Contagio financiero a través del Índice de contagio

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```
# leer los datos
library(readr)
library(reshape2)
library(ggplot2)
library(dplyr)
```

```
Adjuntando el paquete: 'dplyr'

The following objects are masked from 'package:stats':

    filter, lag

The following objects are masked from 'package:base':

    intersect, setdiff, setequal, union
```

```
library(gridExtra)
```

```
Adjuntando el paquete: 'gridExtra'

The following object is masked from 'package:dplyr':

    combine
```

```
library(moments)
library(tseries)
```

```
Registered S3 method overwritten by 'quantmod':
  method            from
  as.zoo.data.frame zoo
```

```r
library(ConnectednessApproach)
```

```
Warning: package 'ConnectednessApproach' was built under R version 4.4.2
```

```
Please cite as:
```

```
 Gabauer, David (2022). ConnectednessApproach.
```

```
 R package version 1.0.0. https://CRAN.R-project.org/package=ConnectednessApproach
```

```r
library(zoo)
```

```
Adjuntando el paquete: 'zoo'
```

```
The following objects are masked from 'package:base':
```

```
    as.Date, as.Date.numeric
```

```r
library(kableExtra)
```

```
Warning: package 'kableExtra' was built under R version 4.4.2
```

```
Adjuntando el paquete: 'kableExtra'
```

```
The following object is masked from 'package:dplyr':
```

```
    group_rows
```

```r
library(vars)
```

```
Warning: package 'vars' was built under R version 4.4.2
```

```
Cargando paquete requerido: MASS
```

```
Adjuntando el paquete: 'MASS'
```

```
The following object is masked from 'package:dplyr':
```

```
    select
```

```
Cargando paquete requerido: strucchange

Warning: package 'strucchange' was built under R version 4.4.2

Cargando paquete requerido: sandwich

Warning: package 'sandwich' was built under R version 4.4.2

Cargando paquete requerido: urca

Cargando paquete requerido: lmtest


Adjuntando el paquete: 'vars'

The following object is masked from 'package:ConnectednessApproach':

    VAR
```

```
rets <- read_csv("~/series-wp/exchange_rates_returns.csv")
```

```
Rows: 5289 Columns: 15

-- Column specification --------------------------------------------------------
Delimiter: ","
dbl  (14): ARS, BRL, CLP, COP, CRC, DOP, GTQ, HNL, MXN, NIO, PAB, PEN, PYG, UYU
date  (1): Date

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
vals <- read_csv("~/series-wp/exchange_rates_values.csv")
```

```
Rows: 5290 Columns: 15
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl  (14): ARS, BRL, CLP, COP, CRC, DOP, GTQ, HNL, MXN, NIO, PAB, PEN, PYG, UYU
date  (1): Date

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```r
rets <- dplyr::select(rets, -c(PAB))
vals <- dplyr::select(vals, -c(PAB))

# graficar los datos

vals$Date <- as.Date(vals$Date)
rets$Date <- as.Date(rets$Date)


