Question:

Estimation of linear and log-linear trend in the data and forecasting gasoline sales in US.

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The following table shows gasoline sales in the United States (in millions of barrels) from the first quarter of 1986 to the last quarter of 1989.

Gasoline sales in the United States: 1986:1 To 1989:4 (in millions of barrels)							
1986.1	600.4	1987.1	610.8	1988.1	640.8	1989.1	639.3
1986.2	652.8	1987.2	679.5	1988.2	686.5	1989.2	681.0
1986.3	671.1	1987.3	681.2	1988.3	691.1	1989.3	685.5
1986.4	654.8	1987.4	667.6	1988.4	676.5	1989.4	677.7

a.Estimate the linear trend in the data, and use it to forecast gasoline sales in the United States in each quarter of 1990.

b.Estimate the log-linear trend in the data, and use it to forecast gasoline sales in the United States in each quarter of 1990.

c.Which form of the trend fits the historical data better? Why would we expect both forecasts to be rather poor?

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Solution:

a.Estimation of Linear trend line

$\mathbf{T_t = b_0+b_1t}$

T_t = Trend value in period t

b_0 = intercept of the line

b_1 = Slope of the trend line

t = time

T_t = 649.204+1.91t

Forecast of each quarter of 1990

$T_{17(1990.1)}$ = 649.204+1.91*17 = 681.504

$T_{18(1990.2)}$ = 649.204+1.91*18 = 683.584

$T_{19(1990.3)}$ = 649.204+1.91*19 = 685.494

$T_{20(1990.4)}$ = 649.204+1.91*20 = 687.404

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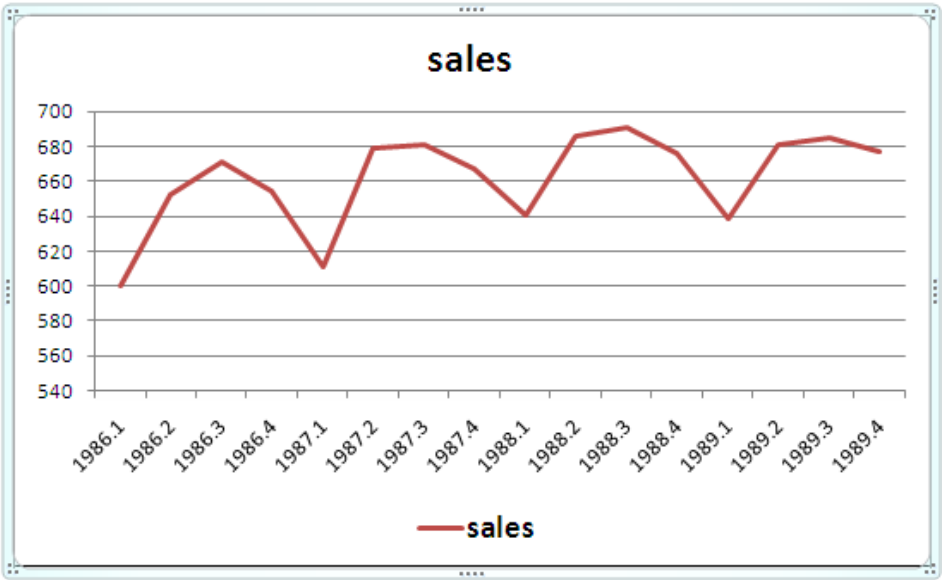

b.Log- linear model

$LogT_t = b_0+b_1t$

T_t = Trend value in log in period t

b_0 = intercept of the line

b_1 = Slope of the trend line

t = time

c.$LogT_t = 2.812+0.001t$

$LogT_{17}$= 2.812+0.001*17 = 2.829 (674.528)

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LogT_{18} = 2.812+0.001*18 = 2.83 (676.083)

$LogT_{19}$ = 2.812+0.001*19 = 2.831 (677.641)

$LogT_{20}$ = 2.812+0.001*20 = 2.832 (679.203)

Linear model fits the data better because its R^2 square value is slightly better than log linear model. Both these model are very poor as it has very low value of R^2values as given below.

R Square	=0.1454
R Square	=0.1427

***** End of the Solution *****

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