

# Future Only Data

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*4/9/2018*

## R code to run data on cryptocurrencies data

```
library(readr)
p <- read_csv("~/SP/futureonly.csv")

## Parsed with column specification:
## cols(
##   .default = col_double(),
##   count = col_integer(),
##   date = col_character(),
##   btc_index = col_integer(),
##   eth_per = col_integer(),
##   ltc_per = col_integer(),
##   txCount = col_integer(),
##   activeAddresses = col_character(),
##   count_vendors = col_integer(),
##   sum = col_integer(),
##   txCount_e_e = col_integer(),
##   activeAddresses_e_e = col_integer(),
##   txCount_l = col_integer(),
##   generatedCoins_l = col_integer(),
##   activeAddresses_l = col_character(),
##   Price_futures = col_number(),
##   cyber_attack_index = col_integer(),
##   dum_future = col_integer(),
##   btc_per = col_integer(),
##   cyber_attack = col_integer()
## )

## See spec(...) for full column specifications.

library(plyr)
library(zoo)

##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##   as.Date, as.Date.numeric

library(survey)

## Loading required package: grid
## Loading required package: Matrix
## Loading required package: survival
##
```

```

## Attaching package: 'survey'

## The following object is masked from 'package:graphics':
##
##      dotchart
library(lmtest)
library(tseries)
library(fUnitRoots)

## Loading required package: timeDate
## Loading required package: timeSeries
##
## Attaching package: 'timeSeries'

## The following object is masked from 'package:zoo':
##
##      time<-

## Loading required package: fBasics

## [1] "dBTC ~ btc_lg + eth_lg + ltc_lg + gg_btc + transact_count + totalcoin + sum_vendor + cy_at + v

## Warning in model.matrix.default(mt, mf, contrasts): the response appeared
## on the right-hand side and was dropped

## Warning in model.matrix.default(mt, mf, contrasts): problem with term 10 in
## model.matrix: no columns are assigned

##
## Call:
## lm(formula = str, data = tsdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.0105434 -0.0037794 -0.0000279  0.0026897  0.0128184
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -4.493e+01  1.235e+02  -0.364  0.72667
## btc_lg         1.147e+00  2.157e-01   5.316  0.00110 **
## eth_lg        -1.055e-01  1.575e-01  -0.670  0.52454
## ltc_lg        -4.445e-01  2.730e-01  -1.628  0.14757
## gg_btc         1.101e-01  2.709e-01   0.406  0.69668
## transact_count -2.977e-01  3.698e-01  -0.805  0.44728
## totalcoin     -7.475e-02  4.638e-01  -0.161  0.87652
## sum_vendor     4.326e+00  1.266e+01   0.342  0.74248
## cy_at         3.871e-02  4.399e-02   0.880  0.40805
## vix           6.342e-02  7.634e-02   0.831  0.43358
## 1BTC1         -7.972e-01  1.891e-01  -4.217  0.00395 **
## 1BTC2         -9.884e-01  2.429e-01  -4.069  0.00476 **
## 1BTC3         -9.960e-01  3.146e-01  -3.166  0.01579 *
## 1BTC4         -8.367e-01  2.441e-01  -3.428  0.01101 *
## 1BTC5         -6.663e-01  1.746e-01  -3.816  0.00658 **
## 1BTC6         -6.034e-01  1.711e-01  -3.527  0.00964 **
## 1BTC7         -4.262e-01  1.878e-01  -2.269  0.05757 .
## 1BTC8         -1.003e-01  1.443e-01  -0.695  0.50941

