ECON 427: Homework #1

1. x = 863.984
2. chr [1:2] “Prachi” “Shah”
3. Loaded the data in R
4. The mean unemployment rate over this period is 5.973%
5. The standard deviation of the unemployment rate over this period is 2.001527%
6. The mean monthly total vehicle sales over this period are 1337.9 thousands of units
7. The standard deviation of monthly total vehicle sales over this period is 235.9574 thousands of units

Chart, scatter chart

Description automatically generated

Figure 8.1

1. Here unemployment rate is the dependent variable (y-axis), and Total vehicle sales is the explanatory variable (x-axis). When the total vehicle sale is at 0, the national unemployment rate is 13.48%. Also, when total vehicle sales increases by one unit, unemployment rate decreases by 0.0056 units. The p-value for this data is < 2.2e-16 which is quite closer to 0, so the variable is highly significant. In this model, 0.4347 adjusted R-square shows that there are 43.47% variation is explained only by a single variable.

Text

Description automatically generated

1. As total vehicle sales increase, national unemployment rate decreases.

Chart, scatter chart

Description automatically generated

Figure 10.1

1. The correlation of the unemployment rate and total vehicle sales is -0.661061. It is a moderate negative relationship.
2. Changes in total vehicle sales causes negative changes in the national unemployment rate. Assuming it to be a linear regression model, when total vehicle sales increases by one unit, unemployment rate decreases by 0.0056 units.
3. I loaded Consumer Price Index data from January 2000 to August 2020. This model would show the effect of Consumer Price Index on Unemployment Rate. The coefficient suggests that when both the explanatory variables are taken as 0, unemployment rate is at 13.50%. Whereas holding total vehicle sales constant, an increase in consumer price index increases the unemployment rate by 0.2850 units, and when we hold consumer price index constant, if total vehicle sales increase by a unit, unemployment rate decreases by 0.00566 units. Adjusted R-square of 0.4352 shows that only 43.52% variation in unemployment rate is explained by Total vehicle sales and Consumer price index so probably these two variables are not the best measure to show changes in unemployment rate.

Table

Description automatically generated

1. Figure 14.1 shows that unemployment rate has been fluctuating quite a bit over the time period from January 2000 to August 2020. There have been seasonal components as well as recession effects visible. For instance, during the great recession of 2008, unemployment rate rose approximately till a little above 10% and during Covid, it raised a lot more – a little over 14%. Figure 14.2 shows a cycle of expansion, peak, contraction, and trough at not so fixed periods of time through January 2000 to August 2020. The lowest vehicle sales are observed during somewhere between 2007 and 2009 and during 2020.

Chart, line chart, histogram

Description automatically generated

Figure 14.1

Chart, line chart

Description automatically generated

Figure 14.2

1. Figure 15.1 and 15.2 show the aggregate of the unemployment rate and total vehicle sales over the period from January 2000 to August 2020. It is better to visualize a trend in aggregate model because fluctuations over a period of 12 months are aggregated and it becomes a cleaner looking graph. In this model, the highest unemployment rate has been observed during sometime between 2009 and 2010, and the lowest vehicle sales has been observed around the same time but a little before 2010.

Chart, line chart

Description automatically generated

Figure 15.1

Chart, line chart

Description automatically generated

Figure 15.2

1. Boxplot uses boxes and lines to depict the distribution of one or more groups of numeric data. Boxes depicts the range of central 50% of the data and the central line within the box marks the median value. The circles outside the ranges are outliers of the dataset. Figure 16.1 shows a steady range of unemployment rate from January 2000 to August 2020 with multiple outliers during time period 4 and 5. In Figure 16.2, there are multiple outliers seen and also the median of the total vehicle sales is seen to be fluctuating over time.

