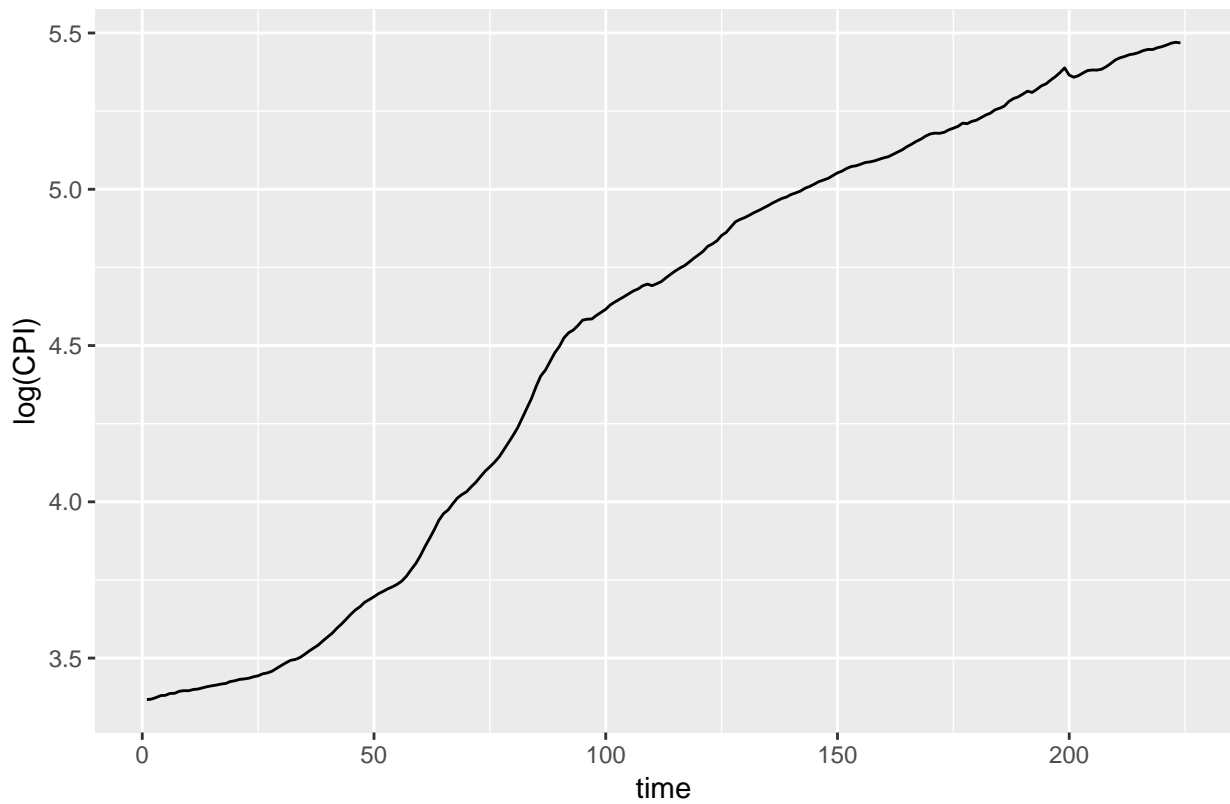# Lasso (Inflation)