```

## dETH	-1.344e-01	3.049e-01	-0.441	0.67263
## lETH1	-2.194e-01	4.019e-01	-0.546	0.60199
## lETH2	2.834e-02	3.377e-01	0.084	0.93546
## lETH3	-9.317e-02	2.974e-01	-0.313	0.76315
## lETH4	-4.520e-03	3.181e-01	-0.014	0.98906
## lETH5	-6.134e-03	2.590e-01	-0.024	0.98177
## lETH6	5.531e-04	2.708e-01	0.002	0.99843
## lETH7	2.737e-01	2.882e-01	0.950	0.37381
## lETH8	1.491e-01	1.730e-01	0.862	0.41729
## dLTC	4.417e-01	3.646e-01	1.212	0.26498
## llTC1	3.414e-01	4.870e-01	0.701	0.50599
## llTC2	2.847e-01	4.811e-01	0.592	0.57256
## llTC3	5.801e-01	3.040e-01	1.908	0.09799
## llTC4	4.992e-01	3.198e-01	1.561	0.16243
## llTC5	3.228e-01	2.811e-01	1.149	0.28843
## llTC6	3.375e-01	1.945e-01	1.735	0.12630
## llTC7	2.609e-01	1.583e-01	1.648	0.14326
## llTC8	1.240e-01	1.704e-01	0.728	0.49046
## dtransact_count	1.296e-02	7.760e-02	0.167	0.87204
## ltransact_count1	3.011e-01	2.656e-01	1.134	0.29422
## ltransact_count2	4.201e-01	1.897e-01	2.214	0.06241
## ltransact_count3	4.319e-01	1.898e-01	2.276	0.05700
## ltransact_count4	4.205e-01	2.444e-01	1.721	0.12899
## ltransact_count5	4.113e-01	3.037e-01	1.354	0.21780
## ltransact_count6	4.231e-01	3.529e-01	1.199	0.26955
## ltransact_count7	3.716e-01	2.793e-01	1.330	0.22508
## ltransact_count8	1.853e-01	1.636e-01	1.133	0.29450
## dtotalcoin	-1.217e-01	1.029e-01	-1.183	0.27544
## ltotalcoin1	-1.785e-01	3.095e-01	-0.577	0.58211
## ltotalcoin2	-2.199e-01	2.444e-01	-0.900	0.39819
## ltotalcoin3	-1.283e-01	1.796e-01	-0.714	0.49806
## ltotalcoin4	-1.789e-01	1.599e-01	-1.119	0.30022
## ltotalcoin5	-2.100e-01	1.750e-01	-1.200	0.26913
## ltotalcoin6	-2.097e-01	2.050e-01	-1.023	0.34044
## ltotalcoin7	-1.527e-01	1.699e-01	-0.898	0.39880
## ltotalcoin8	-4.198e-02	1.259e-01	-0.333	0.74858
## dgg_btc	3.475e-03	1.051e-01	0.033	0.97455
## lgg_btc1	-6.701e-02	1.731e-01	-0.387	0.71019
## lgg_btc2	-1.460e-01	1.730e-01	-0.844	0.42652
## lgg_btc3	-1.511e-01	1.669e-01	-0.905	0.39534
## lgg_btc4	-1.179e-01	1.540e-01	-0.766	0.46878
## lgg_btc5	-9.052e-02	1.425e-01	-0.635	0.54537
## lgg_btc6	-1.071e-01	1.811e-01	-0.591	0.57285
## lgg_btc7	-1.419e-01	1.348e-01	-1.053	0.32746
## lgg_btc8	-3.785e-02	8.461e-02	-0.447	0.66813
## dcy_at	3.003e-02	1.410e-02	2.130	0.07072
## lcy_at1	1.556e-02	3.499e-02	0.445	0.66995
## lcy_at2	2.796e-02	3.256e-02	0.859	0.41896
## lcy_at3	8.366e-03	3.299e-02	0.254	0.80712
## lcy_at4	2.159e-02	4.342e-02	0.497	0.63430
## lcy_at5	2.562e-02	3.748e-02	0.684	0.51626
## lcy_at6	4.533e-03	3.150e-02	0.144	0.88965
## lcy_at7	-1.224e-02	2.710e-02	-0.452	0.66521
## lcy_at8	1.165e-03	2.243e-02	0.052	0.96004

```

## dvix          -8.642e-03  8.126e-02  -0.106  0.91829
## lvix1         -1.167e-01  1.415e-01  -0.825  0.43661
## lvix2         -7.846e-02  9.170e-02  -0.856  0.42053
## lvix3         -3.781e-02  5.365e-02  -0.705  0.50365
## lvix4         -9.169e-02  9.380e-02  -0.978  0.36089
## lvix5         -1.050e-01  1.071e-01  -0.981  0.35937
## lvix6          1.922e-03  1.074e-01   0.018  0.98622
## lvix7          1.030e-02  8.018e-02   0.128  0.90140
## lvix8          3.398e-02  5.825e-02   0.583  0.57796
## dsum_vendor   -1.183e-01  1.329e+01  -0.009  0.99314
## lsum_vendor1   2.425e+01  2.042e+01   1.187  0.27378
## lsum_vendor2   1.376e+01  1.563e+01   0.880  0.40795
## lsum_vendor3   -1.792e+01  1.818e+01  -0.986  0.35697
## lsum_vendor4   -3.102e+01  2.813e+01  -1.102  0.30672
## lsum_vendor5   -5.988e+00  2.584e+01  -0.232  0.82338
## lsum_vendor6   -1.493e+01  1.611e+01  -0.927  0.38489
## lsum_vendor7   -2.189e+01  2.292e+01  -0.955  0.37139
## lsum_vendor8   -2.450e+01  1.929e+01  -1.270  0.24472
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.01677 on 7 degrees of freedom
## (18 observations deleted due to missingness)
## Multiple R-squared:  0.995, Adjusted R-squared:  0.9308
## F-statistic: 15.51 on 89 and 7 DF, p-value: 0.0004285

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## model.matrix: no columns are assigned

##
## Call:
## lm(formula = str, data = tsdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.015167 -0.003731 -0.000062  0.003636  0.014640
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    4.826730     6.634720   0.727 0.473423
## lBTC1         -0.815874     0.071795 -11.364 1.39e-11 ***
## lBTC2         -1.018694     0.078464 -12.983 7.18e-13 ***
## lBTC3         -0.906662     0.073620 -12.315 2.35e-12 ***
## lBTC4         -0.840047     0.057456 -14.621 4.69e-14 ***
## lBTC5         -0.657102     0.069963  -9.392 7.70e-10 ***
## lBTC6         -0.620747     0.058872 -10.544 6.96e-11 ***
## lBTC7         -0.450936     0.061532  -7.328 8.79e-08 ***
## lBTC8         -0.165204     0.053111  -3.111 0.004493 **
## dETH          -0.194927     0.073019  -2.670 0.012916 *
## lETH1         -0.263064     0.067205  -3.914 0.000584 ***
## lETH3         -0.161183     0.057013  -2.827 0.008917 **
## lETH7          0.323859     0.059334   5.458 1.01e-05 ***
## lETH8          0.199139     0.061814   3.222 0.003415 **
## dLTC           0.566455     0.059813   9.470 6.50e-10 ***
## lLTC1          0.464913     0.062199   7.475 6.17e-08 ***
## lLTC2          0.377303     0.052776   7.149 1.36e-07 ***
## lLTC3          0.644256     0.061442  10.486 7.83e-11 ***
## lLTC4          0.526685     0.044521  11.830 5.75e-12 ***
## lLTC5          0.361890     0.045124   8.020 1.69e-08 ***
## lLTC6          0.391056     0.043748   8.939 2.08e-09 ***
## lLTC7          0.291589     0.044094   6.613 5.16e-07 ***
## lLTC8          0.129803     0.040338   3.218 0.003447 **
## ltransact_count1 0.327036     0.035473   9.219 1.12e-09 ***
## ltransact_count2 0.432966     0.041306  10.482 7.89e-11 ***
## ltransact_count3 0.416569     0.038253  10.890 3.49e-11 ***
## ltransact_count4 0.364590     0.044420   8.208 1.09e-08 ***
## ltransact_count5 0.332167     0.044593   7.449 6.57e-08 ***
## ltransact_count6 0.326590     0.046681   6.996 1.99e-07 ***
## ltransact_count7 0.299325     0.039779   7.525 5.47e-08 ***
## ltransact_count8 0.128314     0.025378   5.056 2.90e-05 ***

