INSPECTION OF THE AWM DATA SET AND ESTIMATION OF EUROZONE AGGREGATED MONEY/INFLATION

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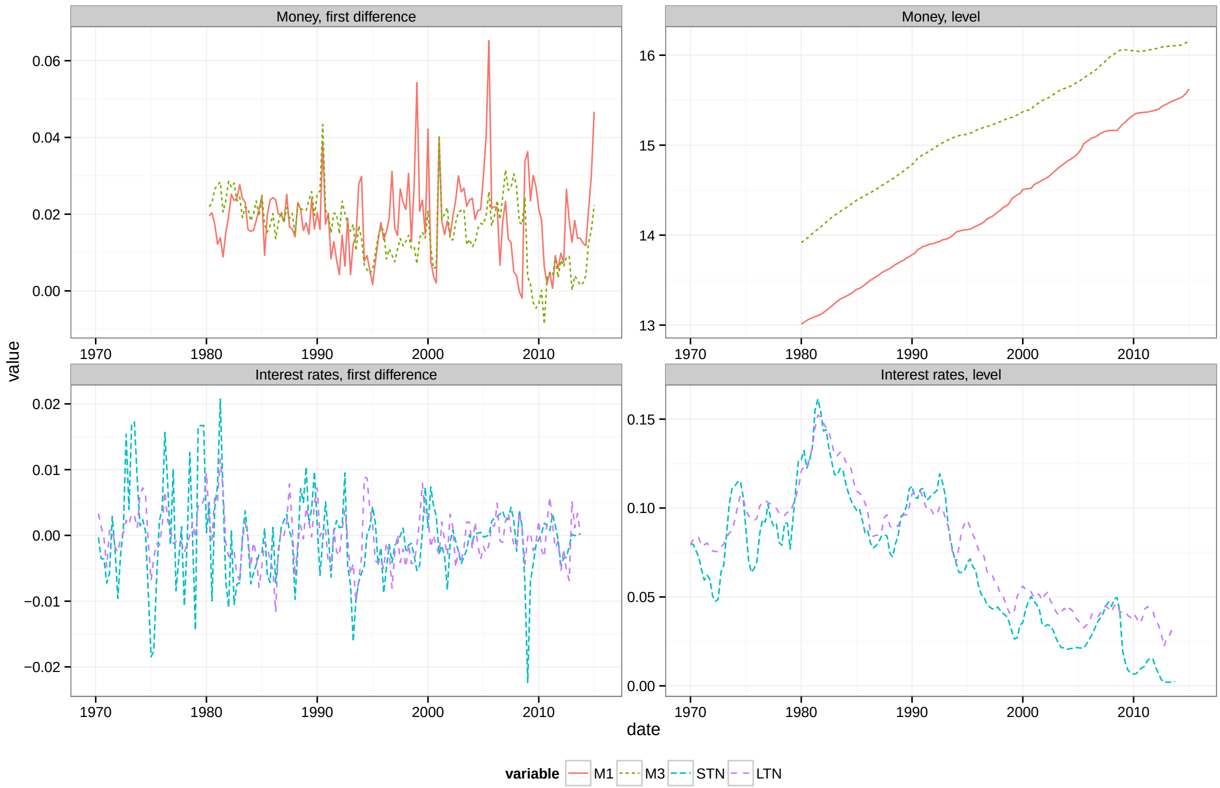
```
## Loading required package:  ggplot2
##
## Attaching package:  'dplyr'
##
## The following object is masked from 'package:stats':
##
##     filter
##
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
##  [1] "YER"     "PCR"     "GCR"     "ITR"     "XTR"     "MTR"     "YED"
##  [8] "PCD"     "GCD"     "ITD"     "XTD"     "MTD"     "YFD"     "YIN"
## [15] "WIN"     "GON"     "TIN"     "YFN"     "HICP"    "HEX"     "HEG"
## [22] "HICPSA"  "HEXSA"   "HEGWEI"  "CAN_YEN" "NFN_YEN" "LFN"     "LNN"
## [29] "UNN"     "URX"     "LEN"     "STN"     "LTN"     "COMPR"   "POILU"
## [36] "PCOMU"   "YWD"     "YWDX"    "YWR"     "YWRX"    "LPROD"   "ULC"
## [43] "WRN"     "SAX"     "EEN"     "EXR"     "LHO"     "LFI"     "M1"
## [50] "M3"      "ESI"     "LIB"     "PPI"     "DJES"    "PROFOOD" "NRJ"
## [57] "HICP_EZ" "UNFOOD"  "INDGOOD" "SERVI"   "date"
```