vals_long <- melt(vals, id.vars = "Date", variable.name = "Series", value.name = "Value")
```

Resumen

Palabras clave:

Abstract

Keywords:

Introducción

Contexto histórico sobre el mercado financiero

Combinación histórica y estudios sobre el mercado financiero

Relevancia del estudio del contagio financiero y mención a algunas fuentes

Objetivo del proyecto

Estructura

Revisión de literatura

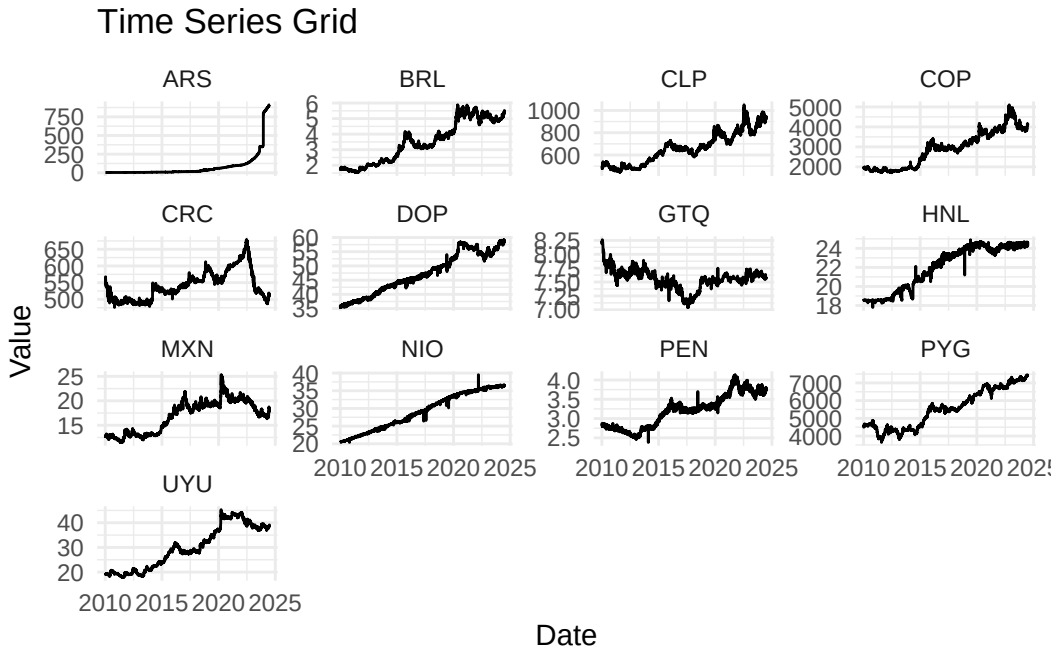
Mercado bursátil

Contagio financiero

Diebold-Yilmaz

Datos

```
ggplot(vals_long, aes(x = Date, y = Value)) +
  geom_line() +
  facet_wrap(~ Series, nrow = 4, ncol = 4, scales = "free_y") +
  theme_minimal() +
  labs(title = "Time Series Grid", x = "Date", y = "Value")
```



```r
series_names <- c("ARS", "BRL", "CLP", "COP", "CRC", "DOP",
                  "GTQ", "HNL", "MXN", "NIO", "PEN", "PYG", "UYU")

stats <- data.frame(
  Statistic = c("Mean", "Variance", "Min", "Max", "Median", "Skewness", "Kurtosis"),
  ARS = c(mean(vals$ARS), var(vals$ARS), min(vals$ARS), max(vals$ARS), median(vals$ARS), skewness(val
  BRL = c(mean(vals$BRL), var(vals$BRL), min(vals$BRL), max(vals$BRL), median(vals$BRL), skewness(val
  CLP = c(mean(vals$CLP), var(vals$CLP), min(vals$CLP), max(vals$CLP), median(vals$CLP), skewness(val
  COP = c(mean(vals$COP), var(vals$COP), min(vals$COP), max(vals$COP), median(vals$COP), skewness(val
  CRC = c(mean(vals$CRC), var(vals$CRC), min(vals$CRC), max(vals$CRC), median(vals$CRC), skewness(val
  DOP = c(mean(vals$DOP), var(vals$DOP), min(vals$DOP), max(vals$DOP), median(vals$DOP), skewness(val
  GTQ = c(mean(vals$GTQ), var(vals$GTQ), min(vals$GTQ), max(vals$GTQ), median(vals$GTQ), skewness(val
  HNL = c(mean(vals$HNL), var(vals$HNL), min(vals$HNL), max(vals$HNL), median(vals$HNL), skewness(val
  MXN = c(mean(vals$MXN), var(vals$MXN), min(vals$MXN), max(vals$MXN), median(vals$MXN), skewness(val
  NIO = c(mean(vals$NIO), var(vals$NIO), min(vals$NIO), max(vals$NIO), median(vals$NIO), skewness(val
  PEN = c(mean(vals$PEN), var(vals$PEN), min(vals$PEN), max(vals$PEN), median(vals$PEN), skewness(val
  PYG = c(mean(vals$PYG), var(vals$PYG), min(vals$PYG), max(vals$PYG), median(vals$PYG), skewness(val
  UYU = c(mean(vals$UYU), var(vals$UYU), min(vals$UYU), max(vals$UYU), median(vals$UYU), skewness(val
)

