

No Dummy

Tram Nguyen

4/9/2018

R code to run data on cryptocurrencies data

```
library(readr)
p <- read_csv("~/SP/ver4.csv")

## Parsed with column specification:
## cols(
##   .default = col_double(),
##   count = col_integer(),
##   date = col_character(),
##   btc_index = 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(),
##   activeAddresses_l = col_character(),
##   Price_futures = col_number(),
##   dum_future = col_integer(),
##   btc_per = 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
## -0.154589 -0.014329 -0.000437  0.014596  0.159004
##
```

```
## Coefficients:
```

```
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.444e+00  4.602e-01   5.310 1.40e-07 ***
## btc_lg          6.842e-02  1.079e-02   6.342 3.65e-10 ***
## eth_lg          6.842e-04  1.856e-03   0.369 0.712498
## ltc_lg         -1.762e-02  4.715e-03  -3.737 0.000199 ***
## gg_btc         -9.552e-03  2.496e-03  -3.828 0.000139 ***
## transact_count -2.725e-02  9.962e-03  -2.735 0.006364 **
## totalcoin      -4.587e-04  6.544e-03  -0.070 0.944143
## sum_vendor     -2.769e-01  5.144e-02  -5.384 9.39e-08 ***
## cy_at          -9.093e-04  9.920e-04  -0.917 0.359602
## vix            2.990e-03  7.100e-03   0.421 0.673794
## lBTC1          -4.665e-02  3.404e-02  -1.370 0.170942
## lBTC2          -8.405e-02  3.390e-02  -2.480 0.013338 *
## lBTC3          -4.017e-02  3.385e-02  -1.187 0.235708
## lBTC4          -1.124e-01  3.326e-02  -3.381 0.000756 ***
## lBTC5          -8.116e-02  3.345e-02  -2.426 0.015473 *
## lBTC6          -3.615e-02  3.353e-02  -1.078 0.281298
## lBTC7          -5.736e-02  3.322e-02  -1.727 0.084569 .
## lBTC8          -2.195e-03  3.289e-02  -0.067 0.946794
## dETH           1.058e-01  1.654e-02   6.394 2.64e-10 ***
## lETH1          -3.101e-02  1.697e-02  -1.828 0.067932 .
## lETH2           9.566e-03  1.695e-02   0.564 0.572631
## lETH3          -7.994e-03  1.702e-02  -0.470 0.638659
## lETH4          -1.720e-03  1.706e-02  -0.101 0.919697
```