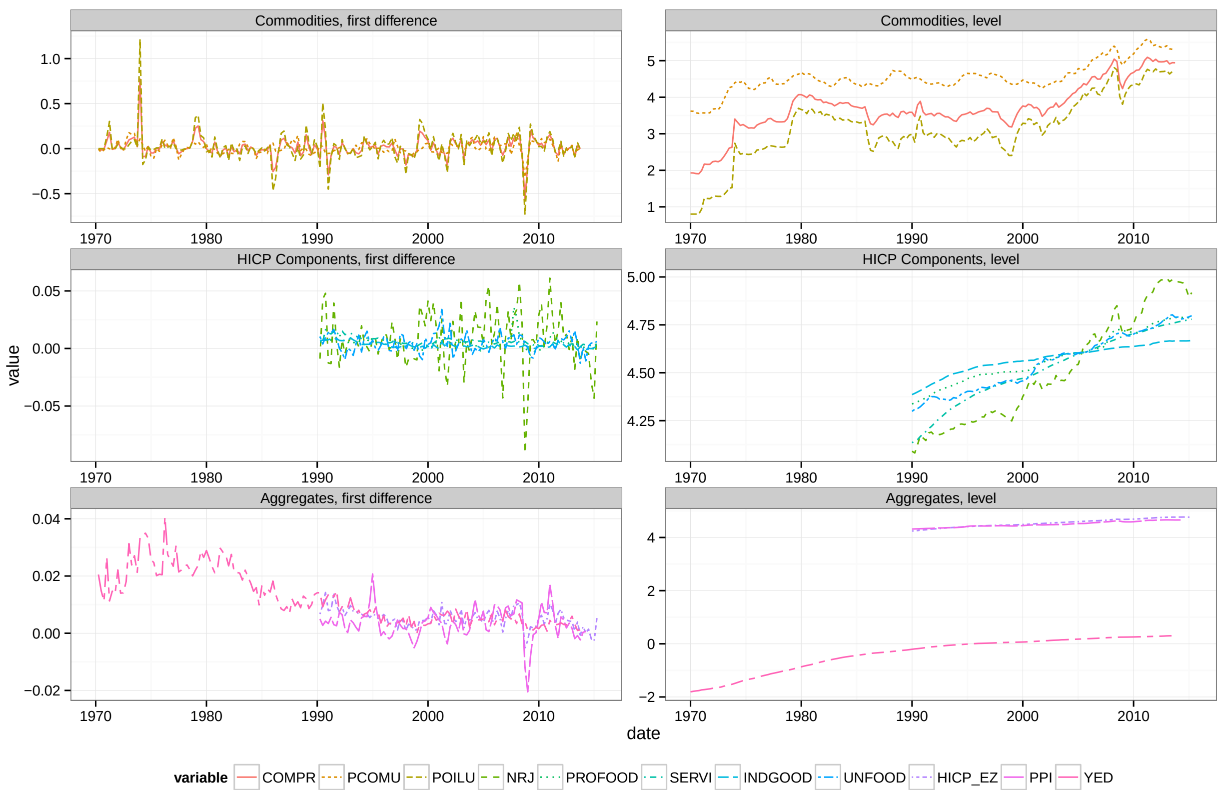
In this document we estimate models for money demand and inflation on aggregated Eurozone data following Bårdsen et al. (2005)