rownames(stats) <- stats$Statistic
stats <- dplyr::select(stats, -c(Statistic))

print(stats)
```

```
                ARS       BRL          CLP          COP          CRC
Mean       79.830672 3.4969053   660.529239 2.913696e+03  541.5401880
Variance 28403.832257 1.7650688 19601.160463 8.020871e+05 1938.7774795
Min          3.736200 1.5337000   442.670013 1.715500e+03  475.8200073
Max        911.003601 5.8864002  1050.260010 5.106000e+03  678.3659668
Median      15.833000 3.3581834   658.899984 2.945150e+03  532.4349976
Skewness     3.727441 0.1076163     0.320086 2.137228e-01    0.7372403
Kurtosis    17.022852 1.6293691     2.165249 1.925449e+00    2.8998241
                DOP         GTQ        HNL        MXN         NIO        PEN
Mean     47.36807960  7.55790040 22.0443283 16.8533138 29.19888946 3.21271679
Variance 49.89647036  0.03253978  5.3416957 10.5773466 27.14359422 0.18044011
Min      35.39599991  7.04269981 17.7950001 11.4890003 20.39200020 2.38199997
Max      59.20000076  8.26130009 24.8999996 25.3362007 39.52999878 4.13600016
Median   46.43650055  7.56570633 23.0050001 17.7620049 29.13649940 3.25951672
Skewness  0.03974217 -0.16575010 -0.4155402 -0.1222726 -0.08803696 0.07168166
Kurtosis  1.71937795  4.13245888  1.5319719  1.7180355  1.57290755 1.91466384
                PYG        UYU
Mean     5.553180e+03 29.8841657
Variance 1.158365e+06 73.9245077
Min      3.642700e+03 17.8670006
Max      7.461059e+03 45.3063850
Median   5.528100e+03 28.5640004
Skewness 9.312526e-02  0.1487073
```

