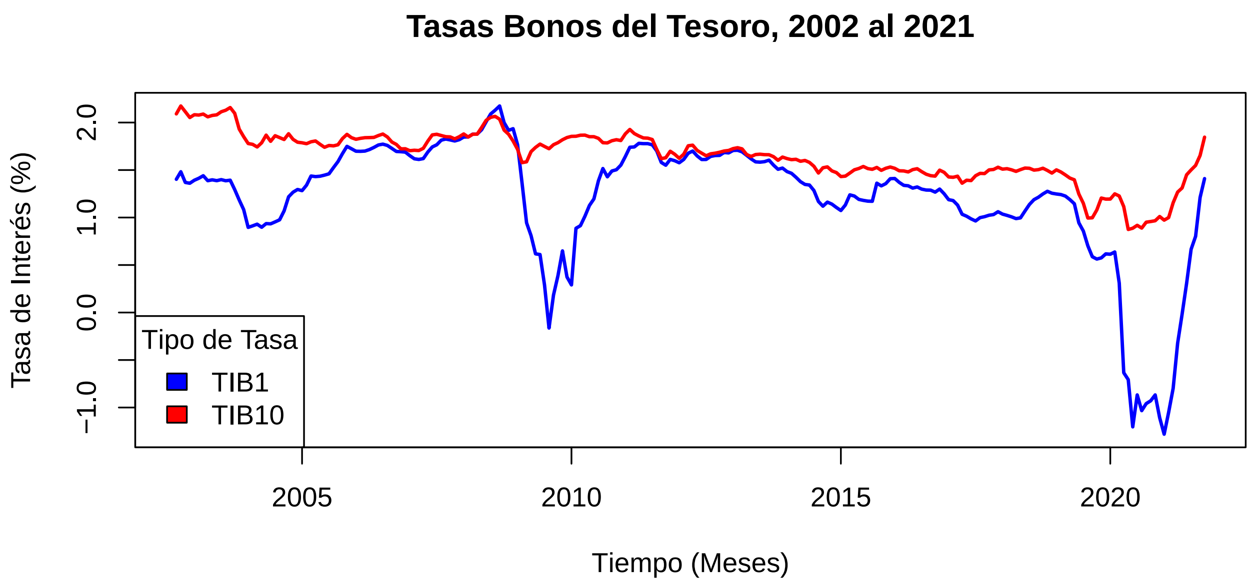
Ejercicio Empírico 6

Profesor: Mauricio Tejada - Estudiante: Matías Vicuña

18/11/2022

Parte 1



Parte 2

TIB1

Test DF TIB1 con Tendencia.

```
##
## ###############################################
## # Augmented Dickey-Fuller Test Unit Root Test #
## ###############################################
##
## Test regression trend
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + tt + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.45476 -0.08858  0.00960  0.13987  1.05061
##
```

```
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.1798487  0.0789299   2.279  0.02363 *
## z.lag.1     -0.0361104  0.0130382  -2.770  0.00608 **
## tt          -0.0003517  0.0003282  -1.072  0.28501
## z.diff.lag   0.5141924  0.0580460   8.858 2.54e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2812 on 224 degrees of freedom
## Multiple R-squared:  0.2676, Adjusted R-squared:  0.2578
## F-statistic: 27.29 on 3 and 224 DF,  p-value: 4.437e-15
##
##
## Value of test-statistic is: -2.7696 2.6058 3.9087
##
## Critical values for test statistics:
##       1pct  5pct 10pct
## tau3 -3.99 -3.43 -3.13
## phi2  6.22  4.75  4.07
## phi3  8.43  6.49  5.47
```

Test DF TIB1 con Drift.

```
##
## ###############################################
## # Augmented Dickey-Fuller Test Unit Root Test #
## ###############################################
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.47363 -0.09452  0.00063  0.14296  1.07735
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.11200    0.04715   2.375   0.0184 *
## z.lag.1     -0.02904    0.01125  -2.582   0.0105 *
## z.diff.lag   0.51109    0.05799   8.813 3.37e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2813 on 225 degrees of freedom
## Multiple R-squared:  0.2639, Adjusted R-squared:  0.2573
## F-statistic: 40.33 on 2 and 225 DF,  p-value: 1.076e-15
##
##
## Value of test-statistic is: -2.5816 3.3323
##
## Critical values for test statistics:
```

```
##       1pct  5pct 10pct
## tau2 -3.46 -2.88 -2.57
## phi1  6.52  4.63  3.81
```