```

```

## dtotalcoin      -0.084687    0.028119   -3.012  0.005720 **
## lttotalcoin1    -0.279688    0.064552   -4.333  0.000195 ***
## lttotalcoin2    -0.289531    0.058281   -4.968  3.66e-05 ***
## lttotalcoin3    -0.186492    0.053099   -3.512  0.001645 **
## lttotalcoin4    -0.232947    0.048656   -4.788  5.89e-05 ***
## lttotalcoin5    -0.237728    0.045262   -5.252  1.73e-05 ***
## lttotalcoin6    -0.201875    0.039581   -5.100  2.58e-05 ***
## lttotalcoin7    -0.126034    0.032552   -3.872  0.000653 ***
## lgg_btc2        -0.097580    0.017015   -5.735  4.89e-06 ***
## lgg_btc3        -0.097072    0.016929   -5.734  4.90e-06 ***
## lgg_btc4        -0.057504    0.019311   -2.978  0.006212 **
## lgg_btc5        -0.038883    0.015186   -2.560  0.016613 *
## lgg_btc6        -0.053711    0.014828   -3.622  0.001242 **
## lgg_btc7        -0.093185    0.015779   -5.906  3.14e-06 ***
## dcy_at          0.033275    0.005802    5.735  4.89e-06 ***
## lcy_at2         0.017973    0.005542    3.243  0.003237 **
## lcy_at4         0.027717    0.005513    5.027  3.13e-05 ***
## lcy_at5         0.025752    0.006104    4.219  0.000264 ***
## lcy_at7        -0.019345    0.005682   -3.404  0.002160 **
## lvix1          -0.107212    0.019965   -5.370  1.27e-05 ***
## lvix2          -0.088093    0.021815   -4.038  0.000423 ***
## lvix3          -0.042279    0.019174   -2.205  0.036502 *
## lvix4          -0.122527    0.023513   -5.211  1.93e-05 ***
## lvix5          -0.089561    0.025288   -3.542  0.001526 **
## lsum_vendor1    25.885453    7.341876    3.526  0.001589 **
## lsum_vendor2    19.558999    5.843601    3.347  0.002496 **
## lsum_vendor3   -21.035586    5.303043   -3.967  0.000510 ***
## lsum_vendor4   -29.986969    6.025998   -4.976  3.58e-05 ***
## lsum_vendor6   -12.308618    5.836280   -2.109  0.044732 *
## lsum_vendor7   -25.810050    6.049222   -4.267  0.000233 ***
## lsum_vendor8   -23.964930    4.881989   -4.909  4.27e-05 ***
## btc_lg          1.104769    0.064868   17.031  1.27e-15 ***
## eth_lg         -0.086495    0.017217   -5.024  3.15e-05 ***
## ltc_lg         -0.560684    0.038049  -14.736  3.90e-14 ***
## gg_btc          0.008974    0.014471    0.620  0.540549
## transact_count  -0.353342    0.040342   -8.759  3.10e-09 ***
## totalcoin       0.078945    0.086284    0.915  0.368628
## sum_vendor     -0.880473    0.691840   -1.273  0.214404
## cy_at           0.055220    0.007555    7.309  9.21e-08 ***
## vix             0.075835    0.013500    5.618  6.64e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.01121 on 26 degrees of freedom
## (18 observations deleted due to missingness)
## Multiple R-squared:  0.9916, Adjusted R-squared:  0.9691
## F-statistic: 43.97 on 70 and 26 DF, p-value: < 2.2e-16

## Warning in model.matrix.default(model, data = structure(list(dBTC =
## c(-0.0650119735512131, : the response appeared on the right-hand side and
## was dropped

## Warning in model.matrix.default(model, data = structure(list(dBTC =
## c(-0.0650119735512131, : problem with term 1 in model.matrix: no columns
## are assigned