```
Kurtosis 1.654361e+00  1.6039233
```

```r
cor(dplyr::select(vals, -c(Date)))
```

```
             ARS        BRL        CLP        COP          CRC        DOP
ARS  1.000000000  0.4942704  0.6367408  0.5121322 -0.007345219  0.5570013
BRL  0.494270444  1.0000000  0.9323268  0.9552890  0.710209834  0.9678287
CLP  0.636740775  0.9323268  1.0000000  0.9494621  0.610978351  0.9108726
COP  0.512132216  0.9552890  0.9494621  1.0000000  0.668064835  0.9172076
CRC -0.007345219  0.7102098  0.6109784  0.6680648  1.000000000  0.6814719
DOP  0.557001349  0.9678287  0.9108726  0.9172076  0.681471912  1.0000000
GTQ  0.081709609 -0.2491306 -0.2345722 -0.2648254 -0.312394033 -0.2938215
HNL  0.430308598  0.9099829  0.8756392  0.9059700  0.706220823  0.9326620
MXN  0.191902168  0.8625417  0.7743661  0.8326788  0.776595807  0.8334191
NIO  0.542774634  0.9550680  0.9223542  0.9444261  0.701205963  0.9795937
PEN  0.495520650  0.9492696  0.9258824  0.9542720  0.733133868  0.9162308
PYG  0.591894195  0.9549344  0.9419062  0.9640869  0.647364614  0.9418398
UYU  0.450279720  0.9837826  0.9110259  0.9366437  0.755566323  0.9655805
            GTQ        HNL        MXN        NIO        PEN        PYG
ARS  0.08170961  0.4303086  0.1919022  0.5427746  0.4955207  0.5918942
BRL -0.24913059  0.9099829  0.8625417  0.9550680  0.9492696  0.9549344
CLP -0.23457219  0.8756392  0.7743661  0.9223542  0.9258824  0.9419062
COP -0.26482542  0.9059700  0.8326788  0.9444261  0.9542720  0.9640869
CRC -0.31239403  0.7062208  0.7765958  0.7012060  0.7331339  0.6473646
DOP -0.29382154  0.9326620  0.8334191  0.9795937  0.9162308  0.9418398
GTQ  1.00000000 -0.4688290 -0.5214386 -0.3354607 -0.2813490 -0.2015132
HNL -0.46882900  1.0000000  0.9100490  0.9614622  0.8844569  0.9088004
MXN -0.52143856  0.9100490  1.0000000  0.8475399  0.8340795  0.8196842
NIO -0.33546069  0.9614622  0.8475399  1.0000000  0.9220871  0.9512105
PEN -0.28134902  0.8844569  0.8340795  0.9220871  1.0000000  0.9479907
PYG -0.20151316  0.9088004  0.8196842  0.9512105  0.9479907  1.0000000
UYU -0.24521166  0.9161556  0.8805138  0.9547095  0.9441336  0.9509955
            UYU
ARS  0.4502797
BRL  0.9837826
CLP  0.9110259
COP  0.9366437
CRC  0.7555663
DOP  0.9655805
GTQ -0.2452117
HNL  0.9161556
MXN  0.8805138
NIO  0.9547095
PEN  0.9441336
PYG  0.9509955
UYU  1.0000000
```

Qué datos se van a utilizar

Tabla con la descripción de los datos

Metodología

Diebold-Yilmaz

Modelo VAR

Modelo DCC-GARCH

DY 2012 y reseña de 2023

Análisis por región

Análisis entre potencias económicas (G8)

Análisis general

Análisis entre cabezas de región

Resultados

```
zoo_rets <- zoo(rets[ , -1], order.by = rets$Date)
zoo_vals <- zoo(vals[ , -1], order.by = rets$Date)

dca <- ConnectednessApproach(zoo_rets,
                             nlag=1,
                             nfore=10,
                             model='VAR',
                             connectedness='Time',
                             Connectedness_config=list(TimeConnectedness=list(generalized=TRUE)))
```

```
Estimating model


Computing connectedness measures


The (generalized) VAR connectedness approach is implemented according to:
 Diebold, F. X., & Yilmaz, K. (2012). Better to give than to receive: Predictive directional measurem
```

