Time Series Analysis

Moving averages, Multiplicative model, Forecasting (long/short term forecasts)
Exercises from chapter 9 (p.110-111),

What is time series analysis and why do we need it?

- Interpretation of your data samples with respect to future trends
- It is never 100% reliable as it is based on past data
- Trends and Forecasts are very crucial for dynamic business
- Trends help in adjusting production/selling strategies (just one of thousands possible examples)
- Do not believe blindly to the calculated forecasts, they always contain some uncertainty components
- Trends and Forecasts help to fight uncertainty in business

Some things we need to talk about before we dig in…

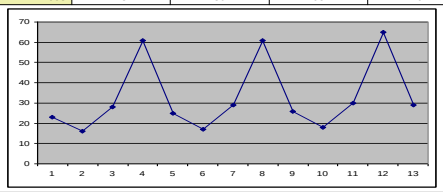
- First of all – what the heck is moving average? I thought it's a stable thing…how can it move?
- What is the difference between the trend and the forecast?
- Why do we need seasonal adjustment ? (and if you do feel very brave today try this one - what is seasonal adjustment?)

Example from my work

Moving averages are one of the most popular and easy to use tools available to the technical analyst. They smooth a data series and make it easier to spot trends, something that is especially helpful in volatile markets. They also form the building blocks for many other technical indicators and overlays.

Example in chapter 9 (p.61f)

	1	2	3	4
2000				23
2001	16	28	61	25
2002	17	29	61	26
2003	18	30	65	29



Quarter	Y	4-qtr MAT	Mov. Ave.	Trend T	Y/T
2001-1	16	16			
				$\frac{16+28+61+25}{4}=32,5$	
2001-2	28	28			
			32,5		
2001-3	61	61		32,625	1,8697318
			32,75		
2001-4	25	25		32,875	0,76045627
			33		
2002-1	17	17		33	0,51515152
			33		
2002-2	29	29		33,125	0,8754717
			33,25		
2002-3	61	61		33,375	1,82771536
			33,5		
2002-4	26	26		33,625	0,7732342
			33,75		
2003-1	18	18		34,25	0,52554745
			34,75		
2003-2	30	30		35,125	0,85409253
			35,5		
2003-3	65	65			
2003-4	29	29			

Example (multiplicative model)

	1	2	3	4
2001			1,8697318	0,76045627
2002	0,51515152	0,8754717	1,82771536	0,7732342
2003	0,52554745	0,85409253		
Average	0,52034948	0,86478211	1,84872358	0,76684524
Corrected S	0,52034948	0,86478211	1,84872358	0,76684524

SUM=4,000700408

$$\frac{0,51515152+0,52554745}{2}=0,52034948$$

- No need to correct the averages we've calculated as the sum of them is close to the value 4 already.

Forecasting

- Seasonal adjustment

  $2003-4 \Rightarrow Y=29, S_4=0,766; Y \div S=37,859$

  $2004-1 \Rightarrow Y=19, S_1=0,520; Y \div S=36,538$
- Short term forecasting

  $2003-3 \Rightarrow Y=65; S_3=1,849; Y \div S=35,154$

  $2003-4 \Rightarrow Y=29; S_4=0,766; Y \div S=37,859$

So we estimate that the trend is changing by approx. 2,7049

$2004-1$:

$Trend \Rightarrow 37,8+2,7049=40,504$

$Actual \Rightarrow 40,504 \times 0,520=21,062$