```

```

## Wald test for btc_lg eth_lg ltc_lg gg_btc transact_count totalcoin sum_vendor cy_at
## in lm(formula = str, data = tsdata)
## F = 40.23456 on 8 and 26 df: p= 1.0248e-12

## Long Run Elasticities:

## Variable, Coeff, Std-Errors, t-stat, prob
## (Intercept), -4.368997 , 6.63472 , 0.7274957 , 0.473423
## 1ETH1, 0.07829279 , 0.01721651 , -5.023982 , 3.154479e-05 ,
## 1LTC1, 0.5075127 , 0.0380489 , -14.73588 , 3.902778e-14
## BTC_searchterm, -0.008123253 , -0.01447092 , -0.620162 , -0.5405491
## Transaction Count, 0.3198337 , -0.04034224 , 8.758617 , -3.104856e-09
## Total Coin, -0.07145884 , -0.08628433 , -0.9149457 , -0.3686282
## Vendors, 0.7969748 , -0.6918398 , 1.272654 , -0.2144043
## Cyberattack searchteam -0.04998366 , -0.007554679 , -7.309428 , -9.207252e-08
## VIX Index, -0.06864321 , -0.01349959 , -5.617568 , -6.639618e-06
## [1] "dBTC ~ dBTC + 1BTC1 + 1BTC2 + 1BTC3 + 1BTC4 + 1BTC5 + 1BTC6 + 1BTC7 + 1BTC8 + dETH + 1ETH1 + 1LTC1 + 1LTC2 + 1LTC3 + 1LTC4 + 1LTC5 + 1LTC6 + 1LTC7 + 1LTC8 + dtotalcoin + 1totalcoin1 + 1totalcoin2 + 1totalcoin3 + 1totalcoin4 + 1totalcoin5 + 1totalcoin6 + 1totalcoin7 + 1totalcoin8 + lgg_btc1 + lgg_btc2 + lgg_btc3 + lgg_btc4 + lgg_btc5 + lgg_btc6"
## Warning in model.matrix.default(mt, mf, contrasts): the response appeared
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## Warning in model.matrix.default(mt, mf, contrasts): problem with term 1 in
## model.matrix: no columns are assigned
## [1] "dBTC ~ dBTC + 1BTC1 + 1BTC2 + 1BTC3 + 1BTC4 + 1BTC5 + 1BTC6 + 1BTC7 + 1BTC8 + dETH + 1ETH1 + 1LTC1 + 1LTC2 + 1LTC3 + 1LTC4 + 1LTC5 + 1LTC6 + 1LTC7 + 1LTC8 + dtotalcoin + 1totalcoin1 + 1totalcoin2 + 1totalcoin3 + 1totalcoin4 + 1totalcoin5 + 1totalcoin6 + 1totalcoin7 + 1totalcoin8 + lgg_btc1 + lgg_btc2 + lgg_btc3 + lgg_btc4 + lgg_btc5 + lgg_btc6"
##
## Call:
## lm(formula = str, data = tsdata)
##
## Coefficients:
##      (Intercept)      1BTC1      1BTC2      1BTC3
##      -0.01122      1.43950      1.79274      1.34124
##      1BTC4      1BTC5      1BTC6      1BTC7
##      1.15357      1.17037      0.73414      0.72251
##      1BTC8      dETH      1ETH1      1ETH3
##      0.24539      0.44415      0.44766      0.26746
##      1ETH7      1ETH8      dLTC      1LTC1
##      -0.49980      -0.50755      -0.61841      -0.83980
##      1LTC2      1LTC3      1LTC4      1LTC5
##      -0.71904      -0.95829      -0.70973      -0.64042
##      1LTC6      1LTC7      1LTC8      ltransact_count1
##      -0.47867      -0.49869      -0.04013      -0.61709
##      ltransact_count2      ltransact_count3      ltransact_count4      ltransact_count5
##      -0.69288      -0.67230      -0.51585      -0.47215
##      ltransact_count6      ltransact_count7      ltransact_count8      dtotalcoin
##      -0.49140      -0.40976      -0.14511      0.17574
##      1totalcoin1      1totalcoin2      1totalcoin3      1totalcoin4
##      0.50069      0.45594      0.30735      0.35305
##      1totalcoin5      1totalcoin6      1totalcoin7      lgg_btc2
##      0.35870      0.31872      0.25645      0.18051
##      lgg_btc3      lgg_btc4      lgg_btc5      lgg_btc6

