R_code_Robustness_check

2023-05-10

Robustness check

DATA Processing

Read in data

```
TE$Date <- as.Date(TE$Date, format = "%m/%d/%Y")
TE <- TE[order(TE$Date),]
TE <- TE[TE$Date>= as.Date("2012-01-01") & TE$Date<= as.Date("2022-12-31"),]
TE <- as.xts(TE)
```

```
logEX <- log(DEXTAUS)
dlogEX <- diff(logEX, lag=1, differences=1)
dlogEX <- na.omit(dlogEX)

logGSPC <- log(GSPC)
dlogGSPC <- diff(logGSPC, lag=1, differences=1)
dlogGSPC <- na.omit(dlogGSPC$GSPC.Close)

logTWII <- log(TWII)
dlogTWII <- diff(logTWII, lag=1, differences=1)
dlogTWII <- na.omit(dlogTWII$TWII.Close)

logTE <- log(TE)
dlogTE <- diff(logTE, lag = 1, differences = 1)
dlogTE <- na.omit(dlogTE)
```

```
date_dlogGSPC <- index(dlogGSPC)
date_dlogTWII <- index(dlogTWII)
date_dlogEX <- index(dlogEX)
date_dlogTE <- index(dlogTE)

common_date_TWII_12 <- Reduce(intersect, list(date_dlogEX, date_dlogGSPC, date_dlogTWII, date_dlogTE))



dlogTWII_common_12 <- dlogTWII[common_date_TWII_12]
dlogGSPC_common_TWII_12 <- dlogGSPC[common_date_TWII_12]
x_TWII_12 <- dlogTWII_common_12-dlogGSPC_common_TWII_12
y_TWII_12 <- dlogEX[common_date_TWII_12]


dlogTWII_common_12 <- data.frame(dlogTWII_common_12)
dlogGSPC_common_TWII_12 <- data.frame(dlogGSPC_common_TWII_12)
x_TWII_12 <- data.frame(x_TWII_12)
```

```r
y_TWII_12 <- data.frame(y_TWII_12)


training_y_TWII_12 <- head(y_TWII_12, -20)
training_x_TWII_12 <- head(x_TWII_12,-20)

TWII_train_df_12 <- data.frame(training_y_TWII_12, training_x_TWII_12)


testing_y_TWII_12 <- tail(y_TWII_12, 20)
testing_x_TWII_12 <- tail(x_TWII_12, 20)

TWII_test_df_12 <- data.frame(testing_y_TWII_12, testing_x_TWII_12)
```

```r
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.1     v purrr     1.0.1
## v forcats   1.0.0     v stringr   1.5.0
## v ggplot2   3.4.1     v tibble    3.2.1
## v lubridate 1.9.2     v tidyr     1.3.0
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::first()  masks xts::first()
## x dplyr::lag()    masks stats::lag()
## x dplyr::last()   masks xts::last()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```r
library(lmtest)
library(sandwich)
reg_TWII_12 <- lm(DEXTAUS~ TWII.Close, data = TWII_train_df_12)
cat("OLS with Heteroskedasticity and Autocorrelation (HAC) Robust S.E.\n")
```

```
## OLS with Heteroskedasticity and Autocorrelation (HAC) Robust S.E.
```

```r
hac_se_TWII_12 <- coeftest(reg_TWII_12, vcov=NeweyWest)
hac_se_TWII_12
```

```
##
## t test of coefficients:
##
##                Estimate  Std. Error t value Pr(>|t|)
## (Intercept) -4.5682e-06  5.3495e-05 -0.0854  0.93195
## TWII.Close  -1.2441e-02  5.9988e-03 -2.0740  0.03818 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
library(forecast)
predict_TWII_12 <- predict(reg_TWII_12, newdata = TWII_test_df_12)

mean((predict_TWII_12-tail(testing_y_TWII_12$DEXTAUS, 20))^2)
```

```
## [1] 5.306486e-06
```

```r
d_TWII_12 <- (testing_y_TWII_12$DEXTAUS)^2-(predict_TWII_12-tail(testing_y_TWII_12$DEXTAUS, 20))^2

d_df_12 <- data.frame(d_TWII_12)
```

```r
reg_d_TWII_12 <- lm(d_TWII_12~1, data=d_df_12)
coeftest(reg_d_TWII_12, vcov=NeweyWest)
```

```
##
## t test of coefficients:
##
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) 5.0552e-08 1.5184e-07  0.3329   0.7428
```