

Quantitative Consulting for Business

Forecasting

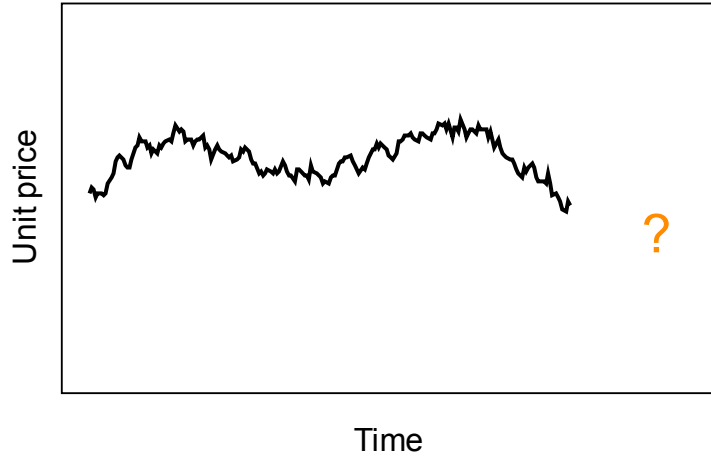


Dr. Boris Vaillant

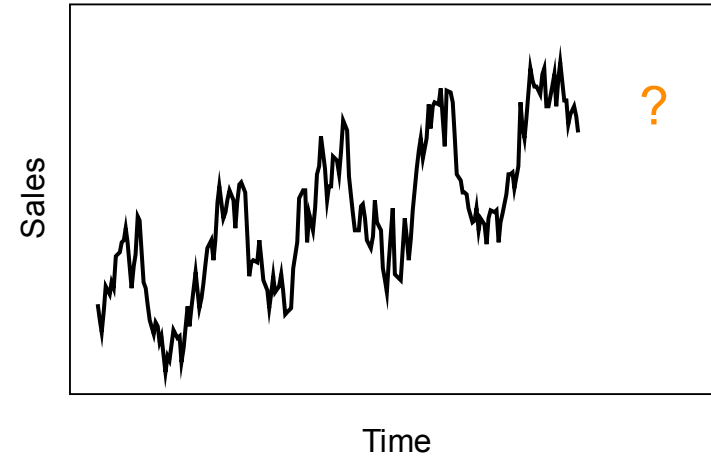


A reliable forecast of the key indicators is the foundation of any planning activity in your business.

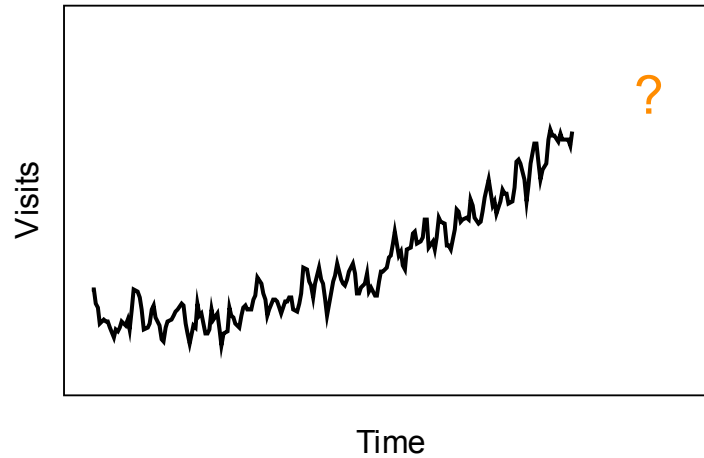
How will raw material prices develop?



What are our future sales?



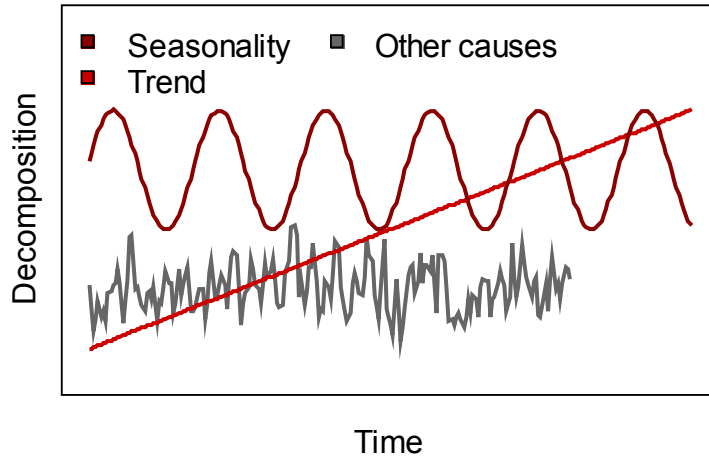
Visits to our web site next year?