## 1ETH5	-9.472e-03	1.665e-02	-0.569	0.569466	
## 1ETH6	-1.801e-05	1.663e-02	-0.001	0.999136	
## 1ETH7	-2.742e-02	1.637e-02	-1.675	0.094338	.
## 1ETH8	-1.199e-02	1.632e-02	-0.735	0.462672	
## dLTC	3.350e-01	1.938e-02	17.287	< 2e-16	***
## lLTC1	-9.433e-03	2.247e-02	-0.420	0.674772	
## lLTC2	1.157e-02	2.236e-02	0.517	0.605041	
## lLTC3	1.353e-02	2.215e-02	0.611	0.541370	
## lLTC4	4.979e-02	2.202e-02	2.261	0.024015	*
## lLTC5	4.709e-02	2.203e-02	2.138	0.032813	*
## lLTC6	6.792e-03	2.227e-02	0.305	0.760481	
## lLTC7	1.203e-02	2.217e-02	0.543	0.587526	
## lLTC8	-1.486e-03	2.216e-02	-0.067	0.946578	
## dtransact_count	1.337e-02	1.198e-02	1.116	0.264727	
## ltransact_count1	4.401e-02	1.507e-02	2.919	0.003598	**
## ltransact_count2	6.313e-02	1.559e-02	4.050	5.59e-05	***
## ltransact_count3	3.966e-02	1.565e-02	2.534	0.011439	*
## ltransact_count4	4.566e-02	1.511e-02	3.022	0.002587	**
## ltransact_count5	4.534e-02	1.480e-02	3.065	0.002247	**
## ltransact_count6	2.042e-02	1.412e-02	1.446	0.148483	
## ltransact_count7	1.367e-02	1.304e-02	1.049	0.294634	
## ltransact_count8	1.154e-02	1.162e-02	0.994	0.320728	
## dtotalcoin	-2.493e-05	1.077e-02	-0.002	0.998153	
## ltotalcoin1	1.122e-02	1.308e-02	0.857	0.391561	
## ltotalcoin2	-8.013e-03	1.358e-02	-0.590	0.555312	
## ltotalcoin3	2.566e-02	1.370e-02	1.873	0.061364	.
## ltotalcoin4	7.642e-03	1.358e-02	0.563	0.573849	
## ltotalcoin5	1.066e-02	1.347e-02	0.791	0.429070	
## ltotalcoin6	4.207e-03	1.302e-02	0.323	0.746641	
## ltotalcoin7	-9.031e-03	1.224e-02	-0.738	0.460669	
## ltotalcoin8	6.599e-03	1.085e-02	0.608	0.543074	
## dgg_btc	7.667e-03	5.780e-03	1.326	0.185050	
## lgg_btc1	1.640e-02	5.860e-03	2.798	0.005260	**
## lgg_btc2	1.586e-02	5.858e-03	2.708	0.006908	**
## lgg_btc3	8.757e-03	5.890e-03	1.487	0.137478	
## lgg_btc4	5.351e-04	5.878e-03	0.091	0.927493	
## lgg_btc5	2.029e-02	5.833e-03	3.479	0.000529	***
## lgg_btc6	2.191e-02	5.851e-03	3.744	0.000193	***
## lgg_btc7	7.730e-05	5.888e-03	0.013	0.989529	
## lgg_btc8	-5.677e-03	5.862e-03	-0.968	0.333138	
## dcy_at	4.602e-04	1.707e-03	0.270	0.787546	
## lcy_at1	-1.404e-03	1.800e-03	-0.780	0.435570	
## lcy_at2	1.222e-03	1.793e-03	0.681	0.495836	
## lcy_at3	-2.095e-04	1.784e-03	-0.117	0.906575	
## lcy_at4	1.245e-03	1.786e-03	0.697	0.486112	
## lcy_at5	-1.223e-03	1.795e-03	-0.681	0.495803	
## lcy_at6	2.975e-04	1.802e-03	0.165	0.868867	
## lcy_at7	-8.825e-04	1.779e-03	-0.496	0.619957	
## lcy_at8	3.455e-05	1.744e-03	0.020	0.984197	
## dvix	-1.994e-02	1.557e-02	-1.280	0.200750	
## lvix1	-9.657e-03	1.560e-02	-0.619	0.536172	
## lvix2	-2.931e-02	1.560e-02	-1.879	0.060614	.
## lvix3	-1.311e-02	1.573e-02	-0.833	0.404815	
## lvix4	-6.283e-03	1.570e-02	-0.400	0.689092	

```