Chart, box and whisker chart

Description automatically generated

Figure 16.1

Chart, box and whisker chart

Description automatically generated

Figure 16.2

17. Figure 17.1 displays plot of unemployment rate series and Figure 17.2 shows plot of total vehicle sales series

Chart, histogram

Description automatically generated

Figure 17.1

Diagram

Description automatically generated

Figure 17.2

18.

a. Your homework grades in 427: Economic Forecasting

To forecast my homework grades, I would still need some more information as to how I perform in the beginning of some homework assignments which would help me in creating variables, explaining the factors affecting my performance, and forecasting the grades.

b. Quarterly US GDP

There is a lot of data available regarding Quarterly US GDP so we could extract datasets from FRED, IPUMS, etc. reliable websites, load it into R, and use different variables as explanatory variables to explain the relationship between them as well as forecast the possible next quarterly US GDP looking at previous trends.

c. S&P 500 daily fluctuations

S&P 500 daily fluctuations can be forecasted using the available data and figuring out which variable/s are closely related to the fluctuations within S&P 500.

19.

In this general explanatory model, to forecast US GDP of a future term (t+1), I have used USGDP, Unemployment rate, and Inflation rate of current time periods (t). Along with that, if there is any variation that is not explained by either of those variables, it would be included in the error term at the end.

R Code

rm(list=ls())

#Question 1

x<-(((12000\*45)-10)/5000)\*(2^3)

#Question 2

myname<- c("Prachi","Shah")

#Question 3

UnemploymentRate <- read.table("UnemploymentRate.csv", header = TRUE, sep=",")

TotalVehicleSales <- read.table("TotalVehicleSales.csv", header = TRUE, sep=",")

ur<-UnemploymentRate

tvs<-TotalVehicleSales

#Question 4

summary(ur)

#Question 5

sapply(ur[2],sd)

#Question 6

summary(tvs)

#Question 7

sapply(tvs[2:2],sd)

#Question 8

plot(tvs$TOTALNSA, ur$UNRATENSA,xlab="Total Vehicle Sales",ylab="Unemployment Rate")

title("Unemployment Rate as compared to Total Vehicle Sales")

#Question 9

model1<- lm(ur$UNRATENSA ~ tvs$TOTALNSA)

summary(model1)

#Question 10

abline(model1)

#Question 11

cor(ur$UNRATENSA,tvs$TOTALNSA)

#Question 12

#Question 13

ConsumerPriceIndex <- read.table("ConsumerPriceIndex.csv", header = TRUE, sep=",")

cpi<-ConsumerPriceIndex

model2 <- lm(ur$UNRATENSA ~ tvs$TOTALNSA + cpi$CPALTT01USM657N)

summary(model2)

#Question 14

class(ur)

ur.ts <- ts(ur$UNRATENSA, start = c(2000, 1), freq = 12)

plot(ur.ts, xlab="Years", ylab="National Unemployment Rate(%)")

title("Unemployment Rate: Jan 2000 - Aug 2020")

class(tvs)

tvs.ts <- ts(tvs$TOTALNSA, start = c(2000, 1), freq = 12)

plot(tvs.ts, xlab="Years",ylab="Total Vehicle Sales")

title("Total Vehicle Sales: Jan 2000 - Aug 2020")

#Question 15

ur.annual.ts <- aggregate(ur.ts)/12

plot(ur.annual.ts, xlab="Years", ylab="National Unemployment Rate(%)")

title("Unemployment Rate: Jan 2000 - Aug 2020")

tvs.annual.ts <- aggregate(tvs.ts)/12

plot(tvs.annual.ts, xlab="Years",ylab="Total Vehicle Sales")

title("Total Vehicle Sales: Jan 2000 - Aug 2020")

UnemploymentRate.ts <- ur.ts

TotalVehicleSales.ts <- tvs.ts

#Question 16

boxplot(UnemploymentRate.ts~cycle(UnemploymentRate.ts))

title("Unemployment Rate")

boxplot(TotalVehicleSales.ts~cycle(TotalVehicleSales.ts))

title("Total Vehicle Sales")

#Question 17

plot(decompose(ur.ts))

plot(decompose(tvs.ts))

9) Coefficient on vehicle sales is negative and significant at the 0.1% level

P value is used for hypotheses test