```
kable(dca$TABLE)
```

	ARS	BRL	CLP	COP	CRC	DOP	GTQ	HNL	MXN	NIO	PEN	PYG	UYU	FROM
ARS	98.61	0.15	0.14	0.16	0.03	0.01	0.01	0.20	0.03	0.11	0.51	0.01	0.02	1.39
BRL	0.12	81.41	6.08	3.45	0.05	0.05	0.15	0.02	6.85	0.04	1.43	0.04	0.30	18.59
CLP	0.10	6.16	80.24	4.16	0.06	0.66	0.39	0.23	3.30	0.05	4.31	0.14	0.18	19.76
COP	0.10	3.00	2.31	78.13	0.01	4.96	1.89	2.04	4.82	0.40	0.72	0.01	1.61	21.87

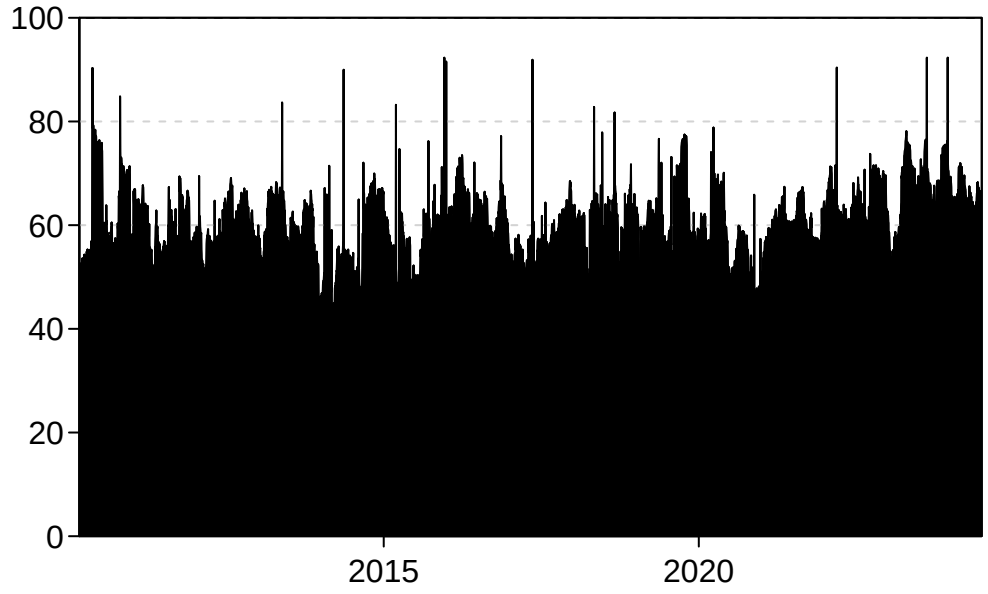
	ARS	BRL	CLP	COP	CRC	DOP	GTQ	HNL	MXN	NIO	PEN	PYG	UYU	FROM
CRC	0.04	0.05	0.16	0.17	71.56	1.51	9.54	2.38	0.50	2.82	1.21	7.04	3.01	28.44
DOP	0.01	0.06	0.04	4.21	0.01	72.01	7.89	9.76	0.32	0.96	0.95	0.16	3.62	27.99
GTQ	0.02	0.02	0.14	1.50	0.18	7.33	63.80	9.48	0.98	0.40	0.20	0.30	15.66	36.20
HNL	0.09	0.03	0.06	1.67	0.03	9.51	10.16	67.78	0.16	2.84	2.90	0.10	4.67	32.22
MXN	0.03	3.20	2.17	4.19	0.04	0.24	0.62	0.18	87.96	0.02	0.38	0.04	0.94	12.04
NIO	0.06	0.03	0.05	0.38	3.11	1.54	4.34	3.09	0.06	79.20	3.91	2.76	1.48	20.80
