

# Lab 7: Debt, the Last Seventy Years

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## Load Data

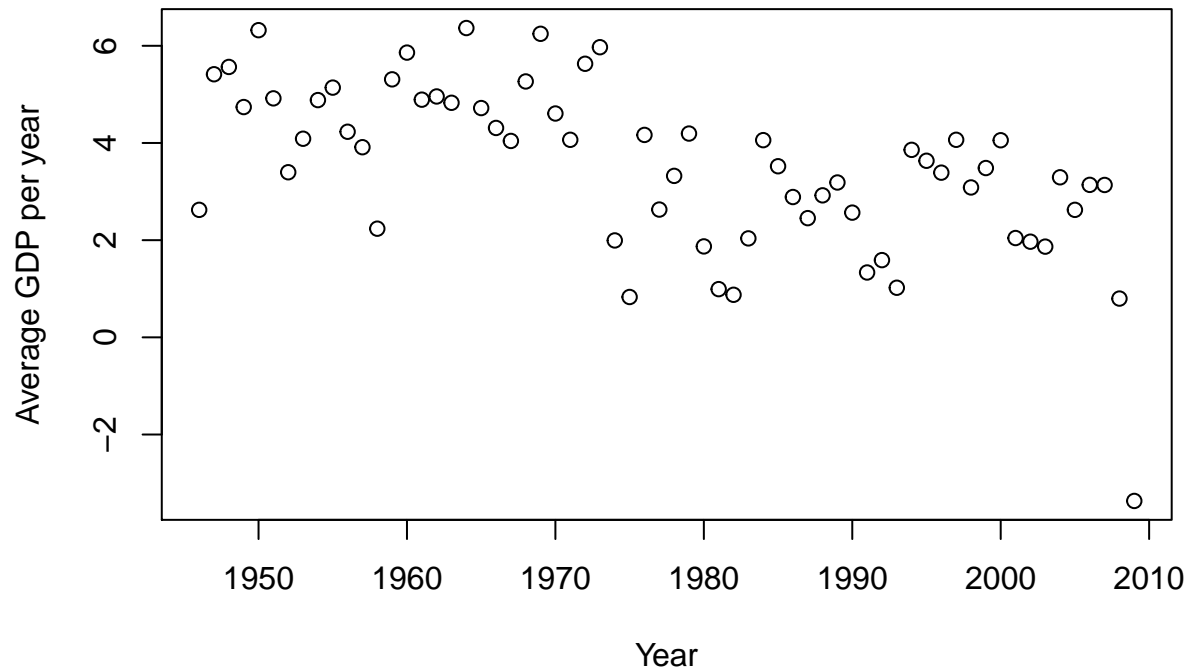
```
setwd("/Users/ankitashankhdhar/Documents/Grad 2nd yr/Comp Stats/Lab 7")  
debt<-read.csv("debt.csv")
```

## Problem 2

```
avgGDP<-tapply(debt$growth,debt$Country,mean)  
avgGDP<- as.table(avgGDP)
```

## Problem 3

```
avgGDPyr<-tapply(debt$growth,debt$Year,mean)  
avgGDPyr.new<-as.vector(avgGDPyr)  
plot(as.numeric(rownames(avgGDPyr)),avgGDPyr,ylab="Average GDP per year", xlab="Year")
```



