

Forecasting

in Economics, Business, Finance and Beyond

CH 1: Introduction



1

This is NOT what this class is about!



2

*“Prediction is very
difficult,
especially if it's about the
future.”*

Nils Bohr

3

What is forecasting?

*Forecasting is a tool used for
predicting
future demand based on
past demand information.*

4

Why is forecasting important?

Demand for products and services is usually uncertain.

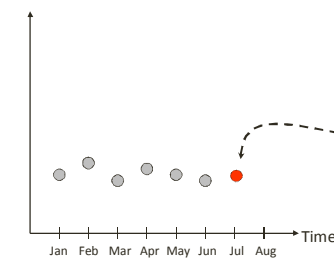
Forecasting can be used for...

- Strategic planning (long range planning)
- Finance and accounting (budgets and cost controls)
- Marketing (future sales, new products)
- Production and operations

5

What is forecasting all about?

Demand for Mercedes E Class

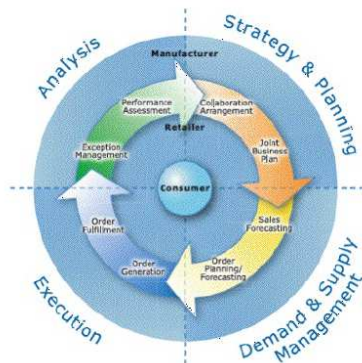


● Actual demand (past sales)
● Predicted demand

We try to predict the future by looking back at the past

6

Sales Forecasting



7

What's Forecasting All About?

From the March 10, 2006 WSJ:

Ahead of the Oscars, an economics professor, at the request of Weekend Journal, processed data about this year's films nominated for best picture through his statistical model and predicted with 97.4% certainty that "Brokeback Mountain" would win. Oops. Last year, the professor tuned his model until it correctly predicted 18 of the previous 20 best-picture awards; then it predicted that "The Aviator" would win; "Million Dollar Baby" won instead.

Sometimes models tuned to prior results don't have great predictive powers.

8

Some general characteristics of forecasts

- Forecasts are always wrong
- Forecasts are more accurate for groups or families of items
- Forecasts are more accurate for shorter time periods
- Every forecast should include an error estimate
- Forecasts are no substitute for calculated demand.

9

Key issues in forecasting

1. A forecast is only as good as the information included in the forecast (past data)
2. History is not a perfect predictor of the future (i.e.: there is no such thing as a perfect forecast)

REMEMBER: Forecasting is based on the assumption that the past predicts the future! When forecasting, think carefully whether or not the past is strongly related to what you expect to see in the future...

10

Example: Mercedes E-class vs. M-class Sales

Month	E-class Sales	M-class Sales
Jan	23,345	-
Feb	22,034	-
Mar	21,453	-
Apr	24,897	-
May	23,561	-
Jun	22,684	-
Jul	?	?

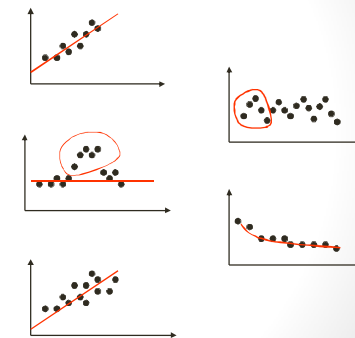
Question: Can we predict the new model M-class sales based on the data in the table?

Answer: Maybe... We need to consider how much the two markets have in common

11

What should we consider when looking at past demand data?

- Trends
- Seasonality
- Cyclical elements
- Autocorrelation
- Random variation



12

Some Important Questions

- What is the purpose of the forecast?
- Which systems will use the forecast?
- How important is the past in estimating the future?

Answers will help determine time horizons, techniques, and level of detail for the forecast.

13

Types of forecasting methods

Qualitative methods

Rely on subjective opinions from one or more experts.

Quantitative methods

Rely on data and analytical techniques.

14

Qualitative forecasting methods

Grass Roots: deriving future demand by asking the person closest to the customer.

Market Research: trying to identify customer habits; new product ideas.

Panel Consensus: deriving future estimations from the synergy of a panel of experts in the area.

Historical Analogy: identifying another similar market.

Delphi Method: similar to the panel consensus but with concealed identities.

15

Quantitative forecasting methods

Time Series: models that predict future demand based on past history trends

Causal Relationship: models that use statistical techniques to establish relationships between various items and demand

Simulation: models that can incorporate some randomness and non-linear effects

16

How should we pick our forecasting model?

1. Data availability
2. Time horizon for the forecast
3. Required accuracy
4. Required Resources

17

HW

True or False?

1a. The underlying principles of time-series forecasting differ radically depending on the time series being forecast.

False - that is the beauty of the situation!

18

HW

True or False?

1b. Ongoing improvements in forecasting methods will eventually enable perfect prediction.

False - the systems forecast in the areas that concern us are intrinsically stochastic and hence can never be perfectly forecast.

19

HW

True or False?

1c. There is no way to learn from a forecast's historical performance whether and how it could be improved.

False. Indeed studying series of forecast errors can provide just such information. The key to forecast evaluation is that good forecasts shouldn't have forecastable forecast errors, so if the errors can be forecast then something is wrong.

20

HW

Degrees of Forecastability

Can the following be forecast perfectly, not forecast at all, or something somewhere in between?

3a. The direction of change tomorrow in a country's stock market.

Some would say imperfectly, some would say not at all.

21

HW

Degrees of Forecastability

Can the following be forecast perfectly, not forecast at all, or something somewhere in between?

3b. The eventual lifetime sales of a newly-introduced automobile model.

Imperfectly.

22

HW

Degrees of Forecastability

Can the following be forecast perfectly, not forecast at all, or something somewhere in between?

3c. The outcome of a coin flip.

Not at all, in the sense of guessing correctly more than fifty percent of the time (assuming a fair coin).

23

HW

Degrees of Forecastability

Can the following be forecast perfectly, not forecast at all, or something somewhere in between?

3d. The date of the next full moon.

Perfectly.

24

HW

Degrees of Forecastability

Can the following be forecast perfectly, not forecast at all, or something somewhere in between?

3e. The outcome of a (fair) lottery.

Not at all.

25

HW

4. We all forecast, all the time, implicitly if not explicitly.

5. Take a look at these. Each of the scenarios is complex and realistic, with no clear cut answer. Instead, the idea is to start thinking about relevant issues that run through the scenarios that will be illustrated in future class sessions, such the forecast object, the forecast horizon, the loss function and whether it might be asymmetric, the fact that some risks can be hedged and hence need not contribute to forecast uncertainty, etc.

26

HW

6. Using data on the web. Can it be trusted?

27

HW

7. Software differences and bugs: caveat emptor.

Be warned: no software is perfect.

In fact, all software is highly imperfect!

The results obtained when modeling or forecasting in different software environments may differ (sometimes a little and sometimes a lot) for a variety of reasons.

28

HW

7. Software differences and bugs: caveat emptor.

The details of implementation may differ across packages, for example, and small differences in details can sometimes produce large differences in results.

Hence, it is important that you understand precisely what your software is doing (insofar as possible, as some software documentation is more complete than others).

And of course, quite apart from correctly-implemented differences in details, deficient implementations can and do occur: there is no such thing as bug-free software.

29

HW

8. Forecasting vs. prediction.

We will use the terms prediction and forecasting interchangeably, using either term in all environments (time-series environments), cross-section environments, etc.)

30