## lvix5          1.978e-02  1.554e-02   1.273 0.203255
## lvix6          1.829e-02  1.550e-02   1.180 0.238220
## lvix7          2.568e-02  1.557e-02   1.649 0.099511 .
## lvix8          2.820e-03  1.558e-02   0.181 0.856466
## dsum_vendor    3.313e+00  1.629e+00   2.034 0.042267 *
## lsum_vendor1    3.132e+00  1.653e+00   1.895 0.058462 .
## lsum_vendor2   -3.038e+00  1.657e+00  -1.833 0.067075 .
## lsum_vendor3   -2.809e+00  1.671e+00  -1.681 0.093061 .
## lsum_vendor4    5.854e-01  1.668e+00   0.351 0.725763
## lsum_vendor5    6.046e-02  1.663e+00   0.036 0.971007
## lsum_vendor6   -1.436e+00  1.660e+00  -0.865 0.387229
## lsum_vendor7   -4.343e-01  1.654e+00  -0.263 0.792926
## lsum_vendor8    1.753e+00  1.650e+00   1.062 0.288467
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0318 on 862 degrees of freedom
## (18 observations deleted due to missingness)
## Multiple R-squared:  0.4489, Adjusted R-squared:  0.392
## F-statistic: 7.889 on 89 and 862 DF,  p-value: < 2.2e-16

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## model.matrix: no columns are assigned

##
## Call:
## lm(formula = str, data = tsdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.164785 -0.014781 -0.000095  0.014507  0.162547
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.2483866   0.4146401   5.423 7.52e-08 ***
## lBTC2          -0.0525353   0.0258431  -2.033 0.042356 *
## lBTC4          -0.0948581   0.0309803  -3.062 0.002264 **
## lBTC5          -0.0736495   0.0308531  -2.387 0.017184 *
## lBTC7          -0.0466456   0.0269707  -1.729 0.084059 .
## dETH           0.1018003   0.0158593   6.419 2.20e-10 ***
## lETH1          -0.0362414   0.0151293  -2.395 0.016800 *
## lETH7          -0.0272811   0.0152757  -1.786 0.074445 .
## dLTC           0.3325107   0.0184118  18.060 < 2e-16 ***
## lLTC4           0.0476834   0.0209141   2.280 0.022839 *
## lLTC5           0.0461613   0.0208906   2.210 0.027375 *
## ltransact_count1 0.0350938   0.0114418   3.067 0.002225 **
## ltransact_count2 0.0459813   0.0110096   4.176 3.24e-05 ***
## ltransact_count3 0.0242787   0.0109004   2.227 0.026168 *
## ltransact_count4 0.0280224   0.0097263   2.881 0.004056 **
## ltransact_count5 0.0310881   0.0090229   3.445 0.000596 ***
## ltotalcoin3     0.0246327   0.0090507   2.722 0.006619 **
## ltotalcoin7    -0.0149370   0.0082936  -1.801 0.072028 .
## lgg_btc1        0.0162846   0.0054763   2.974 0.003020 **
## lgg_btc2        0.0148740   0.0055349   2.687 0.007334 **
## lgg_btc5        0.0180600   0.0054883   3.291 0.001038 **
## lgg_btc6        0.0216032   0.0054505   3.964 7.96e-05 ***
## lcy_at4         0.0010526   0.0015792   0.667 0.505240
## lvix2          -0.0303050   0.0147008  -2.061 0.039542 *
## lvix7           0.0276316   0.0147876   1.869 0.062003 .
## dsum_vendor     3.5481355   1.5431623   2.299 0.021715 *