```



```
##          0.15358          0.05985          0.04179          0.13333
##      lgg_btc7      dcy_at      lcy_at2      lcy_at4
##      0.09323      -0.04108      -0.01400      -0.04791
##      lcy_at5      lcy_at7      lvix1      lvix2
##      -0.05155      0.03201      0.14126      0.13680
##      lvix3      lvix4      lvix5      lsum_vendor1
##      0.03702      0.23294      0.15924      -22.62071
##      lsum_vendor2      lsum_vendor3      lsum_vendor4      lsum_vendor6
##      -33.86589      31.42792      44.87939      16.77121
##      lsum_vendor7      lsum_vendor8      ecm1
##      46.30166      47.52499      -1.97196
```

```
##
```

```
## Call:
```

```
## lm(formula = str, data = tsdata)
```

```
##
```

```
## Residuals:
```

```
##      Min      1Q      Median      3Q      Max
## -0.045874 -0.011193 -0.000097  0.012333  0.041628
```

```
##
```

```
## Coefficients:
```

```
##      Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.01122    0.02252  -0.498 0.621471
## lBTC1        1.43950    0.39263   3.666 0.000833 ***
## lBTC2        1.79274    0.47744   3.755 0.000650 ***
## lBTC3        1.34124    0.44873   2.989 0.005171 **
## lBTC4        1.15357    0.41720   2.765 0.009129 **
## lBTC5        1.17037    0.32045   3.652 0.000866 ***
## lBTC6        0.73414    0.33154   2.214 0.033612 *
## lBTC7        0.72251    0.25350   2.850 0.007373 **
## lBTC8        0.24539    0.14956   1.641 0.110056
## dETH         0.44415    0.16483   2.695 0.010869 *
## lETH1        0.44766    0.17848   2.508 0.017071 *
## lETH3        0.26746    0.14109   1.896 0.066533 .
## lETH7       -0.49980    0.20526  -2.435 0.020292 *
## lETH8       -0.50755    0.15607  -3.252 0.002588 **
## dLTC        -0.61841    0.30021  -2.060 0.047131 *
## lLTC1       -0.83980    0.24156  -3.477 0.001409 **
## lLTC2       -0.71904    0.19660  -3.657 0.000854 ***
## lLTC3       -0.95829    0.32178  -2.978 0.005318 **
## lLTC4       -0.70973    0.26977  -2.631 0.012708 *
## lLTC5       -0.64042    0.19216  -3.333 0.002084 **
## lLTC6       -0.47867    0.21500  -2.226 0.032720 *
## lLTC7       -0.49869    0.16767  -2.974 0.005371 **
## lLTC8       -0.04013    0.11970  -0.335 0.739493
## ltransact_count1 -0.61709    0.15262  -4.043 0.000286 ***
## ltransact_count2 -0.69288    0.21528  -3.218 0.002831 **
## ltransact_count3 -0.67230    0.20591  -3.265 0.002500 **
## ltransact_count4 -0.51585    0.19224  -2.683 0.011176 *
## ltransact_count5 -0.47215    0.17654  -2.674 0.011423 *
## ltransact_count6 -0.49140    0.17268  -2.846 0.007454 **
## ltransact_count7 -0.40976    0.16144  -2.538 0.015893 *
## ltransact_count8 -0.14511    0.08098  -1.792 0.082069 .
## dtotalcoin    0.17574    0.06412   2.741 0.009694 **
```

```

## ltotalcoin1      0.50069      0.14484      3.457 0.001487 **
## ltotalcoin2      0.45594      0.16179      2.818 0.007994 **
## ltotalcoin3      0.30735      0.11291      2.722 0.010155 *
## ltotalcoin4      0.35305      0.13618      2.592 0.013948 *
## ltotalcoin5      0.35870      0.13937      2.574 0.014595 *
## ltotalcoin6      0.31872      0.12409      2.568 0.014779 *
## ltotalcoin7      0.25645      0.08397      3.054 0.004368 **
## lgg_btc2         0.18051      0.05410      3.337 0.002061 **
## lgg_btc3         0.15358      0.05774      2.660 0.011842 *
## lgg_btc4         0.05985      0.04807      1.245 0.221613
## lgg_btc5         0.04179      0.03471      1.204 0.236934
## lgg_btc6         0.13333      0.03342      3.989 0.000334 ***
## lgg_btc7         0.09323      0.05573      1.673 0.103539
## dcy_at           -0.04108      0.01962     -2.093 0.043842 *
## lcy_at2          -0.01400      0.01612     -0.868 0.391362
## lcy_at4          -0.04791      0.01780     -2.692 0.010932 *
## lcy_at5          -0.05155      0.01825     -2.825 0.007853 **
## lcy_at7          0.03201      0.01644      1.947 0.059778 .
