

Ch 2 Homework Solutions: Forecasting

Problem 2-1

- a. Naïve Model

Year	Quarter	Net Deposits	Forecast	Error
1989	1	20.0		
	2	16.5	20.0	-3.5
	3	19.9	16.5	3.4
	4	22.9	19.9	3.0
1990	1	21.4	22.9	-1.5
	2	24.6	21.4	3.2
	3	20.7	24.6	-3.9
	4	25.5	20.7	4.8
1991	1		25.5	

MSE for periods 90-3 and 90-4 is $[(-3.9)^2 + (4.8)^2] / 2 = 19.1$

- b. Simple Smoothing Model
Alpha = 0.2

Year	Quarter	Net Deposits	Forecast	Error	Forecast for t+1
1989	1	20.0	20.9	-0.9	20.7
	2	16.5	20.7	-4.2	19.9
	3	19.9	19.9	0.0	19.9
	4	22.9	19.9	3.0	20.5
1990	1	21.4	20.5	0.9	20.7
	2	24.6	20.7	3.9	21.4
	3	20.7	21.4	-0.7	21.3
	4	25.5	21.3	4.2	22.1
1991	1		22.4		

MSE for periods 90-3 and 90-4 = 9.1 (improvement over the naïve model)

Problem 2-2

Weight = 0.50

	Actual	Forecast	Error
Initial forecast		140	
Apr	106	140	-34
May	195	123	72
June	119	159	-40
July		139	
Aug		139	
Sep		139	

Problem 2-3

Level weight	0.20
Trend weight	0.10
Damping	0.90

	Actual	Forecast	Error	Level	Trend
Initial forecast				\$2.3	\$2.7
1999	\$5.0	\$4.7	\$0.3	\$4.8	\$2.4
2000	\$8.0	\$7.0	\$1.0	\$7.2	\$2.3
2001	\$9.0	\$9.2	\$0.2	\$9.2	\$2.0
2002	\$13.0	\$11.0	\$2.0	\$11.4	\$2.0
2003		\$13.2			
2004		\$15.1			

Problem 2-4

A damped trend should be used because growth has been erratic for the last few years. Several sets of parameters might be used. One alternative is:

Solution with level weight = .30, trend weight = .10, and damping = .90

Year	Conver.	Fcst	Error	Level	Trend
				6.60	2.80
1995	9.40	9.12	0.28	9.20	2.55
1996	10.70	11.50	-0.80	11.26	2.21
1997	11.00	13.25	-2.25	12.58	1.77
1998	15.10	14.17	0.93	14.45	1.68
1999	20.60	15.96	4.64	17.35	1.98
2000	22.10	19.13	2.97	20.02	2.08
2001	25.80	21.89	3.91	23.07	2.26
2002	23.00	25.10	-2.10	24.47	1.82
2003		26.11			
2004		27.59			

Problem 2-5

Deseasonalized sales are the original sales divided by the indexes.

Year	Qtr.	Index	Sales	Des. Sales = Sales/Index
1988	1	0.5	204	408.0
	2	0.9	379	421.1
	3	1.5	633	422.0
	4	1.1	430	390.9
1989	1	0.5	191	382.0
	2	0.9	342	380.0
	3	1.5	650	433.3
	4	1.1	388	352.7

Problem 2-6

Year	Qtr.	Data	Moving average	Diff.	Avg. Diff.	Norm. Diff.	Seas. Index
2001	1	204					-205.97
	2	379					-59.22
	3	633	411.50	221.50	239.38	241.41	241.41
	4	430	408.25	21.75	21.75	23.78	23.78
2002	1	191	399.00	-208.00	-208.00	-205.97	-205.97
	2	342	403.25	-61.25	-61.25	-59.22	-59.22
	3	650	392.75	257.25			241.41
	4	388					23.78
Sum					-8.13	0.00	

Problem 2-7

Linear trend with level weight = .20 and trend weight = .10

Year	Qtr	Data	Seas Index	Fcst	Error	Level	Trend	Index + Fcst
						413.22	-3.25	
2001	1	409.97	-205.97	409.97	0.00	409.97	-3.25	204.00
	2	438.22	-59.22	406.72	31.50	413.02	-0.10	347.50
	3	391.59	241.41	412.92	-21.33	408.65	-2.23	654.33
	4	406.22	23.78	406.42	-0.20	406.38	-2.25	430.20
2002	1	396.97	-205.97	404.13	-7.16	402.70	-2.97	198.16
	2	401.22	-59.22	399.73	1.49	400.03	-2.82	340.51
	3	408.59	241.41	397.21	11.39	399.48	-1.68	638.61
	4	364.22	23.78	397.80	-33.58	391.09	-5.04	421.58
2003	1		-205.97	386.05				180.08
	2		-59.22	381.01				321.79
	3		241.41	375.97				617.37
	4		23.78	370.93				394.71

Problem 2-8

We treat each watch as a separate season.
There are 3 watches, or 3 "seasons" each day.
3-watch moving averages are centered on the
second watch. There are n-2 moving averages.

Steps 1 and 2: Centered moving averages and ratios

Week	Watch	Calls X	3-Qtr. MA	Ratio: X/MA
1	1	10.1		
	2	23.8	32.1000	0.7414
	3	62.4	31.5333	1.9789
2	1	8.4	32.5000	0.2585
	2	26.7	35.1667	0.7592
	3	70.4	35.4000	1.9887
3	1	9.1	33.6000	0.2708
	2	21.3	36.3000	0.5868
	3	78.5	35.8000	2.1927
4	1	7.6	38.5333	0.1972
	2	29.5	34.3333	0.8592
	3	65.9		

Steps 3 and 4: Mean ratios and normalization factor.

1	0.2422	Factor = $3/3.0323 = 0.9894$
2	0.7367	
3	2.0534	
Sum	3.0323	

Step 5: Final seasonal indexes (normalize to sum to 3).

Qtr.	Mean Ratio	Factor	Final Index
1	0.2422	0.9894	0.2396
2	0.7367	0.9894	0.7288
3	2.0534	0.9894	2.0316
Sum			3.0000