Test DF TIB1 método None.

```
##
## ###############################################
## # Augmented Dickey-Fuller Test Unit Root Test #
## ###############################################
##
## Test regression none
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 - 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.57265 -0.07494  0.03241  0.16209  1.15502
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## z.lag.1    -0.004493   0.004491  -1.001    0.318
## z.diff.lag  0.498199   0.058329   8.541 1.98e-15 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2842 on 226 degrees of freedom
## Multiple R-squared:  0.2454, Adjusted R-squared:  0.2388
## F-statistic: 36.75 on 2 and 226 DF,  p-value: 1.514e-14
##
##
## Value of test-statistic is: -1.0005
##
## Critical values for test statistics:
##       1pct  5pct 10pct
## tau1 -2.58 -1.95 -1.62
```

Comprobamos Raíz Unitaria con Orden de Cointegración

```
## [1] 1
```

Respuesta: Se comprueba que mediante los test de raiz unitaria, el bono de tesoro TIB1 se observa que hay condiciones para la Cointegración de Orden 1.

TIB10

Test DF TIB10 con Tendencia.

```
##
## ###############################################
## # Augmented Dickey-Fuller Test Unit Root Test #
## ###############################################
##
## Test regression trend
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + tt + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.89674 -0.11631 -0.00227  0.11715  1.01029
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.5805950  0.1885851   3.079 0.002339 **
## z.lag.1     -0.0855131  0.0251208  -3.404 0.000786 ***
## tt          -0.0011175  0.0005047  -2.214 0.027836 *
## z.diff.lag   0.4274467  0.0636320   6.717 1.51e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.234 on 224 degrees of freedom
## Multiple R-squared:  0.1922, Adjusted R-squared:  0.1814
## F-statistic: 17.77 on 3 and 224 DF,  p-value: 2.205e-10
##
##
## Value of test-statistic is: -3.4041 4.8722 7.2344
##
## Critical values for test statistics:
##       1pct  5pct 10pct
## tau3 -3.99 -3.43 -3.13
## phi2  6.22  4.75  4.07
## phi3  8.43  6.49  5.47
```

Test DF TIB10 con Drift.

```
##
## ###############################################
## # Augmented Dickey-Fuller Test Unit Root Test #
## ###############################################
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
```

```
## -0.93831 -0.12110  0.00142  0.11931  0.90786
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.18844    0.06530   2.886  0.00428 **
## z.lag.1     -0.03636    0.01186  -3.067  0.00243 **
## z.diff.lag   0.39255    0.06218   6.313 1.44e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.236 on 225 degrees of freedom
## Multiple R-squared:  0.1746, Adjusted R-squared:  0.1672
## F-statistic: 23.79 on 2 and 225 DF,  p-value: 4.231e-10
##
##
## Value of test-statistic is: -3.0666 4.7746
##
## Critical values for test statistics:
##       1pct  5pct 10pct
## tau2 -3.46 -2.88 -2.57
## phi1  6.52  4.63  3.81
```

Test DF TIB10 método None.

```
##
## ###############################################
## # Augmented Dickey-Fuller Test Unit Root Test #
## ###############################################
##
## Test regression none
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 - 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.02556 -0.09624  0.01918  0.12962  0.92798
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## z.lag.1    -0.003141   0.002888  -1.088    0.278
## z.diff.lag  0.382433   0.063081   6.063 5.56e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2398 on 226 degrees of freedom
## Multiple R-squared:  0.1455, Adjusted R-squared:  0.138
## F-statistic: 19.24 on 2 and 226 DF,  p-value: 1.917e-08
##
##
## Value of test-statistic is: -1.0877
##
## Critical values for test statistics:
##       1pct  5pct 10pct
```

```
## tau1 -2.58 -1.95 -1.62
```

Comprobamos Raíz Unitaria con Orden de Cointegración

```
## [1] 1
```

Respuesta: Se comprueba que mediante los test de raiz unitaria, el bono de tesoro TIB10 se observa que hay condiciones para la Cointegración de Orden 1.