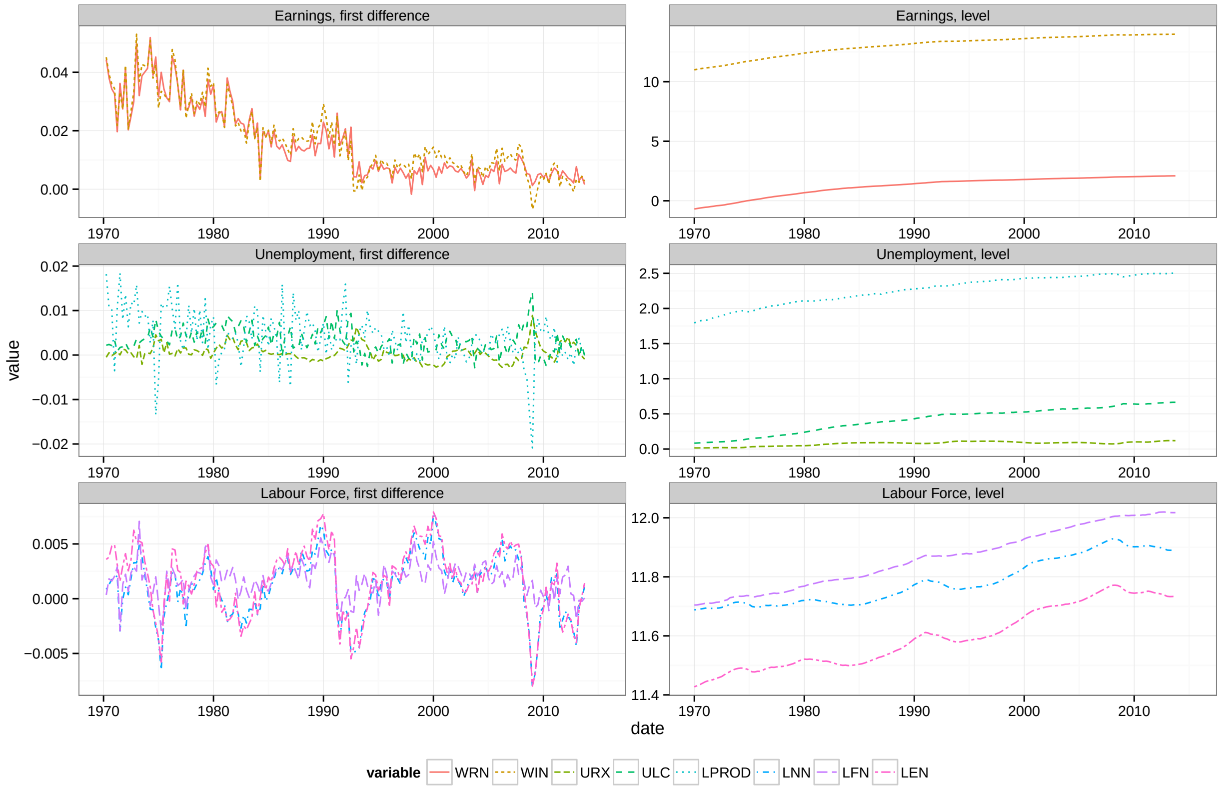
1. Visualisation of the data

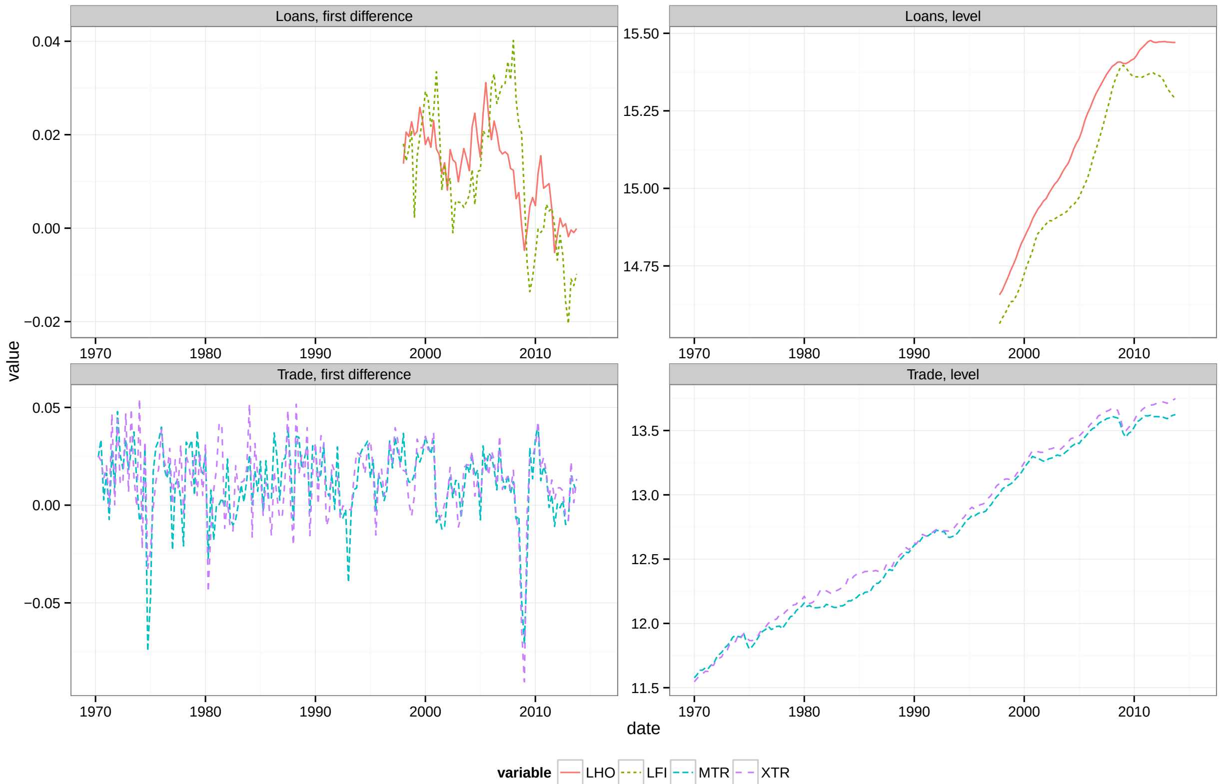
Date: July 23, 2015.