## Problem 4

### -Part a

```
cor(debt$growth,debt$ratio)
```

```
## [1] -0.199468
```

### -Part b

```
country<-split(debt,debt$Country)
names(country)
```

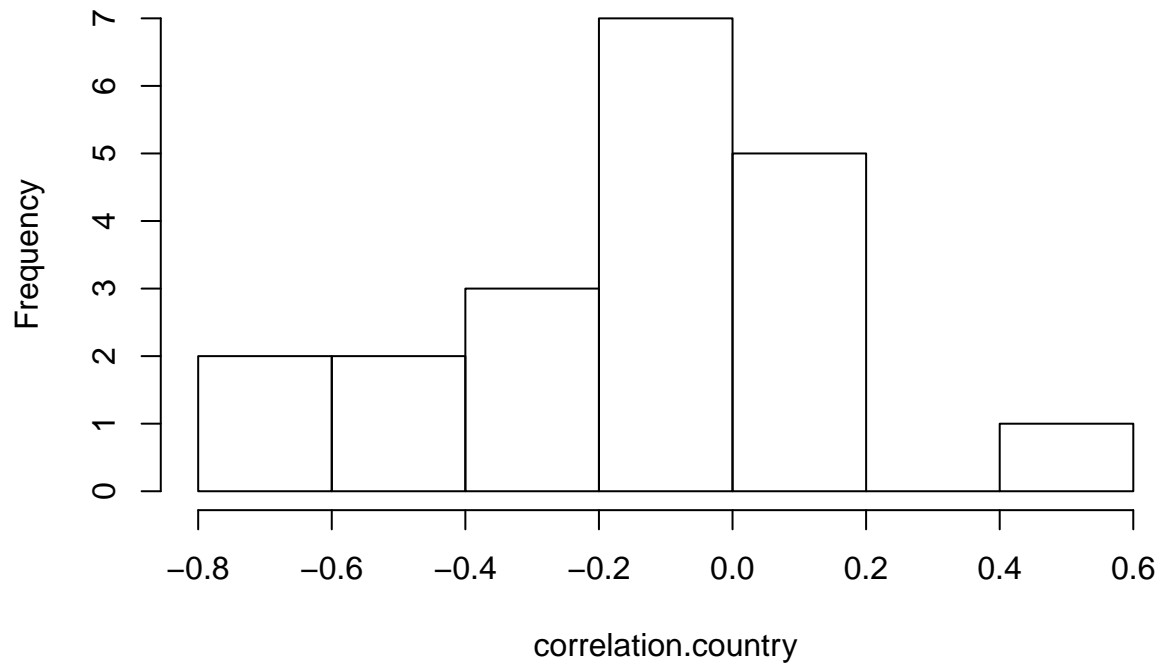
```
## [1] "Australia" "Austria" "Belgium" "Canada" "Denmark"
## [6] "Finland" "France" "Germany" "Greece" "Ireland"
## [11] "Italy" "Japan" "Netherlands" "New Zealand" "Norway"
## [16] "Portugal" "Spain" "Sweden" "UK" "US"
```

```
index_cor<-function(data){
  x<-data$growth
  y<-data$ratio
  correlation.xy<-cor(x,y)
  return(correlation.xy)
}
correlation.country<- sapply(country,index_cor)
mean(correlation.country)
```

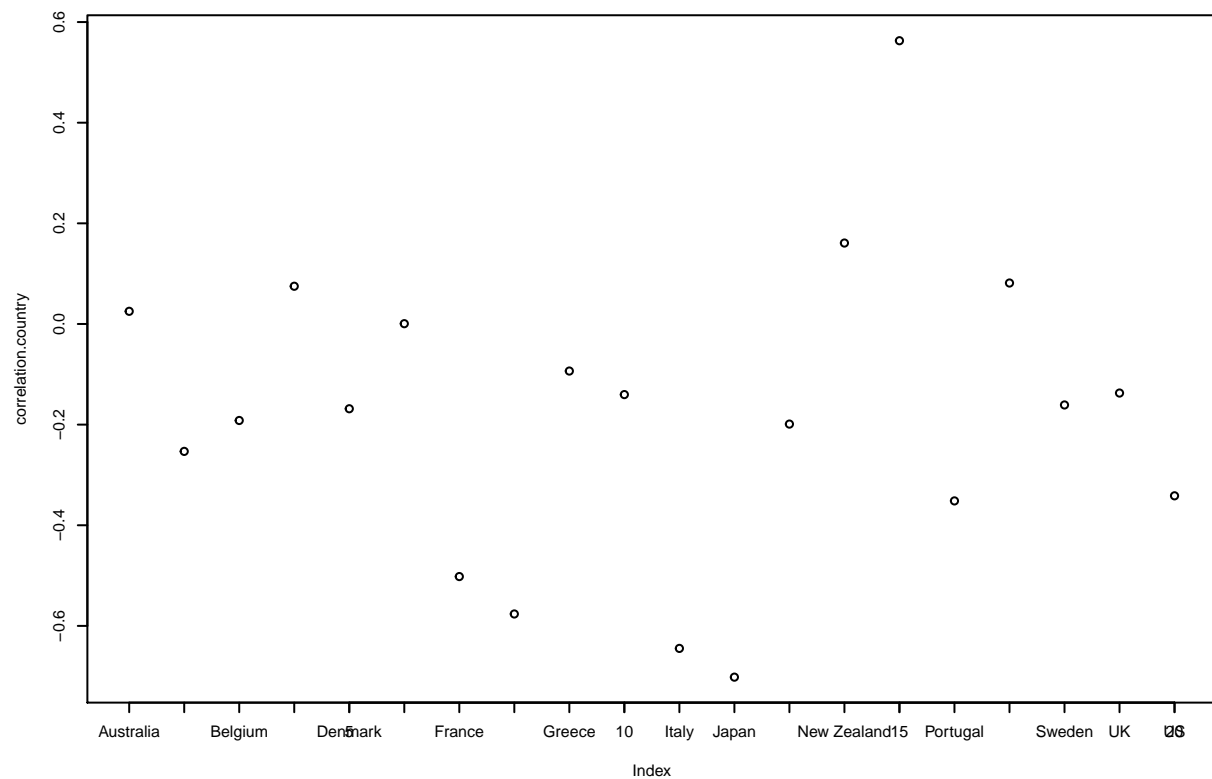
```
## [1] -0.177822
```

```
hist(correlation.country)
```