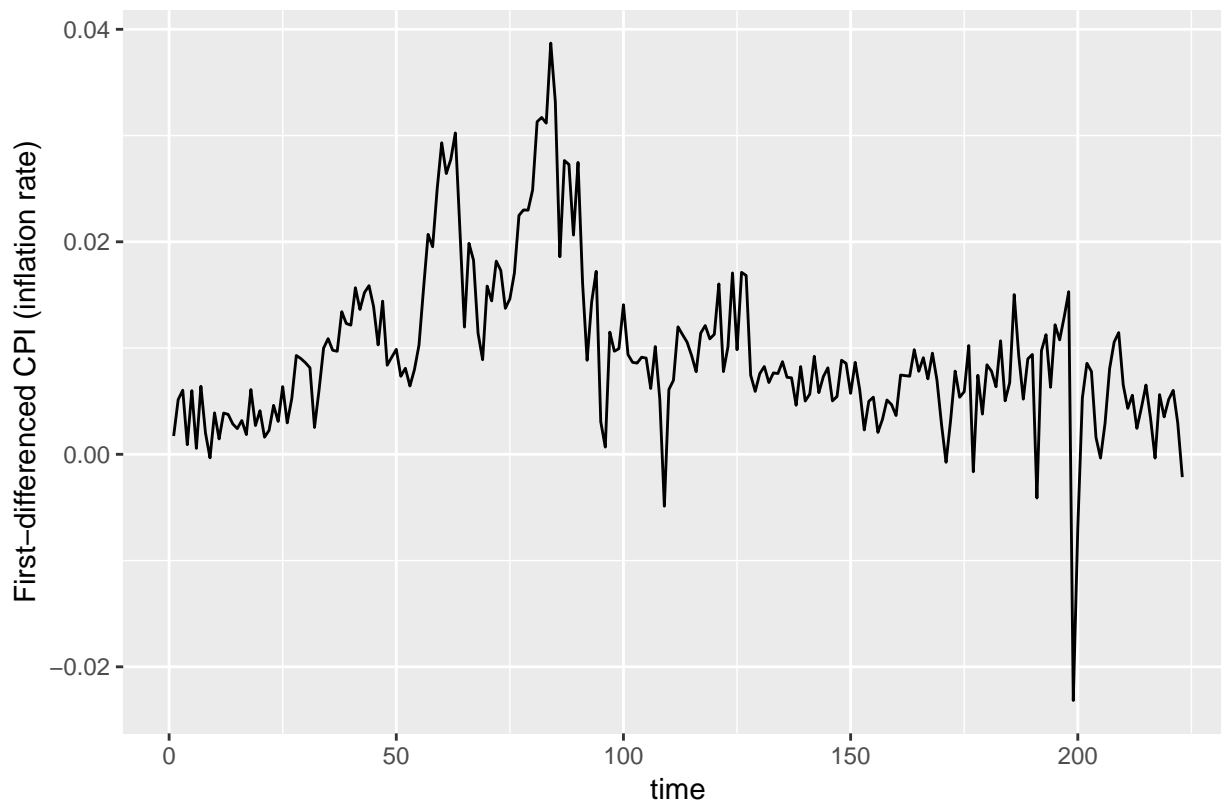*Shuofan Zhang*

October 23, 2018

Detailed description

The inflation rate is used as the dependent variable.
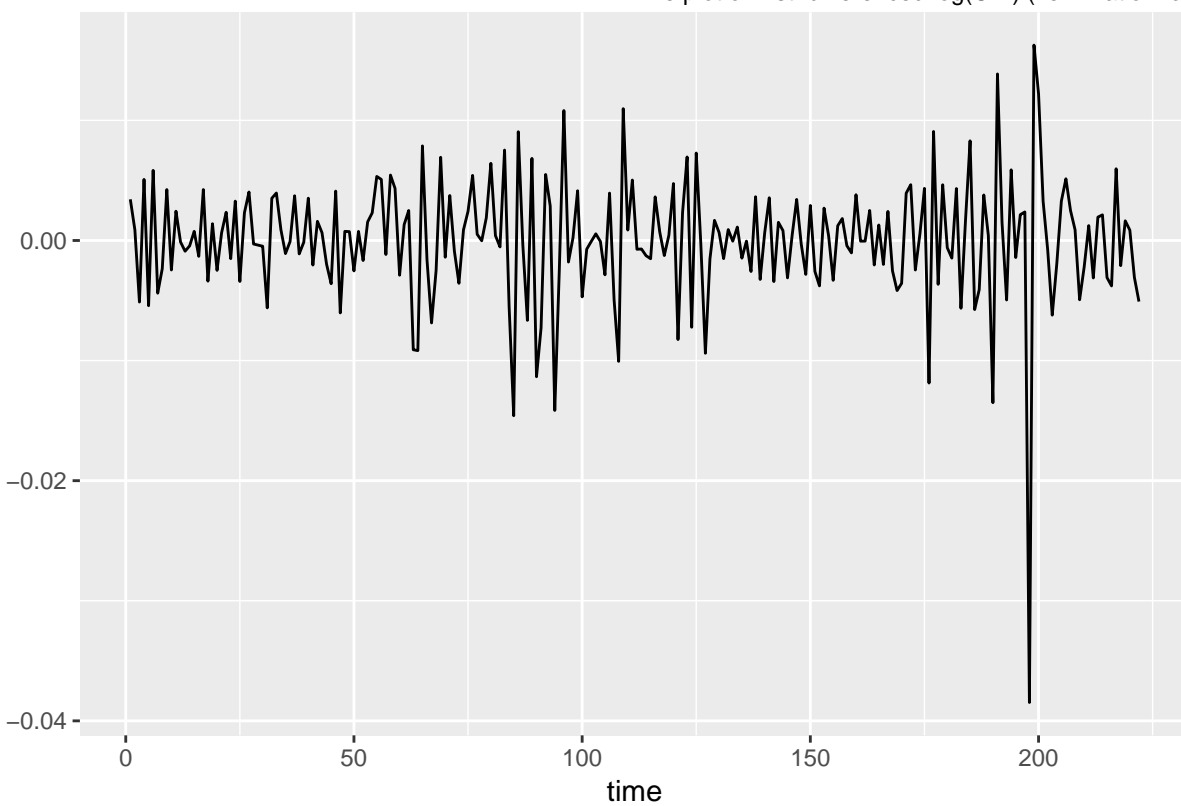
$$y_t = log(CPI_t) - log(CPI_{t-1})$$