Parte 3

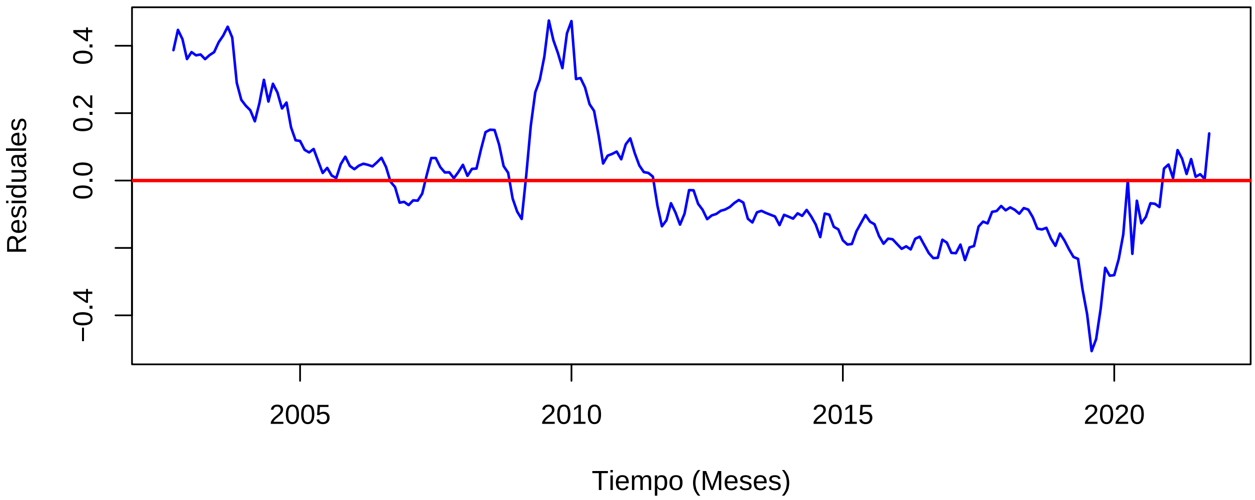
Table 1:

	Dependent variable:
	lTIB10
lTIB1	0.290***
	(0.019)
Constant	1.297***
	(0.026)
Observations	230
R^2	0.499
Adjusted R^2	0.497
Residual Std. Error	0.191 (df = 228)
F Statistic	227.027*** (df = 1; 228)
Note:	$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

La interpretación es que, ceteris paribus, el efecto de TIB1 sobre TIB10 es cercano a cero, con un p-value de $< 2.2e-16$, por tanto, la variación de la tasa a 10 años sobre la variación en 1 a 1 año es prácticamente infima.

Parte 4

Gráfico de Residuales del Modelo.



Realizamos el test de DF con los residuales.

```
##
## ###############################################
## # Augmented Dickey-Fuller Test Unit Root Test #
## ###############################################
##
## Test regression none
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 - 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.22948 -0.02653 -0.00677  0.01833  0.16176
##
## Coefficients:
##            Estimate Std. Error t value Pr(>|t|)
## z.lag.1    -0.04464    0.01758  -2.540   0.0118 *
## z.diff.lag  0.06278    0.06775   0.927   0.3551
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.04736 on 221 degrees of freedom
## Multiple R-squared:  0.0304, Adjusted R-squared:  0.02163
## F-statistic: 3.465 on 2 and 221 DF,  p-value: 0.03298
##
##
## Value of test-statistic is: -2.5398
##
## Critical values for test statistics:
##       1pct  5pct 10pct
## tau1 -2.58 -1.95 -1.62
```