Strong seasonal effect in M1, M3 seems better behaved.




Earnings, first difference
Earnings, level
Unemployment, first difference
Unemployment, level
Labour Force, first difference
Labour Force, level
value
date
variable
WRN
WIN
URX
ULC
LPROD
LNN
LFN
LEN


Loans, first difference
Loans, level
Trade, first difference
Trade, level
value
date
variable
LHO
LFI
MTR
XTR

2. Money demand function

Bårdsen et al. (2005) estimates a money demand function on AWM data from 1980:4 to 1997:2. The equation is based on a model from Coenen and Vega (2001) and it includes lagged and contemporanous variables as well as an error correction term. It has the form:

$$
\begin{aligned}
\Delta\widehat{(m-p)}_t &= \alpha_0 + \alpha_1 \Delta\Delta y_t + \alpha_2 \frac{\Delta RS_t + \Delta RS_{t-1}}{2} + \alpha_3 \Delta RL_{t-1} \\
&+ \alpha_4 \frac{\Delta pan_t + \Delta pan_{t-1}}{2} + \alpha_5 emc_{t-2}, \\
ecm_t &= (m-p)_t + \beta_1 y_t + \beta_2 \Delta pan_t + \beta_3 (RL - RS)_t.
\end{aligned}
$$

The it is a co-intergration relation taken form references in (Bårdsen et al., 2005, p. 152). RL and RS are the short and long rates from the AWM, y_t the log of real GDP, and Δpan is the annualized change in the GDP deflator.