$$\Delta y_t = log(CPI_t) - 2 * log(CPI_{t-1}) + log(CPI_{t-2})$$

Time plot of log(CPI).

Time plot of first−differenced log(CPI) (i.e. inflation rate).

Time plot of second−differenced log(CPI) (first−differenced inflation rate

Table 2: Non-zero Coefficients with fixed lambda

variable	value
Disp-Income.lag1	0.0150656
U: Dur<5wks.lag1	-0.0221654
Orders(ConsumerGoods/Mat.).lag1	0.0680045
PCED_RecServices.lag1	-0.0511471
CPH:NFB.lag1	0.0296267
TB-3Mth.lag1	0.0210499
PPI:FinGds.lag2	-0.0055467
Petroleum Stocks.lag2	0.0165502
PCED_RecServices.lag4	-0.0095667
PCED_Gas_Enrgy.lag1.level	-0.2401656

Table 1: Augmented Dickey-Fuller Test: `inflation`

Test statistic	Lag order	P value	Alternative hypothesis
-2.884	6	0.2047	stationary

ADF test suggests inflation rate is I(1) at 10% significance level.

Lasso

The regression being estimated is:

$$
\begin{aligned}
\Delta y_t = y_{t-1} \\
+ \Delta y_{t-1} + \Delta y_{t-2} + \Delta y_{t-3} + \Delta y_{t-4} \\
+ I(0)_{t-1} + I(0)_{t-2} + I(0)_{t-3} + I(0)_{t-4} \\
+ \Delta I(1)_{t-1} + \Delta I(1)_{t-2} + \Delta I(1)_{t-3} + \Delta I(1)_{t-4} \\
+ \Delta^2 I(2)_{t-1} + \Delta^2 I(2)_{t-2} + \Delta^2 I(2)_{t-3} + \Delta^2 I(2)_{t-4} \\
+ I(1)_{t-1} + \Delta I(2)_{t-1}
\end{aligned}
$$

713 series are used as explanatory variables.