```

```

## lsum_vendor1      2.8495526  1.5579498   1.829 0.067719 .
## lsum_vendor2     -2.9496847  1.5648051  -1.885 0.059744 .
## lsum_vendor3     -2.8795618  1.5693654  -1.835 0.066851 .
## btc_lg           0.0642420  0.0097554   6.585 7.65e-11 ***
## eth_lg           0.0004903  0.0017312   0.283 0.777093
## ltc_lg          -0.0164354  0.0042810  -3.839 0.000132 ***
## gg_btc          -0.0095755  0.0021340  -4.487 8.14e-06 ***
## transact_count   -0.0246982  0.0089082  -2.773 0.005675 **
## totalcoin       -0.0003375  0.0053242  -0.063 0.949469
## sum_vendor      -0.2561687  0.0463853  -5.523 4.35e-08 ***
## cy_at           -0.0010217  0.0007744  -1.319 0.187343
## vix             0.0041898  0.0058777   0.713 0.476130
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.03143 on 915 degrees of freedom
## (17 observations deleted due to missingness)
## Multiple R-squared:  0.4285, Adjusted R-squared:  0.4054
## F-statistic: 18.54 on 37 and 915 DF,  p-value: < 2.2e-16

## Warning in model.matrix.default(model, data = structure(list(dBTC =
## c(-0.00216877820185601, : the response appeared on the right-hand side and
## was dropped

## Warning in model.matrix.default(model, data = structure(list(dBTC =
## c(-0.00216877820185601, : problem with term 1 in model.matrix: no columns
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## 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 = 6.250391 on 8 and 915 df: p= 6.8126e-08

## Long Run Elasticities:

## Variable, Coeff, Std-Errors, t-stat, prob
## (Intercept), -34.99869 , 0.4146401 , 5.422502 , 7.52277e-08
## 1ETH1, -0.007631581 , 0.001731217 , 0.2831928 , 0.7770931 ,
## 1LTC1, 0.2558354 , 0.004280994 , -3.839151 , 0.0001319549
## BTC_searchterm, 0.1490532 , -0.002134047 , 4.487006 , -8.142711e-06
## Transaction Count, 0.3844562 , -0.008908183 , 2.772534 , -0.005675161
## Total Coin, 0.005253606 , -0.005324161 , 0.06339069 , -0.9494692
## Vendors, 3.987556 , -0.04638534 , 5.522621 , -4.352433e-08
## Cyberattack searchteam 0.01590457 , -0.0007743587 , 1.319468 , -0.1873427
## VIX Index, -0.06521914 , -0.005877678 , -0.7128341 , -0.4761302
## [1] "dBTC ~ dBTC + 1BTC2 + 1BTC4 + 1BTC5 + 1BTC7 + dETH + 1ETH1 + 1ETH7 + dLTC + 1LTC4 + 1LTC5 + 1LTC7 + dVIX + 1VIX1 + 1VIX2 + 1VIX3 + 1VIX4 + 1VIX5 + 1VIX6 + 1VIX7 + 1VIX8 + 1VIX9 + 1VIX10 + 1VIX11 + 1VIX12 + 1VIX13 + 1VIX14 + 1VIX15 + 1VIX16 + 1VIX17 + 1VIX18 + 1VIX19 + 1VIX20 + 1VIX21 + 1VIX22 + 1VIX23 + 1VIX24 + 1VIX25 + 1VIX26 + 1VIX27 + 1VIX28 + 1VIX29 + 1VIX30 + 1VIX31 + 1VIX32 + 1VIX33 + 1VIX34 + 1VIX35 + 1VIX36 + 1VIX37 + 1VIX38 + 1VIX39 + 1VIX40 + 1VIX41 + 1VIX42 + 1VIX43 + 1VIX44 + 1VIX45 + 1VIX46 + 1VIX47 + 1VIX48 + 1VIX49 + 1VIX50 + 1VIX51 + 1VIX52 + 1VIX53 + 1VIX54 + 1VIX55 + 1VIX56 + 1VIX57 + 1VIX58 + 1VIX59 + 1VIX60 + 1VIX61 + 1VIX62 + 1VIX63 + 1VIX64 + 1VIX65 + 1VIX66 + 1VIX67 + 1VIX68 + 1VIX69 + 1VIX70 + 1VIX71 + 1VIX72 + 1VIX73 + 1VIX74 + 1VIX75 + 1VIX76 + 1VIX77 + 1VIX78 + 1VIX79 + 1VIX80 + 1VIX81 + 1VIX82 + 1VIX83 + 1VIX84 + 1VIX85 + 1VIX86 + 1VIX87 + 1VIX88 + 1VIX89 + 1VIX90 + 1VIX91 + 1VIX92 + 1VIX93 + 1VIX94 + 1VIX95 + 1VIX96 + 1VIX97 + 1VIX98 + 1VIX99 + 1VIX100"
## 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 1 in
## model.matrix: no columns are assigned

## [1] "dBTC ~ dBTC + 1BTC2 + 1BTC4 + 1BTC5 + 1BTC7 + dETH + 1ETH1 + 1ETH7 + dLTC + 1LTC4 + 1LTC5 + 1LTC7 + dVIX + 1VIX1 + 1VIX2 + 1VIX3 + 1VIX4 + 1VIX5 + 1VIX6 + 1VIX7 + 1VIX8 + 1VIX9 + 1VIX10 + 1VIX11 + 1VIX12 + 1VIX13 + 1VIX14 + 1VIX15 + 1VIX16 + 1VIX17 + 1VIX18 + 1VIX19 + 1VIX20 + 1VIX21 + 1VIX22 + 1VIX23 + 1VIX24 + 1VIX25 + 1VIX26 + 1VIX27 + 1VIX28 + 1VIX29 + 1VIX30 + 1VIX31 + 1VIX32 + 1VIX33 + 1VIX34 + 1VIX35 + 1VIX36 + 1VIX37 + 1VIX38 + 1VIX39 + 1VIX40 + 1VIX41 + 1VIX42 + 1VIX43 + 1VIX44 + 1VIX45 + 1VIX46 + 1VIX47 + 1VIX48 + 1VIX49 + 1VIX50 + 1VIX51 + 1VIX52 + 1VIX53 + 1VIX54 + 1VIX55 + 1VIX56 + 1VIX57 + 1VIX58 + 1VIX59 + 1VIX60 + 1VIX61 + 1VIX62 + 1VIX63 + 1VIX64 + 1VIX65 + 1VIX66 + 1VIX67 + 1VIX68 + 1VIX69 + 1VIX70 + 1VIX71 + 1VIX72 + 1VIX73 + 1VIX74 + 1VIX75 + 1VIX76 + 1VIX77 + 1VIX78 + 1VIX79 + 1VIX80 + 1VIX81 + 1VIX82 + 1VIX83 + 1VIX84 + 1VIX85 + 1VIX86 + 1VIX87 + 1VIX88 + 1VIX89 + 1VIX90 + 1VIX91 + 1VIX92 + 1VIX93 + 1VIX94 + 1VIX95 + 1VIX96 + 1VIX97 + 1VIX98 + 1VIX99 + 1VIX100"