Let's try to estimate some variation of it. We do not include an ECM term for starters, and the GDP deflator isn't in the data yet.

```
##
## Call:
## lm(formula = dmp ~ L1_dmp + ddy + LD0_YED + LD1_YED + LD2_YED +
##     LD0_STN + LD1_STN + LD2_STN + LD0_LTN + LD1_LTN + LD2_LTN,
##     data = cbind(awm, LD))
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0139268 -0.0033644 -0.0005169  0.0031606  0.0287833
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.002267   0.001769   1.282  0.20358
## L1_dmp       0.625006   0.083996   7.441 9.39e-11 ***
## ddy          0.078849   0.140051   0.563  0.57499
## LD0_YED     -0.131912   0.217594  -0.606  0.54606
## LD1_YED      0.049565   0.238232   0.208  0.83571
## LD2_YED      0.101564   0.219890   0.462  0.64540
## LD0_STN      0.235471   0.376657   0.625  0.53362
## LD1_STN     -0.452479   0.356601  -1.269  0.20812
## LD2_STN      0.478643   0.344373   1.390  0.16837
## LD0_LTN     -1.273155   0.276552  -4.604 1.52e-05 ***
## LD1_LTN      0.994704   0.307420   3.236  0.00176 **
## LD2_LTN      0.087609   0.306684   0.286  0.77586
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.006173 on 81 degrees of freedom
##   (89 observations deleted due to missingness)
## Multiple R-squared:  0.5167,Adjusted R-squared:  0.451
## F-statistic: 7.871 on 11 and 81 DF,  p-value: 4.064e-09
## Call:
## lassovar(dat = var1, lags = 4)
##
## Model estimated equation by equation
## Selection criterion: BIC
## Estimator: Lasso
## Deterministics: intercept.
## Dimensions: T = 91  N = 5
##
## Total number of variables selected:24 (24% of candidates)
##
```

```
##  Model summary statistics:
##                   Lambda non-zero    resid var
## dmp        0.0006152253        8 3.582759e-05
## LD0_HICPSA 0.0003189406        5 1.125704e-05
## LD0_STN    0.0003510535        5 3.303019e-06
## LD0_LTN    0.0005579283        3 6.698120e-06
## LD0_YED    0.0005798616        3 9.937294e-06
##
## Deterministics not included in the non-zero count.
##                       [,1]          [,2]        [,3]        [,4]
##               0.002393135  5.436049e-05 0.001316101 0.003241236
## 1L_dmp        0.286298712  0.000000e+00 0.000000000 0.000000000
## 1L_LD0_HICPSA 0.319321350  3.663569e-01 0.000000000 0.000000000
## 1L_LD0_STN    0.000000000  0.000000e+00 0.169700299 0.157986792
## 1L_LD0_LTN    0.000000000  2.510268e-01 0.024828531 0.167309399
## 1L_LD0_YED    0.000000000  2.714280e-01 0.000000000 0.000000000
## 2L_dmp        0.143163044  0.000000e+00 0.000000000 0.000000000
## 2L_LD0_HICPSA 0.000000000  0.000000e+00 0.000000000 0.000000000
## 2L_LD0_STN    0.205863360  0.000000e+00 0.330066519 0.000000000
## 2L_LD0_LTN    0.056964304 -1.811029e-01 0.064911077 0.000000000
## 2L_LD0_YED    0.000000000  0.000000e+00 0.000000000 0.000000000
## 3L_dmp        0.149968856  0.000000e+00 0.000000000 0.000000000
## 3L_LD0_HICPSA 0.147444355  0.000000e+00 0.000000000 0.000000000
## 3L_LD0_STN    0.000000000  0.000000e+00 0.111954516 0.000000000
## 3L_LD0_LTN    0.000000000  0.000000e+00 0.000000000 0.079333452
## 3L_LD0_YED    0.000000000  0.000000e+00 0.000000000 0.000000000
## 4L_dmp        0.000000000  0.000000e+00 0.000000000 0.000000000
## 4L_LD0_HICPSA 0.073580614  0.000000e+00 0.000000000 0.000000000
## 4L_LD0_STN    0.000000000  0.000000e+00 0.000000000 0.000000000
## 4L_LD0_LTN    0.000000000 -1.632442e-01 0.000000000 0.000000000
## 4L_LD0_YED    0.000000000  0.000000e+00 0.000000000 0.000000000
##                       [,5]
##               -0.0007433915
## 1L_dmp         0.0000000000
## 1L_LD0_HICPSA  0.0000000000
## 1L_LD0_STN     0.0000000000
## 1L_LD0_LTN     0.0000000000
## 1L_LD0_YED     0.2452826133
## 2L_dmp         0.0000000000
## 2L_LD0_HICPSA  0.0000000000
## 2L_LD0_STN     0.0000000000
## 2L_LD0_LTN     0.0000000000
## 2L_LD0_YED     0.0000000000
## 3L_dmp         0.0000000000
## 3L_LD0_HICPSA  0.0000000000
## 3L_LD0_STN     0.0000000000
## 3L_LD0_LTN     0.0000000000
## 3L_LD0_YED     0.0000000000
## 4L_dmp         0.0000000000
## 4L_LD0_HICPSA -0.0803712461
## 4L_LD0_STN     0.0000000000
## 4L_LD0_LTN     0.0000000000
## 4L_LD0_YED    -0.0523508099
```