Corroboramos Cointegración

```
## [1] 1
```

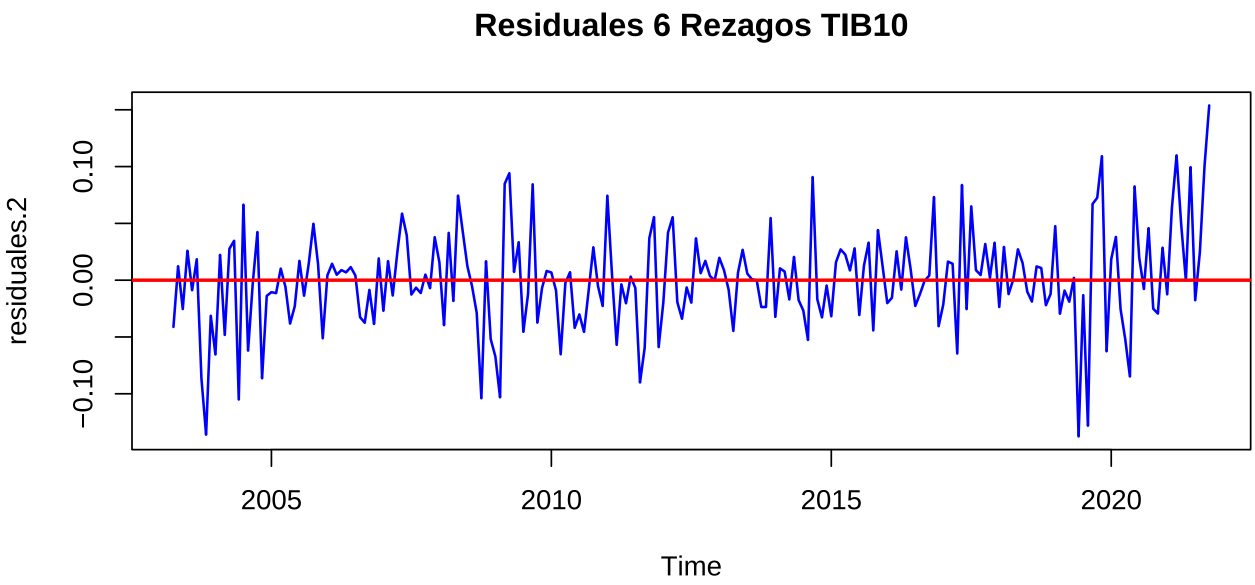
Tiene un orden de Cointegración de 1, por tanto, si se confirma la relación a largo plazo de las tasas.

Parte 5

Modelo de Rezagos con TIB10

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Fri, Nov 18, 2022 - 23:40:16

Residuos del Modelo



Test de DF con el Modelo

```
##
## ###############################################
## # Augmented Dickey-Fuller Test Unit Root Test #
## ###############################################
##
## Test regression none
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 - 1 + z.diff.lag)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.137164 -0.023206  0.000146  0.023230  0.150183
##
## Coefficients:
##            Estimate Std. Error t value Pr(>|t|)
## z.lag.1    -0.94718    0.09927  -9.541   <2e-16 ***
## z.diff.lag -0.02217    0.07023  -0.316    0.753
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.04397 on 219 degrees of freedom
## Multiple R-squared:  0.4708, Adjusted R-squared:  0.4659
## F-statistic: 97.41 on 2 and 219 DF,  p-value: < 2.2e-16
```

Table 2:

	Dependent variable:
	diff.lTIB10
L(diff.lTIB10, 1:6)1	0.330^{***}
	(0.075)
L(diff.lTIB10, 1:6)2	-0.198^{**}
	(0.080)
L(diff.lTIB10, 1:6)3	0.075
	(0.080)
L(diff.lTIB10, 1:6)4	-0.091
	(0.080)
L(diff.lTIB10, 1:6)5	-0.002
	(0.079)
L(diff.lTIB10, 1:6)6	-0.126^{*}
	(0.075)
L(diff.lTIB1, 1:6)1	0.104^{***}
	(0.027)
L(diff.lTIB1, 1:6)2	0.010
	(0.027)
L(diff.lTIB1, 1:6)3	-0.040
	(0.027)
L(diff.lTIB1, 1:6)4	0.044
	(0.028)
L(diff.lTIB1, 1:6)5	0.002
	(0.027)
L(diff.lTIB1, 1:6)6	-0.024
	(0.027)
residuales	0.033^{*}
	(0.018)
Constant	-0.001
	(0.003)
Observations	223
R^2	0.259
Adjusted R^2	0.213
Residual Std. Error	0.045 (df = 209)
F Statistic	5.634^{***} (df = 13; 209)
Note:	*p<0.1; **p<0.05; ***p<0.01

```
##
##
## Value of test-statistic is: -9.5413
##
## Critical values for test statistics:
##       1pct  5pct 10pct
## tau1 -2.58 -1.95 -1.62
```