4 lags of I(0), including first-differenced I(1) and second-differenced I(2), 4*145=580; (lags of $\Delta y_{t-1}, \Delta y_{t-2}, \Delta y_{t-3}, \Delta y_{t-4}$ are included)

1 lag of I(1), including first-differenced I(2), 133. (y_{t-1} is included)
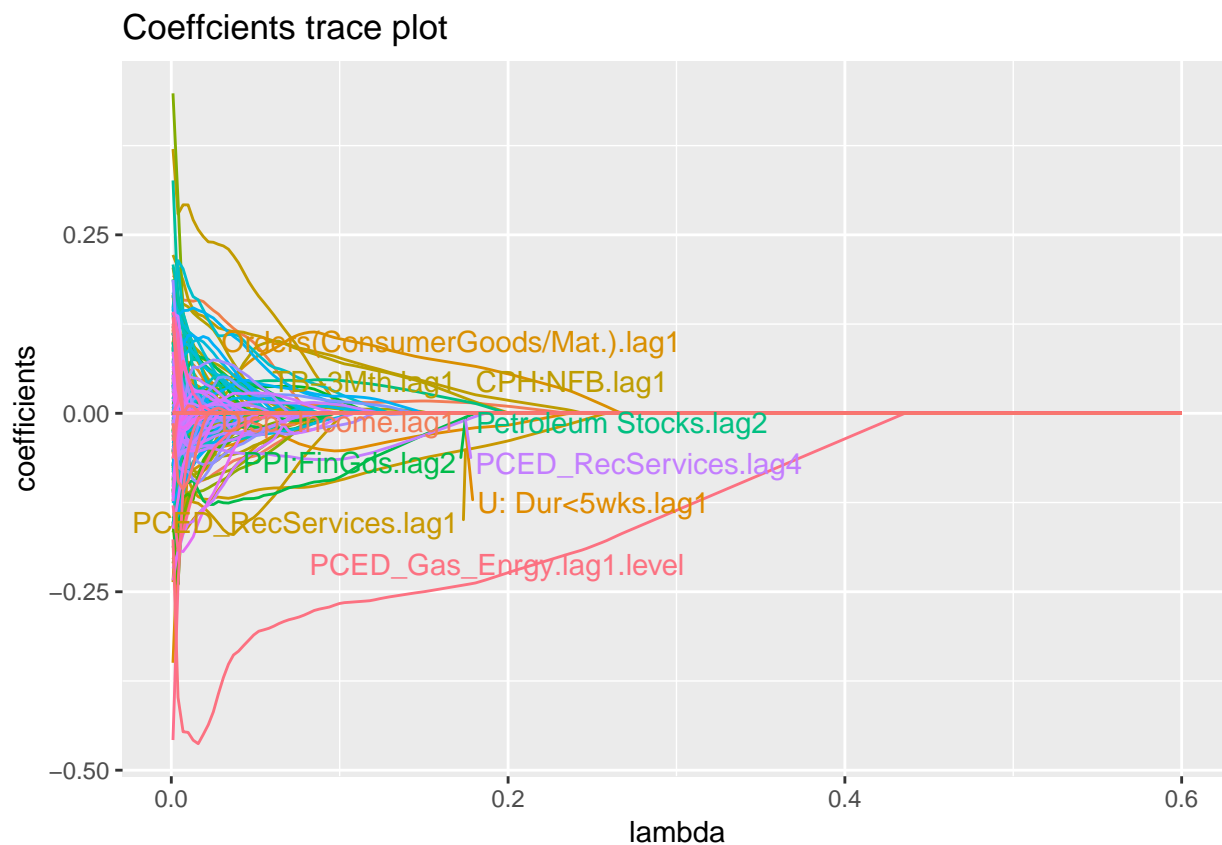
Coeffcients trace plot

Table 3: Augmented Dickey-Fuller Test: `pced.gas.energy.level`

Test statistic	Lag order	P value	Alternative hypothesis
-5.345	6	0.01 * *	stationary

Table 4: Non-zero Coefficients with fixed lambda

variable	value
TB-3Mth.lag1	0.0314708
FedFunds.lag1.level	0.0047930
PCED.lag1.level	0.3077776
BusSec Defl.lag1.level	0.0414736
PCED_FoodServ_Acc..lag1.level	0.1826493
CPI_LFE.lag1.level	0.1116604
PPI:FinGds.lag1.level	0.0134324