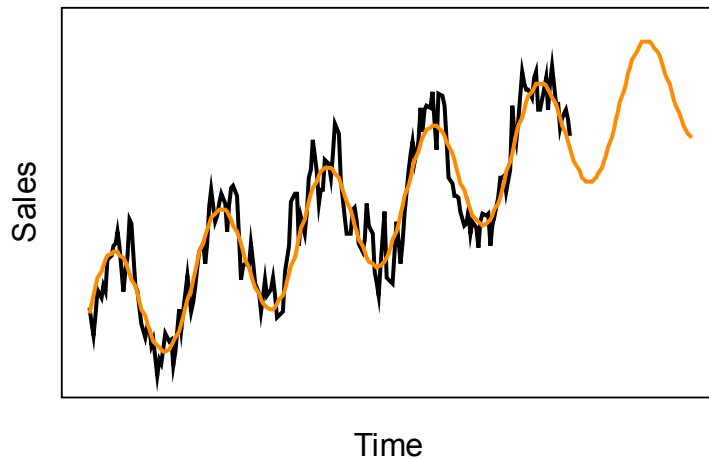


Time series analysis proceeds according to the motto: „Understand the past to learn for the future.“

Decomposing the structure ...



...allows to make a forecast



Time series models use your knowledge about

- **Intrinsic factors**
 - Trend
 - Seasonality (yearly, weekly, even daily)
 - Past development of indicators
- **External factors**
 - Holidays, the weather
 - Economic climate
 - Special activities (World cup, price moves)
- **Business Logic**
 - Known Patterns (customer behavior before / after holidays, after a large order, etc.)
 - Structure of variations (additive vs. multiplicative)

... to forecast the future development.



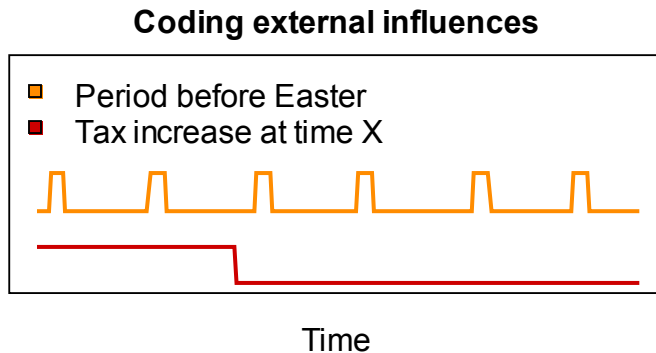
For a forecasting model that is close to real life, it is crucial to include as much of your knowledge and your business intuition as possible.

Integration of business logic

- 1 Clean data from all non-recurrent special effects
- 2 **List known phenomena and translate them into model language**

Examples




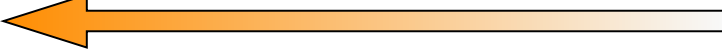


- 2a „Increased sales before Easter“
- 2b „Tax increase in X led to a loss of sales“



- 2c „High sales in one week are typically followed by lower sales in the following week“
 - is translated to: „Make sure model includes sales of last two weeks“
- 2d „Calculation of deviations in %“
 - usually means that important parts of the model are multiplicative. Example:
 - $(Trend + Seasonality) * (other\ causes)$
 - $Trend * Seasonality * (other\ causes)$
- 3 Finally, the **relevance** of these model elements are **tested on the data**
 - Low relevance: This effect is probably already being covered by other elements
 - **High relevance: This effect is included into the model**



The intended use and the scope of the forecast determine which method should be used and which influences should be integrated.

| | | | | |
|----------------------------|----------------------------------|--|--|--|
| Forecasting scope | | Short (Days/ |  | Long weeks) Years) |
| Goal | | Management of operative processes | Budget planning | Strategy definition |
| Influence | Example | Importance of the Influence | | |
| History | Development in the past weeks |  | | |
| Special effects | Holidays, Strike |  | | |
| Intrinsic logic | Seasonality |  | | |
| External trends | Market trends |  | | |
| Detail | Group level vs. Store level |  | | |
| Methodology | | Time series analysis | Time series analysis | Scenario simulation, Decision models etc. |