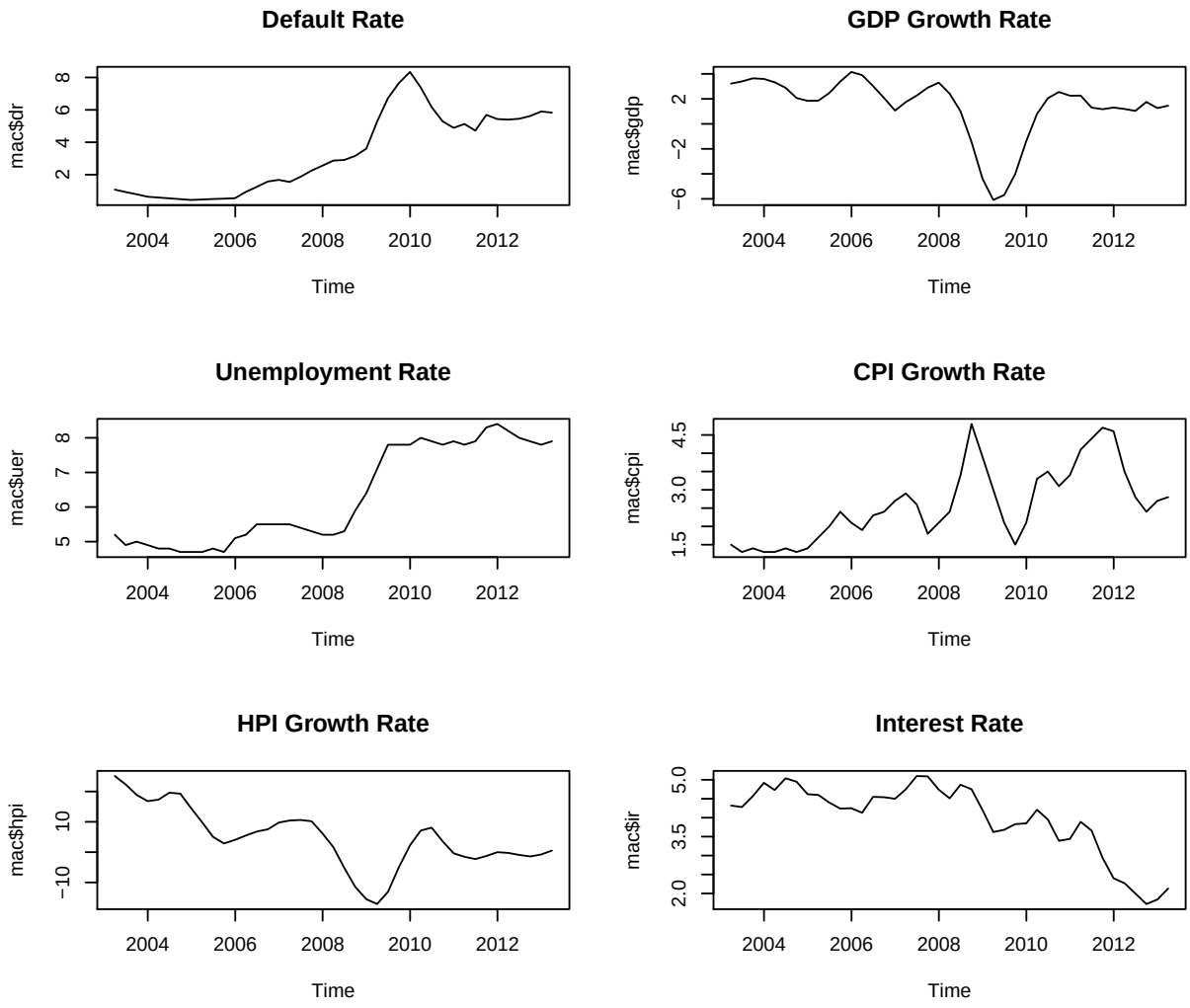
Default Rate Regression Against MVs

```
#setwd('z:/Model Risk/Adam/IFRS9_CECL_MV/')

mac <- read.csv('z:/Model Risk/Adam/IFRS9_CECL_MV/data/chap3drts.csv', header=TRUE, sep=",", dec='.')
mac$Date <- as.Date(mac$Date, format='%m/%d/%Y')

oldpar <- par()
par(mfrow=c(3,2))

plot(y=mac$dr, x=mac$Date, main='Default Rate', type='l', xlab = 'Time')
plot(y=mac$gdp, x=mac$Date, main='GDP Growth Rate', type='l', xlab = 'Time')
plot(y=mac$uer, x=mac$Date, main='Unemployment Rate', type='l', xlab = 'Time')
plot(y=mac$cpi, x=mac$Date, main='CPI Growth Rate', type='l', xlab = 'Time')
plot(y=mac$hpi, x=mac$Date, main='HPI Growth Rate', type='l', xlab = 'Time')
plot(y=mac$ir, x=mac$Date, main='Interest Rate', type='l', xlab = 'Time')
```



KPSS testing Test for stationarity of level and trend.

```
library(tseries)

tbl <- as.data.frame(matrix(data = rep(NA, 18), nrow = 6, ncol = 2),row.names = c('DR','GDP_growth','UE
colnames(tbl) <- c('Level (p-value)', 'Trend (p-value)')

for (i in 2:length(colnames(mac))) {
  tbl[i-1,1] <- round(kpss.test(mac[,i], null='Level', lshort=TRUE)$p.value,3)
  tbl[i-1,2] <- round(kpss.test(mac[,i], null='Trend', lshort=TRUE)$p.value,3)
}
```

```
## Warning in kpss.test(mac[, i], null = "Level", lshort = TRUE): p-value
## smaller than printed p-value

## Warning in kpss.test(mac[, i], null = "Trend", lshort = TRUE): p-value
## greater than printed p-value

## Warning in kpss.test(mac[, i], null = "Level", lshort = TRUE): p-value
## greater than printed p-value

## Warning in kpss.test(mac[, i], null = "Trend", lshort = TRUE): p-value
## greater than printed p-value

## Warning in kpss.test(mac[, i], null = "Level", lshort = TRUE): p-value
## smaller than printed p-value

## Warning in kpss.test(mac[, i], null = "Level", lshort = TRUE): p-value
## smaller than printed p-value

## Warning in kpss.test(mac[, i], null = "Trend", lshort = TRUE): p-value
## greater than printed p-value

## Warning in kpss.test(mac[, i], null = "Level", lshort = TRUE): p-value
## smaller than printed p-value

## Warning in kpss.test(mac[, i], null = "Trend", lshort = TRUE): p-value
## smaller than printed p-value
```

```
print(tbl)
```

```
##            Level (p-value) Trend (p-value)
## DR                   0.010           0.100
## GDP_growth           0.100           0.100
## UER                  0.010           0.076
## CPI_growth           0.010           0.100
## HPI_growth           0.017           0.060
## IR                   0.010           0.010
```