PEN	0.33	1.23	3.78	2.29	1.33	3.49	0.89	3.32	0.49	3.66	77.61	0.99	0.59	22.39
PYG	0.01	0.02	0.12	0.13	7.07	1.50	11.17	2.39	0.26	2.30	0.95	70.68	3.41	29.32
UYU	0.06	0.35	0.09	1.41	0.24	3.71	18.76	5.07	0.96	0.27	0.30	0.03	68.74	31.26
TO	0.97	14.31	15.14	23.73	12.16	34.52	65.80	38.16	18.73	13.87	17.77	11.62	35.49	302.26
Inc.Own	99.58	95.72	95.38	101.86	83.72	106.53	129.60	105.94	106.69	93.07	95.37	82.30	104.23	cTCI/TCI
NET	-	-	-	1.86	-	6.53	29.60	5.94	6.69	-	-	-	4.23	25.19/23.25
	0.42	4.28	4.62		16.28					6.93	4.63	17.70		
NPT	4.00	5.00	2.00	6.00	4.00	7.00	10.00	10.00	11.00	4.00	4.00	5.00	6.00	

Gráficos

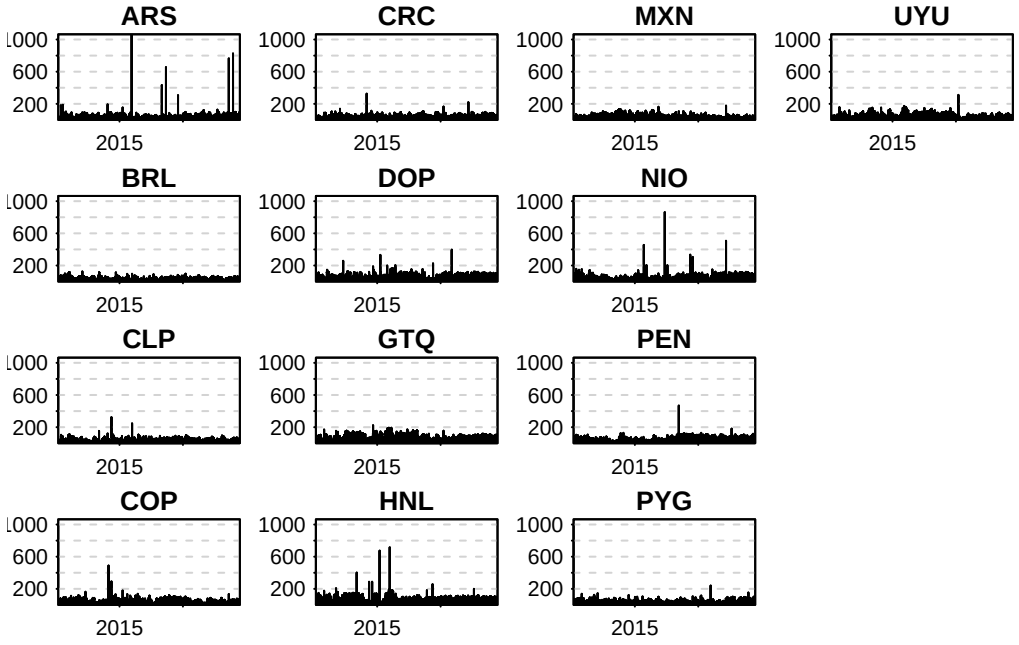
```
dca <- ConnectednessApproach(zoo_rets,
                             nlag=1,
                             nfore=10,
                             window.size=60,
                             model='VAR',
                             connectedness='Time',                Connectedness_config=list(TimeCon
```