Corroboramos

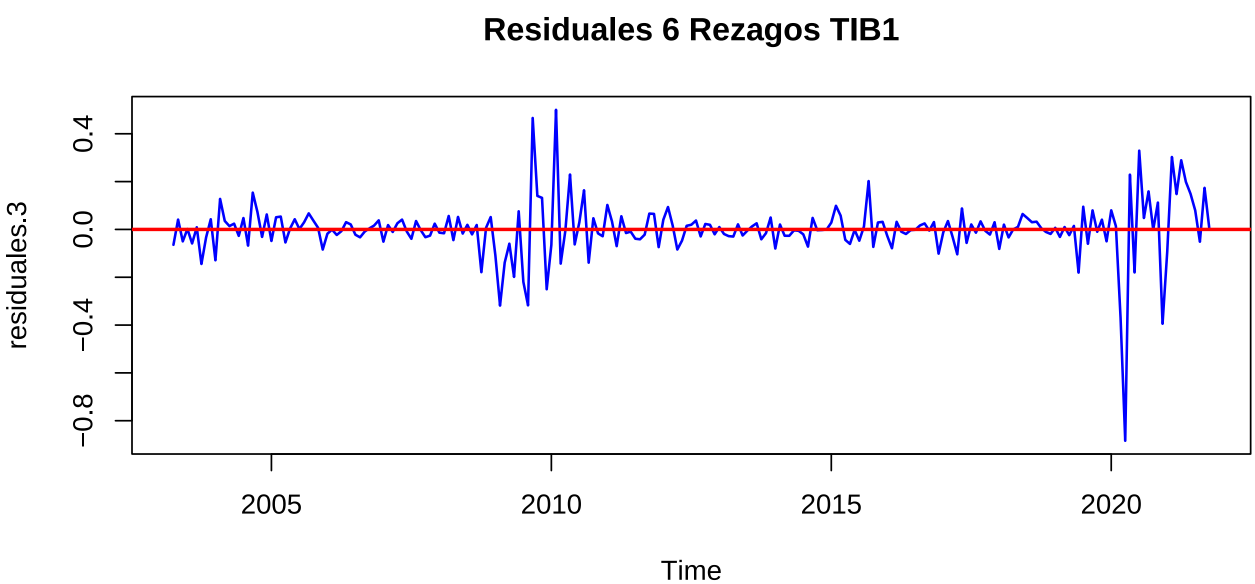
```
## [1] 1
```

Conclusión: el modelo de 6 rezagos de TIB10 es de orden de cointegración 1, por tanto, habría relación al LP.

Modelo de Rezagos con TIB1

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Fri, Nov 18, 2022 - 23:40:17

Residuos del Modelo



Test de DF del Modelo

```
##
## ###############################################
## # Augmented Dickey-Fuller Test Unit Root Test #
## ###############################################
##
## Test regression none
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 - 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
```

Table 3:

	Dependent variable:
	diff.lTIB1
L(diff.lTIB10, 1:6)1	0.896***
	(0.204)
L(diff.lTIB10, 1:6)2	−0.346
	(0.216)
L(diff.lTIB10, 1:6)3	0.294
	(0.218)
L(diff.lTIB10, 1:6)4	−0.239
	(0.216)
L(diff.lTIB10, 1:6)5	0.157
	(0.214)
L(diff.lTIB10, 1:6)6	0.054
	(0.204)
L(diff.lTIB1, 1:6)1	0.197***
	(0.074)
L(diff.lTIB1, 1:6)2	0.141*
	(0.074)
L(diff.lTIB1, 1:6)3	−0.084
	(0.074)
L(diff.lTIB1, 1:6)4	0.137*
	(0.075)
L(diff.lTIB1, 1:6)5	0.191**
	(0.075)
L(diff.lTIB1, 1:6)6	−0.127*
	(0.074)
residuales	0.019
	(0.048)
Constant	0.003
	(0.008)
Observations	223
R^2	0.287
Adjusted R^2	0.243
Residual Std. Error	0.122 (df = 209)
F Statistic	6.471*** (df = 13; 209)
Note:	*p<0.1; **p<0.05; ***p<0.01

```
## -0.88666 -0.03140  0.00002  0.03640  0.49965
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## z.lag.1    -1.0077169  0.0961593 -10.480   <2e-16 ***
## z.diff.lag  0.0002559  0.0678406   0.004    0.997
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1194 on 219 degrees of freedom
## Multiple R-squared:  0.5039, Adjusted R-squared:  0.4993
## F-statistic: 111.2 on 2 and 219 DF,  p-value: < 2.2e-16
##
##
## Value of test-statistic is: -10.4797
##
## Critical values for test statistics:
##       1pct  5pct 10pct
## tau1 -2.58 -1.95 -1.62
```

Corroboramos

```
## [1] 0
```

Conclusión: el modelo de 6 rezagos de TIB1 es de orden de cointegración 0, por tanto, habría relación al LP.