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Chapter 2 – Forecasting

- Marketing Division
- Production (and Operations) division <- focus of this chapter

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Characteristics of Forecasts:

1. They are WRONG! Definitely some error that you must be aware of
2. They are not just a single figure
3. Aggregate forecasts are typically *more* accurate than individuals
    a. Forecast for a product family instead of individual product
    b. SKU – Stock Keeping Unit assigned to each individual product
4. Long term forecasts are less accurate than short term

Forecasting Methods - Figure 2.1

Causal Methods: we analyze data different than the series that we want to forecast.

Ex. Unemployment, school ratings etc. data when trying to forecast house sales

Y = what we want to forecast

X1, X2,….Xn that influence Y

Y = f(X1,….Xn)

Ex. $Y = \alpha_0 + \alpha_1 X_1 \ldots\ldots$

Time Series Methods: use past value of some series (historical observations) to predict the *same* series.

*Important Assumption: future is an extension of the past

Notation: *Figure 2.2*

$D_1, D_2, \ldots$: Observed values of historical demand

$F_{t,t+\tau}$: forecast when we are at time t for _____ periods into the future

$F_{4,7} \rightarrow$ multi-step-look-ahead-forecast

Special case T=1 -> single-step-look-ahead-forecast

$F_{t-1,t} = F_t$

In Time Series Methods: $F_t = \sum_{n=1}^{\infty} A_n * D_{t-n}$

How good is a forecast?

e_t = Forecast error = F_t-D_t

Measures:

1. MAD (Mean absolute deviation)
   a. MAD = $\frac{1}{n}\sum_{i=1}^{n} i\, e_i v i i$
2. MSE (Mean squared error)
   a. MSE = $\frac{1}{n}\sum_{i=1}^{n} e_i^2$
3. MAPE (Mean absolute Percentage Error)
   a. MAPE = $\frac{1}{n}\sum_{i=1}^{n} \frac{e_i}{D_i} * 100\,\%$

Figure 2.3