## lvix1            0.14126      0.06908      2.045 0.048671 *
## lvix2            0.13680      0.06242      2.192 0.035349 *
## lvix3            0.03702      0.05075      0.730 0.470665
## lvix4            0.23294      0.07100      3.281 0.002396 **
## lvix5            0.15924      0.06079      2.619 0.013064 *
## lsum_vendor1     -22.62071     20.68164     -1.094 0.281750
## lsum_vendor2     -33.86589     16.49271     -2.053 0.047792 *
## lsum_vendor3      31.42792     15.76281      1.994 0.054245 .
## lsum_vendor4      44.87939     18.11502      2.477 0.018361 *
## lsum_vendor6      16.77121     13.40061      1.252 0.219285
## lsum_vendor7      46.30166     15.74771      2.940 0.005862 **
## lsum_vendor8      47.52499     14.85420      3.199 0.002978 **
## ecm1             -1.97196      0.49505     -3.983 0.000340 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.02985 on 34 degrees of freedom
## (18 observations deleted due to missingness)
## Multiple R-squared:  0.9223, Adjusted R-squared:  0.7806
## F-statistic: 6.508 on 62 and 34 DF, p-value: 3.863e-08

## Warning in model.matrix.default(terms(formula), model.frame(formula)): the
## response appeared on the right-hand side and was dropped

## Warning in model.matrix.default(terms(formula), model.frame(formula)):
## problem with term 1 in model.matrix: no columns are assigned

##
## Durbin-Watson test
##
## data: regress
## DW = 1.8947, p-value = 0.3754
## alternative hypothesis: true autocorrelation is greater than 0

## Warning in model.matrix.default(terms(formula), model.frame(formula)): the
## response appeared on the right-hand side and was dropped

## Warning in model.matrix.default(terms(formula), model.frame(formula)):

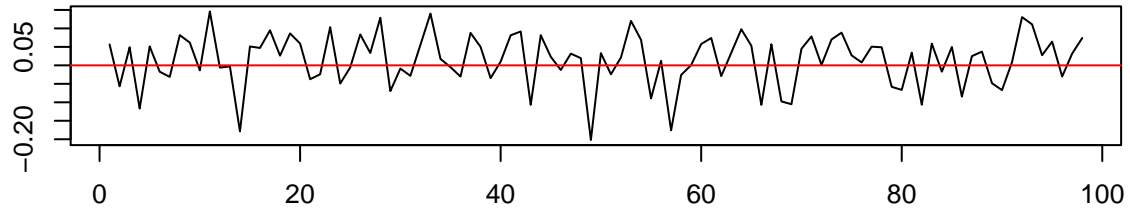
```

```

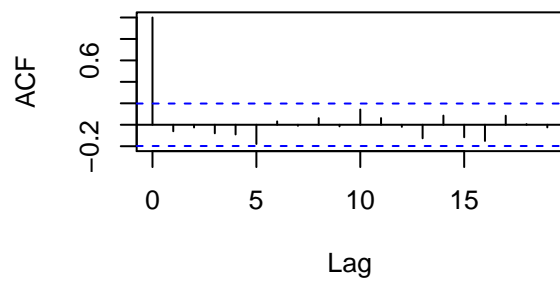
## problem with term 1 in model.matrix: no columns are assigned
##
## Breusch-Godfrey test for serial correlation of order up to 4
##
## data: regress
## LM test = 0.23458, df1 = 4, df2 = 30, p-value = 0.9167
## Warning in model.matrix.default(terms(formula), mf): the response appeared
## on the right-hand side and was dropped
## Warning in model.matrix.default(terms(formula), mf): problem with term 1 in
## model.matrix: no columns are assigned
##
## RESET test
##
## data: regress
## RESET = 0.82533, df1 = 2, df2 = 32, p-value = 0.4472
##
## Jarque Bera Test
##
## data: ecm[4:length(ecm)]
## X-squared = 1.3342, df = 2, p-value = 0.5132
## Warning in adf.test(ecm[4:length(ecm)]): p-value smaller than printed p-
## value
##
## Augmented Dickey-Fuller Test
##
## data: ecm[4:length(ecm)]
## Dickey-Fuller = -4.4125, Lag order = 4, p-value = 0.01
## alternative hypothesis: stationary
## [1] "Unit Root Test"
##
## Title:
## Augmented Dickey-Fuller Test
##
## Test Results:
## PARAMETER:
## Lag Order: 4
## STATISTIC:
## DF: -3.0568
## P VALUE:
## t: 0.002536
## n: 0.2264
##
## Description:
## Thu Apr 19 12:01:36 2018 by user:

```

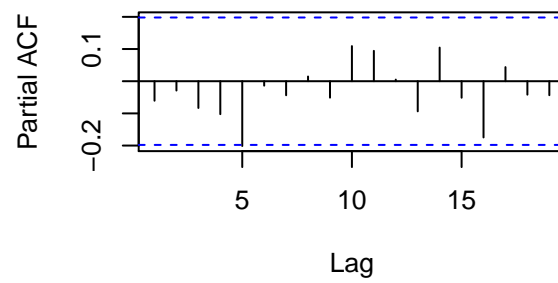
### Residuals



### Autocorrelations of Residuals



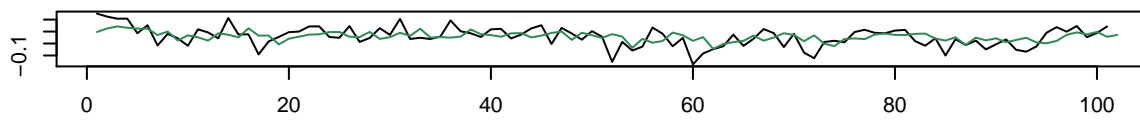
### Partial Autocorrelations of Residuals



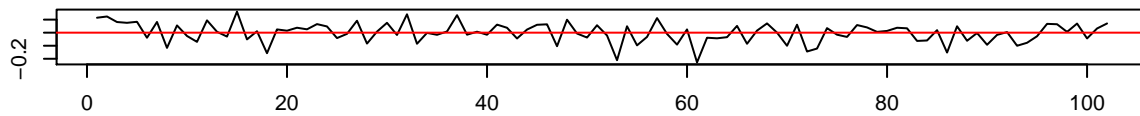
```
##  
## Title:  
##   Augmented Dickey-Fuller Unit Root Test  
##  
## Test Results:  
##  
##  
## Description:  
##   Thu Apr 19 12:01:36 2018 by user:
```