First differenced PCED_GAS_ENERGY
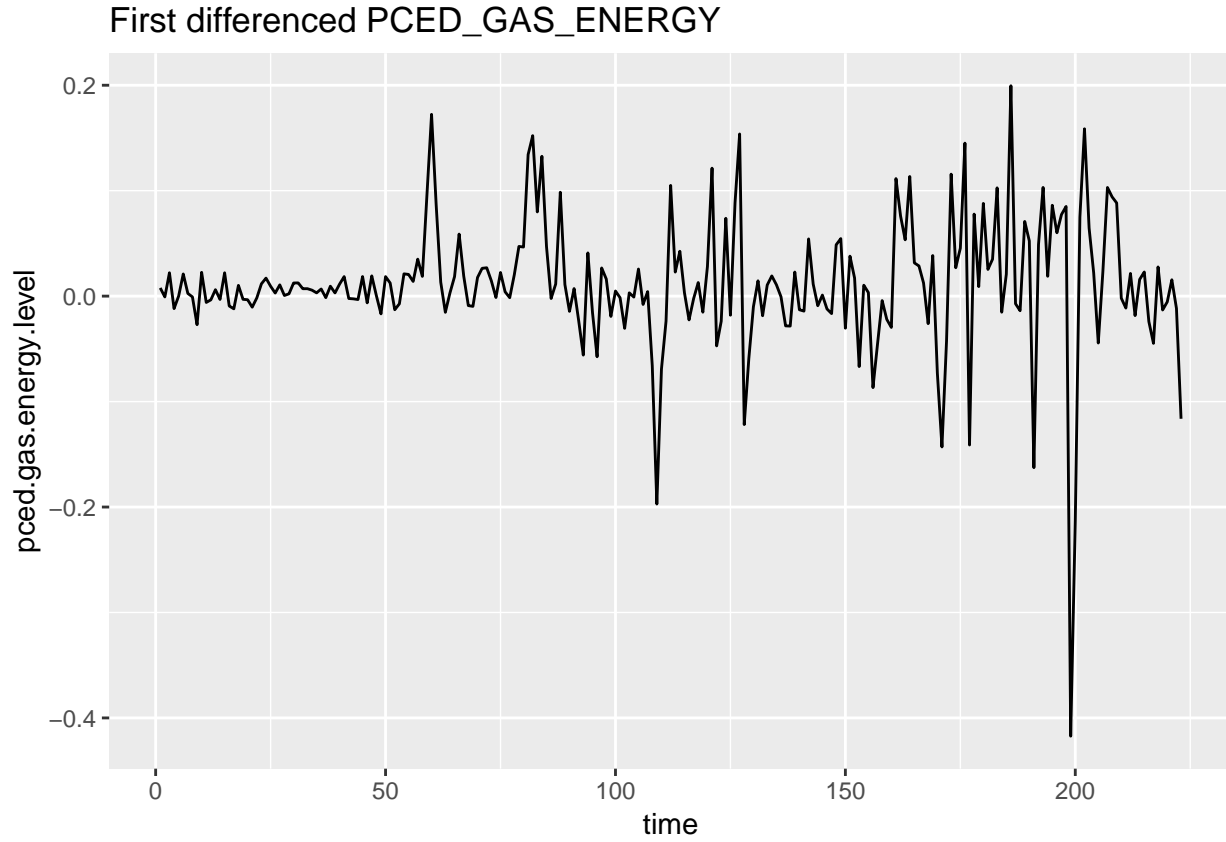
ADF test suggests the "level" variable is actually not I(1).

Now, we use the "inflation rate" as the dependent variable.

The regression being estimated is:

$$
\begin{aligned}
Inflation_t = \ & log(CPI)_{t-1} \\
& + I(0)_{t-1} + I(0)_{t-2} + I(0)_{t-3} + I(0)_{t-4} \\
& + \Delta I(1)_{t-1} + \Delta I(1)_{t-2} + \Delta I(1)_{t-3} + \Delta I(1)_{t-4} \\
& + \Delta^2 I(2)_{t-1} + \Delta^2 I(2)_{t-2} + \Delta^2 I(2)_{t-3} + \Delta^2 I(2)_{t-4} \\
& + I(1)_{t-1} + \Delta I(2)_{t-1}
\end{aligned}
$$

Coeffcients trace plot