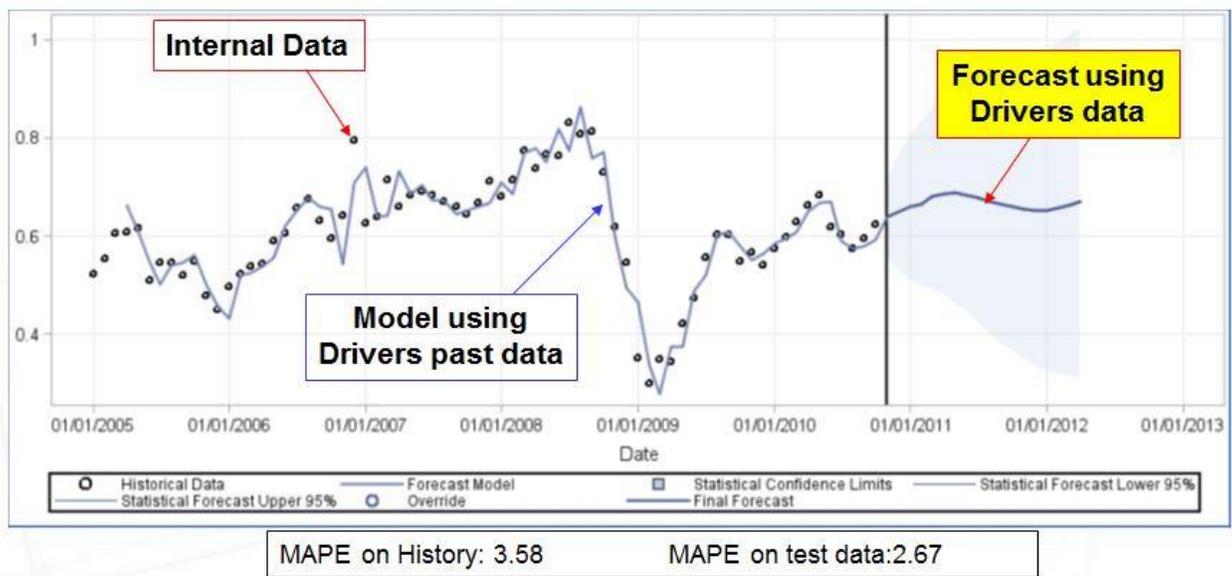
The above graph shows the historic internal data (dots) very close to the model (line), which reconstructed the past using past driver data. This means that the price forecast has 95% confidence.

Takeaways

As with weather forecasting, people in Purchasing use price forecasting to prepare themselves for future events. Although never 100% accurate, they show us trends and patterns that can be used to avoid big losses.

Purchasing people have used price forecasting in order to:

- Inform business clients about trends so they can take proactive price actions to prevent margin erosion.
- Inform other internal clients for budgeting capital expenditures and freight costs.

- Adjust product and service sourcing plans for buying more or less according to the needs and price trends.
- Use repeatable data-driven methodology to understand price trends.

Although there is still criticism of price forecasting, just as with weather forecasting, it is only a matter of time before we adapt to it and learn how to use it well. With experience, I trust this process will not take us another 152 years to achieve.

Taking Purchasing to the next level,

Paulo Moretti
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