```

```
##
## Call:
## lm(formula = str, data = tsdata)
##
## Coefficients:
##      (Intercept)          1BTC2          1BTC4          1BTC5
##      0.0011164      -0.0199206      -0.0593805      -0.0471286
##      1BTC7          dETH          1ETH1          1ETH7
##      -0.0259627      0.1033574      -0.0323502      -0.0342433
##      dLTC          1LTC4          1LTC5  ltransact_count1
##      0.3368656      0.0359562      0.0397443      0.0113593
##  ltransact_count2  ltransact_count3  ltransact_count4  ltransact_count5
##      0.0255857      0.0093817      0.0183028      0.0286754
##      ltotalcoin3      ltotalcoin7      lgg_btc1      lgg_btc2
##      0.0241989      -0.0155503      0.0112345      0.0097089
##      lgg_btc5      lgg_btc6      lcy_at4      lvix2
##      0.0135156      0.0191610      0.0005614      -0.0333289
##      lvix7      dsum_vendor      lsum_vendor1      lsum_vendor2
##      0.0276027      4.4150806      3.5170046      -2.6933586
##      lsum_vendor3      ecm1
##      -2.6130122      -0.0160770
```

```
##
## Call:
## lm(formula = str, data = tsdata)
##
## Residuals:
```

	Min	1Q	Median	3Q	Max
	-0.185991	-0.014021	0.000551	0.015029	0.180027

```
##
```

```
## Coefficients:
```