## Histogram of correlation.country



```
par(cex=0.5)
plot(correlation.country)
axis(1,at=1:20,labels=names(correlation.country))
```



-Part c

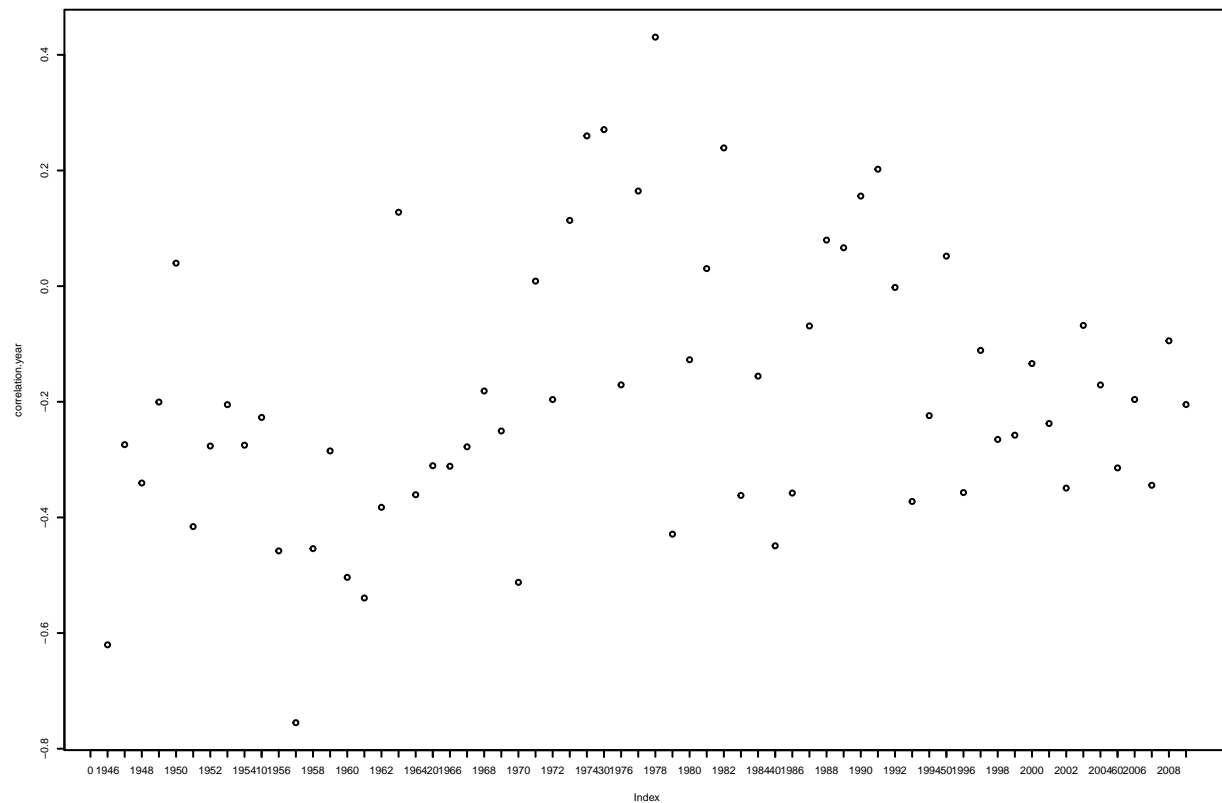
```
year<-split(debt,debt$Year)
names(year)
```

```
## [1] "1946" "1947" "1948" "1949" "1950" "1951" "1952" "1953" "1954" "1955"
## [11] "1956" "1957" "1958" "1959" "1960" "1961" "1962" "1963" "1964" "1965"
## [21] "1966" "1967" "1968" "1969" "1970" "1971" "1972" "1973" "1974" "1975"
## [31] "1976" "1977" "1978" "1979" "1980" "1981" "1982" "1983" "1984" "1985"
## [41] "1986" "1987" "1988" "1989" "1990" "1991" "1992" "1993" "1994" "1995"
## [51] "1996" "1997" "1998" "1999" "2000" "2001" "2002" "2003" "2004" "2005"
## [61] "2006" "2007" "2008" "2009"
```

```
correlation.year<- sapply(year,index_cor)
mean(correlation.year)
```

```
## [1] -0.1905526
```

