Eco Tut - 7
Forecasting

1) $S_t = 50,00,000 + 1,00,000t$

<u>In thousands</u>

$S_t = 5000 + 100t$

a) For 1999 → 1^{st} quarter ⇒ $t = 17$

So,

$S_t = 5000 + 100 \times 17 = 6700$

For 1999 ⇒ 2^{nd} quarter ⇒ $t = 18$

So,

$S_t = 5000 + 100 \times 18 = 6800$

For 1999 ⇒ 3^{rd} quarter ⇒ $t = 19$

$S_t = 5000 + 100 \times 19 = 6900$

b) For 1999 ⇒ IV^{th} quarter (without seasonal adjustment)

$S_t = 5000 + 100 \times 20 = 7000$

c)

Year	Actual IV Quarter Sales	Forecasted IV Quarter Sales	Ratio
1995	5450	5400	1.009
1996	5860	5800	1.010
1997	6270	6200	1.011
1998	6680	6600	1.012

Seasonal adjustment → 1.0105
(Average)

So

Seasonly Adjusted sales = Seasonal Adjustment x Forecasted Value

$= 1.0105 \times 7000$

$$\boxed{\text{Seasonly Adjustment Sales} = \cancel{7073.5} \; 7070}$$

2) $S_t = S_0 + bt$

~~So~~ where $S_0 = \dfrac{(\Sigma s)(\Sigma t^2) - (\Sigma t)(\Sigma s*t)}{d}$

$b = \left[\dfrac{n\Sigma s*t - (\Sigma t)(\Sigma s)}{d}\right]$

& $d = n\Sigma t^2 - (\Sigma t)^2$

Month	Income(S)	t	S*t	t^2
Feb	450	1	450	1
Mar	495	2	990	4
April	518	3	1554	9
May	563	4	2252	16
June	584	5	2920	25
	2610	15	8166	55

Scanned with CamScanner

Date
Page

$$d = 5 \times 55 - (15)^2$$

$$\boxed{d = 50}$$

$$S_0 = \frac{2610 \times 55 - 15 \times 8166}{50} = \frac{143550 - 122490}{50}$$

$$S_0 = 421.2$$

$$b = \frac{5 \times 8166 - 15 \times 2610}{50} = 33.6$$

So,

$$\boxed{S_t = 421.2 + 33.6t}$$

For July $t = 6$

$$S_t = 421.2 + 33.6 \times 6$$

$$\boxed{S_t = 622.8}$$

Date
Page

Price	t	(A) Demand	3-Quarter Moving Average (F)	Forecast with $w=0.7$
				(14)
100	1	20		18.2
150	2	18		18.06
200	3	15		15.918
300	4	12	17.67	13.1754
400	5	5	15	7.452
	6	$\Sigma A = 70$	$\boxed{10.67}$	

→ Mean of A

3)

a) So, 3 Quarter Moving Average for sixth year = 10.67

b) For Exponential Smoothing

$$F_{t+1} = wA_t + (1-w)F_t$$

So, using this we get

$$\boxed{F_6 = 7.452}$$

$$RMSE = \sqrt{\frac{\Sigma(A_t - F_t)^2}{n}}$$

For Moving Average

A	F	A-F	$(A-F)^2$
20			
18			
15			
12	17.67	-5.67	32.149
5	15	-10	100

$$RMSE = \sqrt{\frac{32.149 + 100}{2}} = 8.125$$

For Exponental Smoothi

A	F	(A − F)	$(A-F)^2$
20	14	6	36
18	18.2	−0.2	0.04
15	18.06	−3.06	9.3636
12	15.918	−3.918	15.35
5	13.1754	−8.1754	66.83
			127.5836

$$RMSE = \sqrt{\frac{127.58}{5}} = 5.051$$

As

~~$RMSE_{MA} \geq RMSE_E$~~

$$RMSE_{MA} > RMSE_{ES}$$

So,

Exponental smoothing provides more accurate forecasting