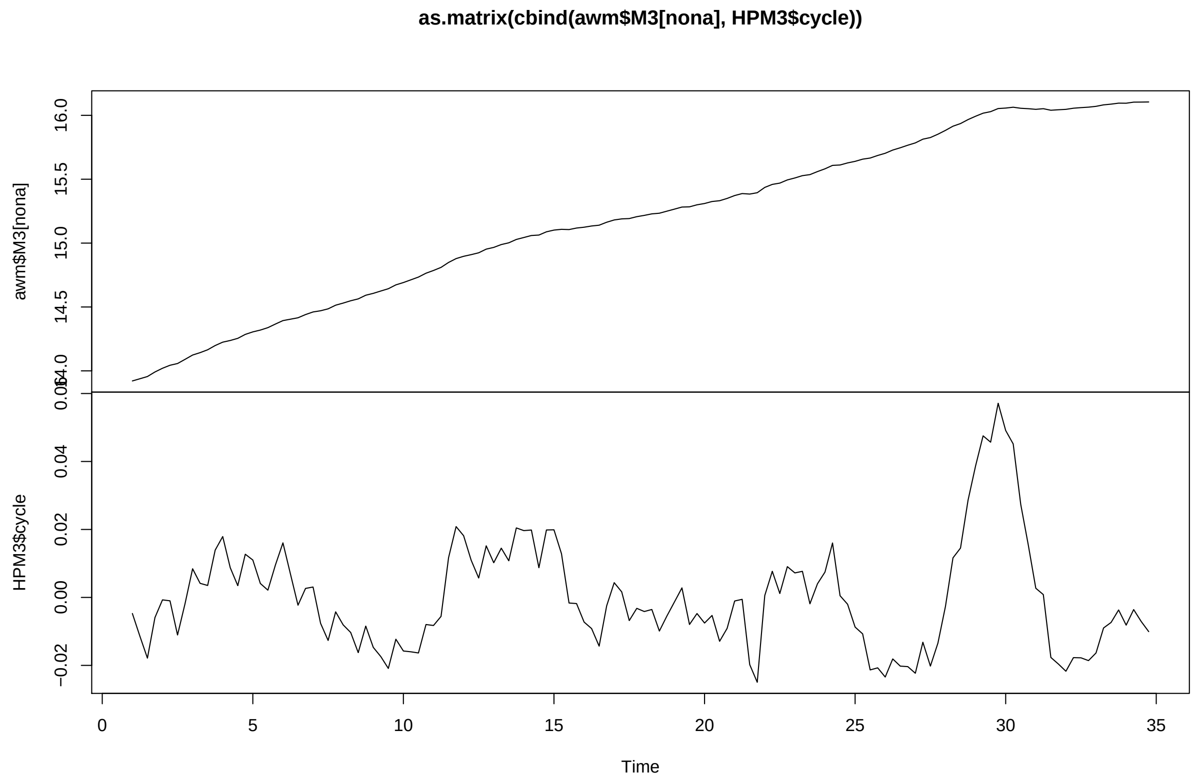
Some models in levels:

```
##
## Call:
## lm(formula = mp ~ YER + STN + LTN, data = awm)
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.11779 -0.03585 -0.00800  0.03598  0.15127
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -25.0117     1.8767 -13.327  < 2e-16 ***
## YER           2.5007     0.1291  19.364  < 2e-16 ***
## STN          -1.8992     0.6127  -3.100  0.00257 **
## LTN           4.3620     1.0428   4.183 6.56e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06377 on 92 degrees of freedom
##   (80 observations deleted due to missingness)
## Multiple R-squared:  0.9441,Adjusted R-squared:  0.9423
## F-statistic: 517.8 on 3 and 92 DF,  p-value: < 2.2e-16
##                    [,1]
##            1.3388037179
## 1L_dat     0.8765929977
## STN        0.0000000000
## LTN        0.0000000000
## YER        0.0003278016
## LDO_HICPSA 0.0000000000
##                   [,1]         [,2]        [,3]        [,4]
##              -1.1960265  0.042599060  0.18303063  0.76113369
## 1L_mp         0.9257880 -0.003811509  0.00000000  0.00000000
## 1L_STN        0.0000000  0.945491666  0.04670236 -0.10497598
## 1L_LTN        0.0000000  0.005022450  0.85051184 -0.06335923
## 1L_YER        0.1407295  0.000000000 -0.01241340  0.94748692
## 1L_LDO_HICPSA  0.0000000  0.504065809  0.43919307  0.33430108
##                       [,5]
##               0.0008704405
## 1L_mp         0.0000000000
## 1L_STN        0.0000000000
## 1L_LTN       -0.0246811771
## 1L_YER        0.0000000000
## 1L_LDO_HICPSA  0.3564794659
```

Totally different from the relation in JAE/Baardsen, but then again the modes are totally difference as well.

3. Inflation models


as.matrix(cbind(awm$M3[nona], HPM3$cycle))
awm$M3[nona]
16.0
15.5
15.0
14.5
14.0
HPM3$cycle
0.06
0.04
0.02
0.00
−0.02
0
5
10
15
20
25
30
35
Time

References

Bårdsen, G., Ø. Eitrheim, E. S. Jansen, and R. Nymoen (2005). *The econometrics of macroeconomic modelling*. Oxford University Press Oxford.

Coenen, G. and J.-L. Vega (2001). The demand for m3 in the euro area. *Journal of Applied Econometrics 16*(6), 727–748.