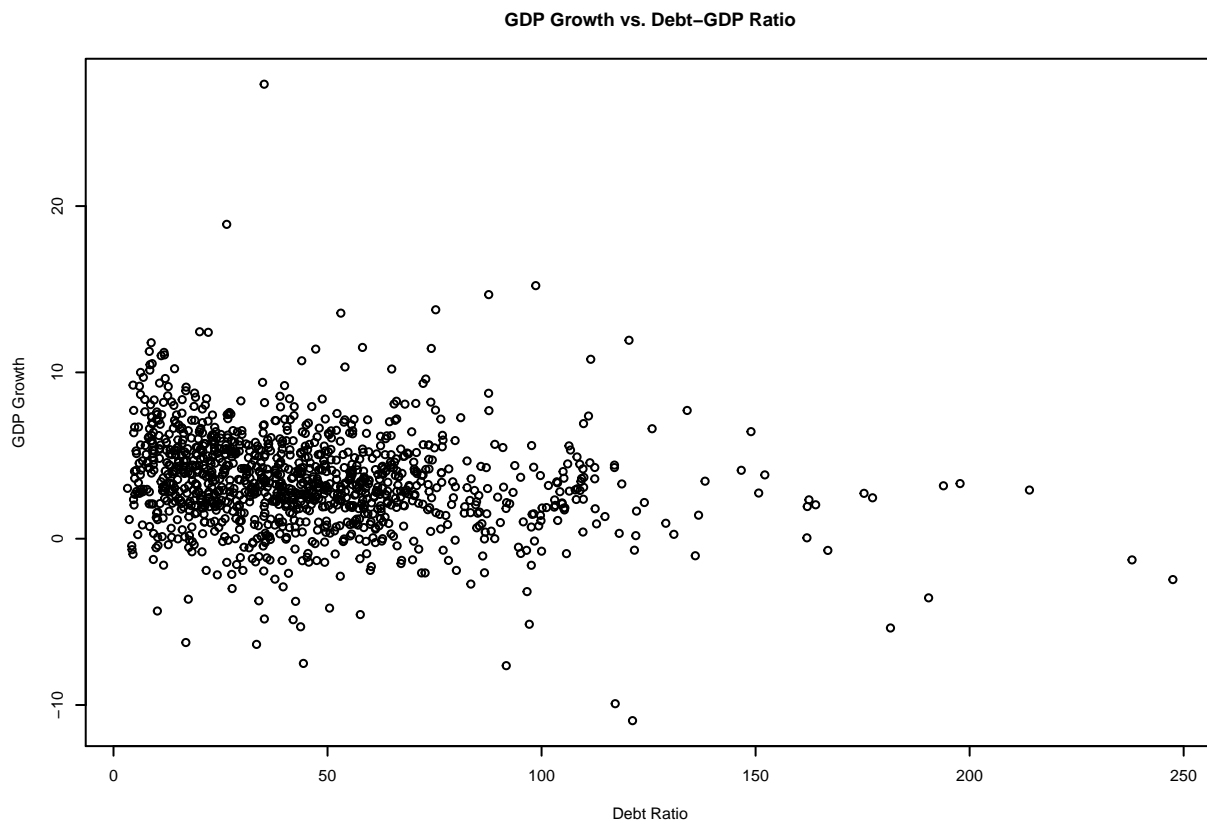
```
par(cex=0.35)
plot(correlation.year)
axis(1,at=1:64,labels=names(correlation.year))
```



-**Part d** Yes there are a few European countries that seem to be outside the trend. Such as Norway, Italy, Germany and France. Also Japan seems to be outside the general trend as well. For the years I would say that 1946, 1957 and 1978 seem to be outside the general trend. There is more variability in the correlation between the year than there is for the countries.

## Problem 5

```
par(cex=0.5)
plot(debt$ratio,debt$growth, main="GDP Growth vs. Debt-GDP Ratio", xlab="Debt Ratio",ylab="GDP Growth")
```



Yes the shape does match what I expected from problem 4 specially because we can observe the GDP growth decreasing as the debt ratio increases. So they are negatively correlated which can be seen in the graphs in problem 4 as the correlations between the debt and GDP growth are in the negative region.