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.0011164	0.0017047	0.655	0.512718
1BTC2	-0.0199206	0.0262968	-0.758	0.448925
1BTC4	-0.0593805	0.0316657	-1.875	0.061076 .
1BTC5	-0.0471286	0.0314684	-1.498	0.134566
1BTC7	-0.0259627	0.0272845	-0.952	0.341573
dETH	0.1033574	0.0160153	6.454	1.76e-10 ***
1ETH1	-0.0323502	0.0152442	-2.122	0.034092 *
1ETH7	-0.0342433	0.0154671	-2.214	0.027076 *
dLTC	0.3368656	0.0186655	18.048	< 2e-16 ***
1LTC4	0.0359562	0.0212420	1.693	0.090852 .
1LTC5	0.0397443	0.0211238	1.881	0.060220 .
ltransact_count1	0.0113593	0.0096762	1.174	0.240722
ltransact_count2	0.0255857	0.0099106	2.582	0.009986 **
ltransact_count3	0.0093817	0.0102942	0.911	0.362342
ltransact_count4	0.0183028	0.0094960	1.927	0.054233 .
ltransact_count5	0.0286754	0.0090229	3.178	0.001532 **
ltotalcoin3	0.0241989	0.0092363	2.620	0.008938 **
ltotalcoin7	-0.0155503	0.0084623	-1.838	0.066443 .
lgg_btc1	0.0112345	0.0055213	2.035	0.042160 *
lgg_btc2	0.0097089	0.0055943	1.736	0.082985 .
lgg_btc5	0.0135156	0.0055657	2.428	0.015357 *
lgg_btc6	0.0191610	0.0055175	3.473	0.000539 ***

```

## lcy_at4          0.0005614  0.0015930   0.352 0.724621
## lvix2           -0.0333289  0.0147547  -2.259 0.024124 *
## lvix7           0.0276027  0.0149163   1.851 0.064561 .
## dsum_vendor     4.4150806  1.5232797   2.898 0.003839 **
## lsum_vendor1     3.5170046  1.5315342   2.296 0.021877 *
## lsum_vendor2    -2.6933586  1.5410260  -1.748 0.080836 .
## lsum_vendor3    -2.6130122  1.5500904  -1.686 0.092188 .
## ecm1            -0.0160770  0.0095038  -1.692 0.091051 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.03209 on 923 degrees of freedom
## (17 observations deleted due to missingness)
## Multiple R-squared:  0.3991, Adjusted R-squared:  0.3802
## F-statistic: 21.14 on 29 and 923 DF,  p-value: < 2.2e-16

## 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 = 1.956, p-value = 0.2497
## 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 = 0.16153, df1 = 4, df2 = 919, p-value = 0.9577

## 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 = 59.764, df1 = 2, df2 = 921, p-value < 2.2e-16

##
## Jarque Bera Test
##
## data: ecm[4:length(ecm)]
## X-squared = 53.022, df = 2, p-value = 3.065e-12

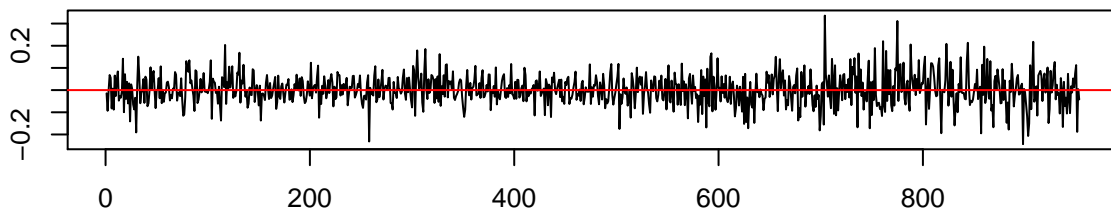
```

```
## Warning in adf.test(ecm[4:length(ecm)]): p-value smaller than printed p-
## value

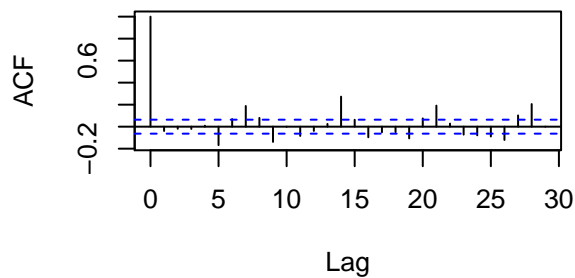
##
## Augmented Dickey-Fuller Test
##
## data: ecm[4:length(ecm)]
## Dickey-Fuller = -5.0794, Lag order = 9, p-value = 0.01
## alternative hypothesis: stationary
## [1] "Unit Root Test"

##
## Title:
## Augmented Dickey-Fuller Test
##
## Test Results:
## PARAMETER:
## Lag Order: 4
## STATISTIC:
## DF: -5.5738
## P VALUE:
## t: 4.925e-08
## n: 0.1039
##
## Description:
## Thu Apr 19 11:58:56 2018 by user:
```