Actual and fitted values

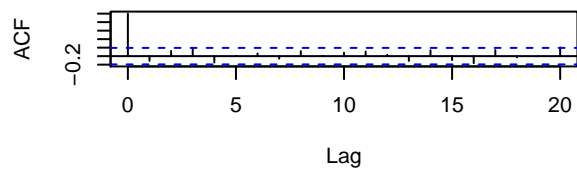
Diagram of fit for model with intercept



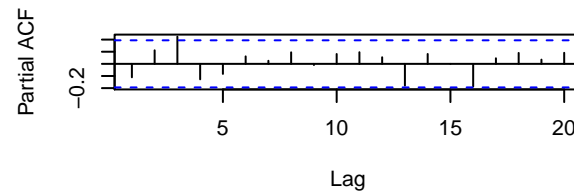
Residuals



Autocorrelations of Residuals



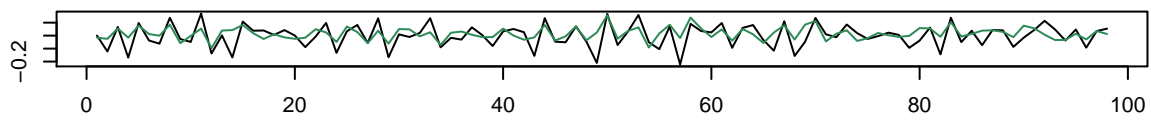
Partial Autocorrelations of Residuals



```
##  
## Title:  
## Phillips-Perron Unit Root Test  
##  
## Test Results:  
##  
##  
## Description:  
## Thu Apr 19 12:01:37 2018 by user:
```

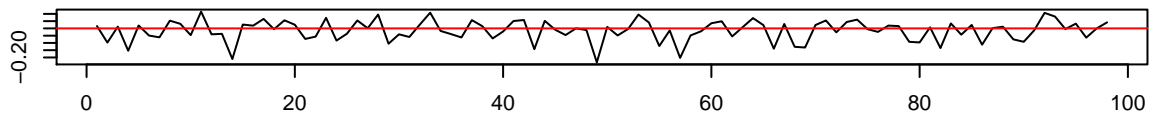
Actual and fitted values

Diagram of fit for test regression

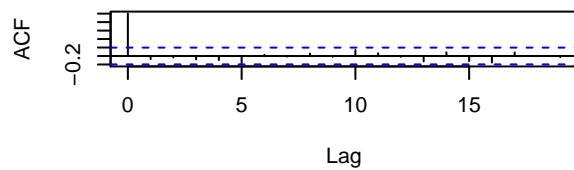


detrending with intercept and 4 lagged differences used in test regression

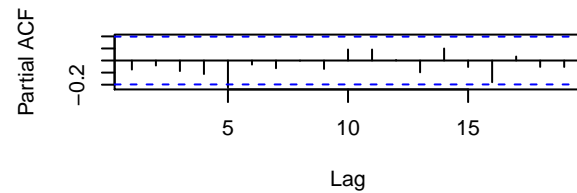
Residuals



Autocorrelations of Residuals



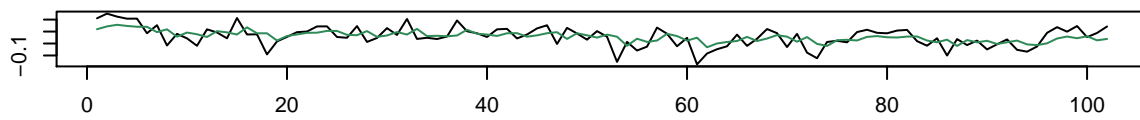
Partial Autocorrelations of Residuals



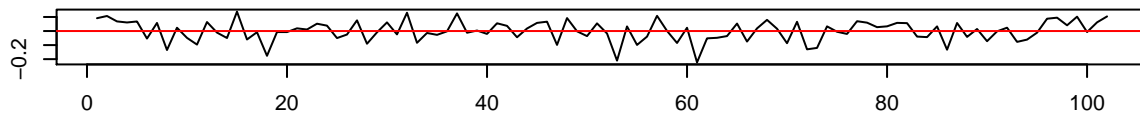
```
##
## Title:
## Elliott-Rothenberg-Stock Unit Root Test
##
## Test Results:
##
##
## Description:
## Thu Apr 19 12:01:37 2018 by user:
```

Actual and fitted values

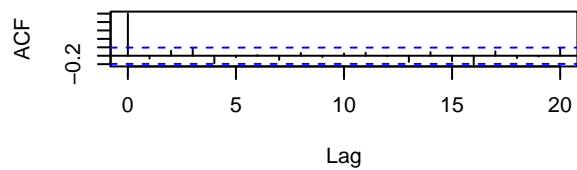
Diagram of fit for model with polynomial degree of 1



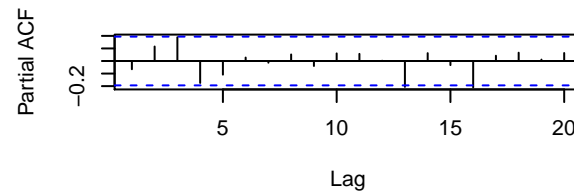
Residuals



Autocorrelations of Residuals



Partial Autocorrelations of Residuals



```
##
## Title:
## Schmidt-Phillips Unit Root Test
##
## Test Results:
## NA
##
## Description:
## Thu Apr 19 12:01:37 2018 by user:
```