```
Estimating model

Computing connectedness measures

The (generalized) VAR connectedness approach is implemented according to:
 Diebold, F. X., & Yilmaz, K. (2012). Better to give than to receive: Predictive directional measurem
```

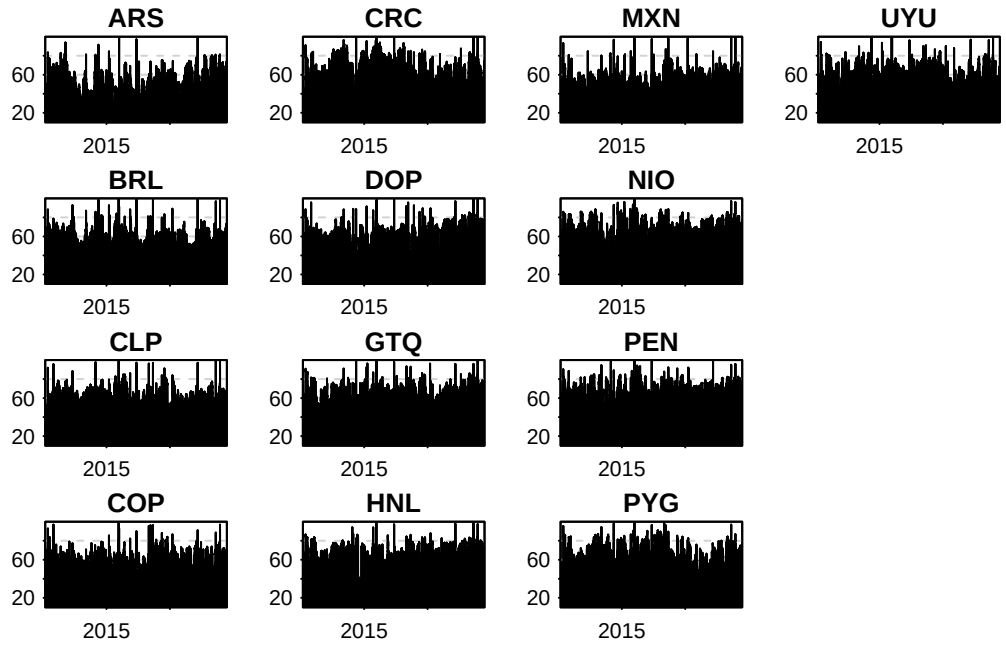
```
PlotTCI(dca)
```


100
80
60
40
20
0
2015
2020

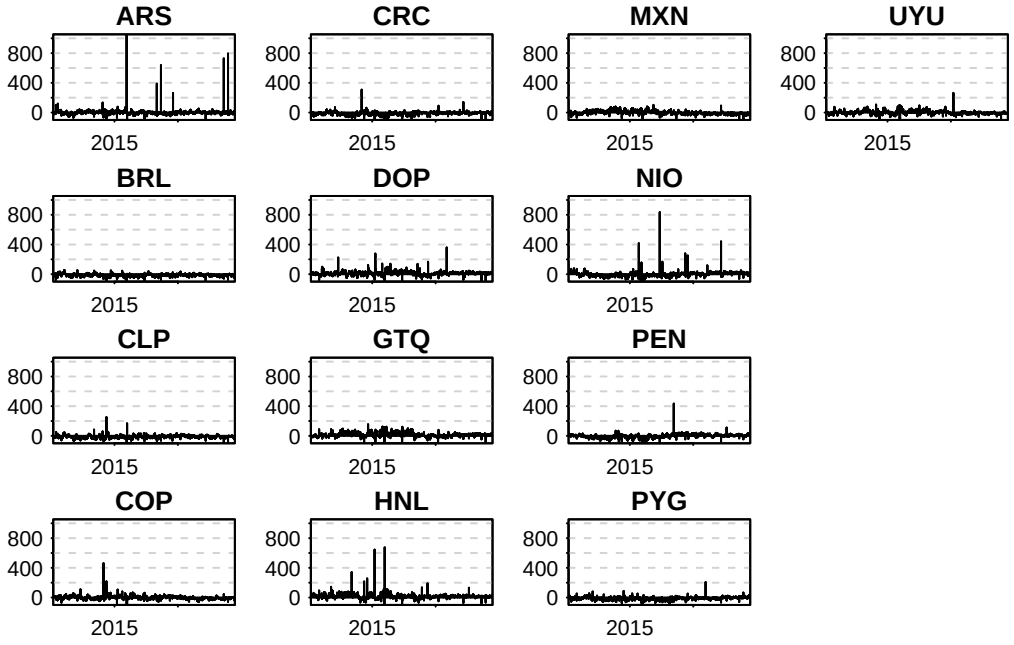
```
PlotTO(dca)
```


ARS
CRC
MXN
UYU
BRL
DOP
NIO
CLP
GTQ
PEN
COP
HNL
PYG
1000
600
200
2015

```
PlotFROM(dca)
```




```
PlotNET(dca)
```



Índices

Conclusiones

Conclusión sobre lo realizado

Conclusión sobre los hallazgos por región

Conclusión sobre los hallazgos por potencias económicas

Conclusión sobre los hallazgos generales

Conclusión sobre las cabezas de región

Lo que queda por hacer