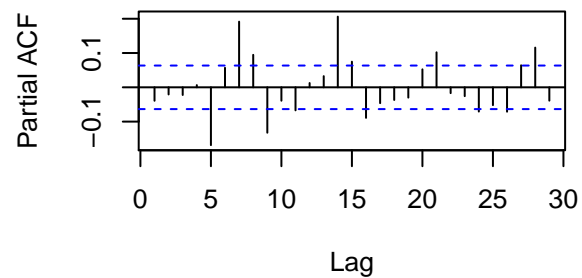
Residuals



Autocorrelations of Residuals

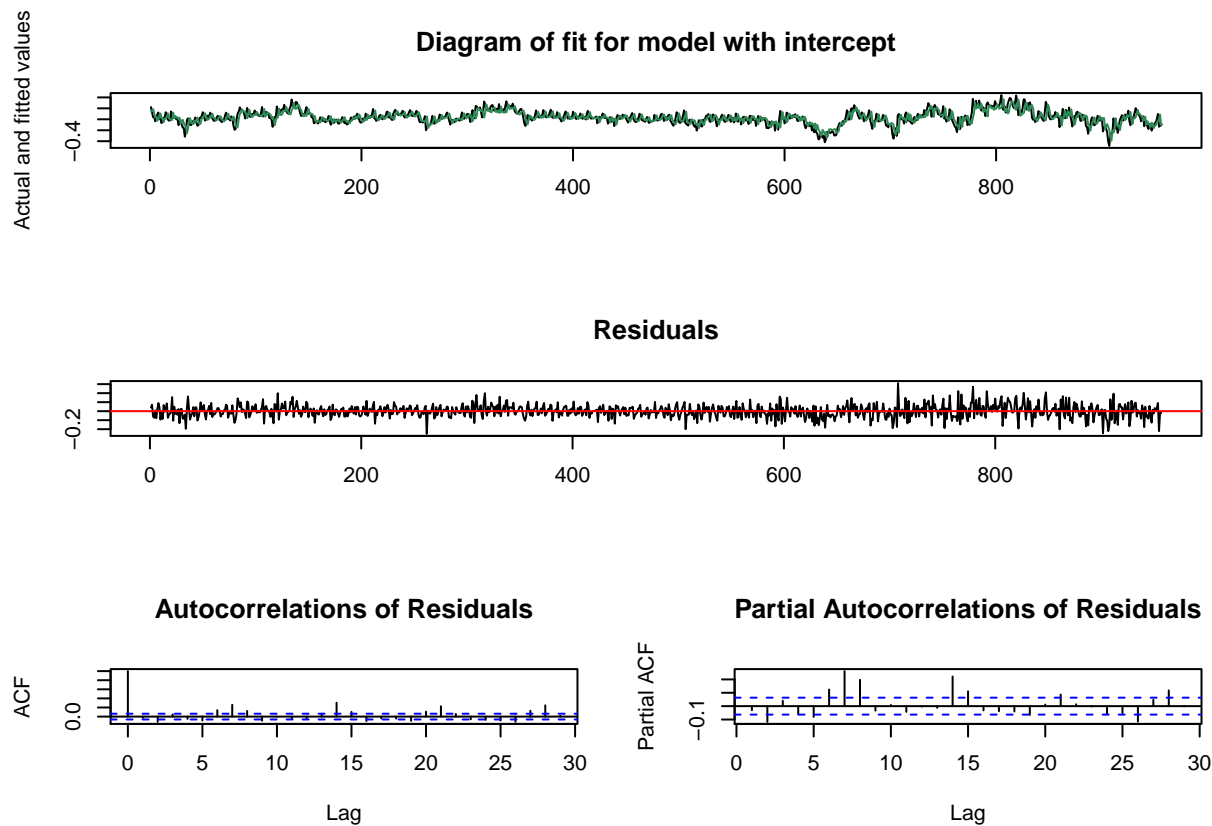


Partial Autocorrelations of Residuals



```
##
## Title:
## Augmented Dickey-Fuller Unit Root Test
```

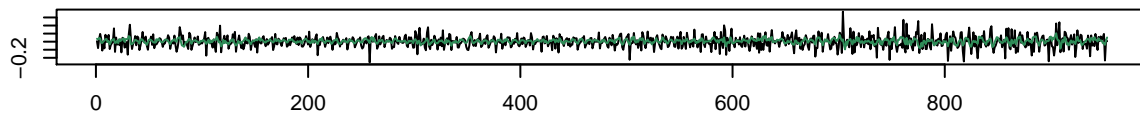
```
##
## Test Results:
##
##
## Description:
## Thu Apr 19 11:58:56 2018 by user:
```



```
##
## Title:
## Phillips-Perron Unit Root Test
##
## Test Results:
##
##
## Description:
## Thu Apr 19 11:58:56 2018 by user:
```

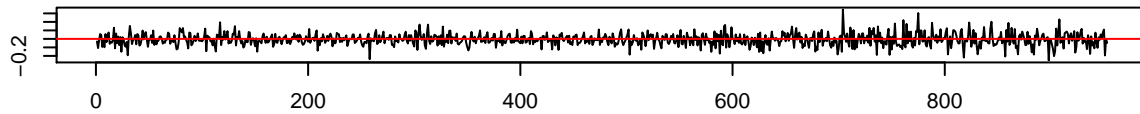
Actual and fitted values

Diagram of fit for test regression

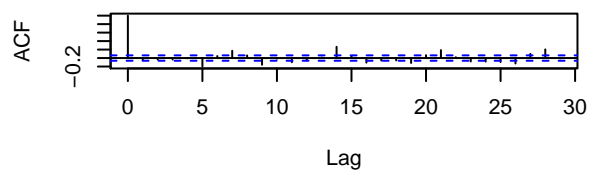


detrending with intercept and 4 lagged differences used in test regression

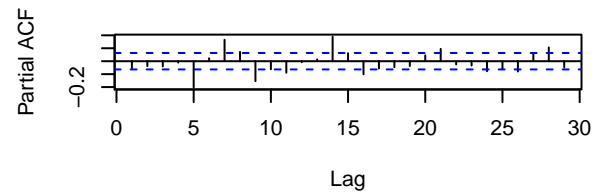
Residuals



Autocorrelations of Residuals



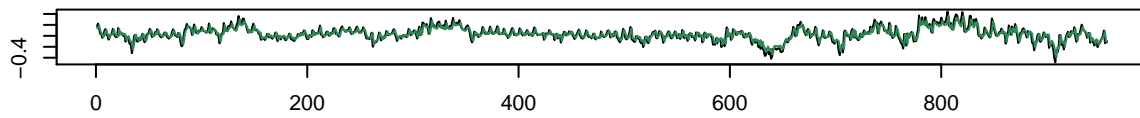
Partial Autocorrelations of Residuals



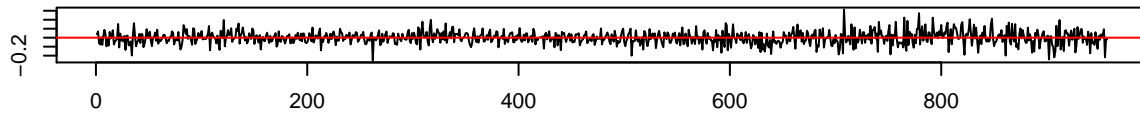
```
##
## Title:
## Elliott-Rothenberg-Stock Unit Root Test
##
## Test Results:
##
##
## Description:
## Thu Apr 19 11:58:56 2018 by user:
```

Actual and fitted values

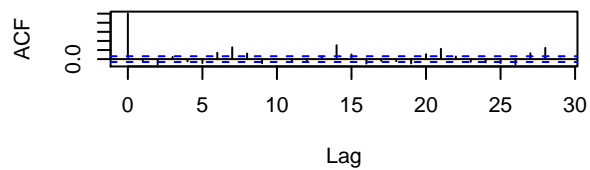
Diagram of fit for model with polynomial degree of 1



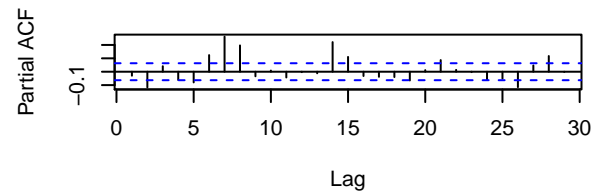
Residuals



Autocorrelations of Residuals



Partial Autocorrelations of Residuals



```
##
## Title:
## Schmidt-Phillips Unit Root Test
##
## Test Results:
## NA
##
## Description:
## Thu Apr 19 11:58:56 2018 by user:
```