

Total Expenditure into monthly data and Model Consumption and CPI

Yiyi

2022-03-17

Contents

| | | |
|----------|--|-----------|
| 1 | Process | 2 |
| 2 | Augmented Dickey-Fuller Test | 2 |
| 3 | Growth rate | 3 |
| 4 | CPI all items level | 3 |
| 4.1 | Model and data | 3 |
| 4.2 | Stepwise function | 5 |
| 4.3 | Results | 5 |
| 5 | Divisions level | 7 |
| 5.1 | Model | 7 |
| 5.2 | Output | 7 |
| 5.3 | Conclusions | 9 |
| 6 | Unemployment (growth) | 10 |
| 6.1 | Data and methods | 10 |
| 6.2 | Regression output (growth rate) | 10 |
| 6.3 | The simplified result (growth rate) | 12 |
| 6.4 | Some more lags of unemployment (Growth rate) | 12 |
| 7 | Unemployment (level) | 15 |
| 7.1 | Regression output | 17 |
| 7.2 | The simplified result | 19 |

1 Process

According to your suggestion, I made quarterly into smoothed monthly data. The idea is I give Jan, April, July and Oct 1/3 weight of the previous quarter and 2/3 current quarter, sum up and divided by 2. Feb, May, August, Nov keep their quarter figures and divide by 2. March, June, Sept and Dec have given 1/3 of the previous quarter and 2/3 current quarter, sum up and divided by 2.

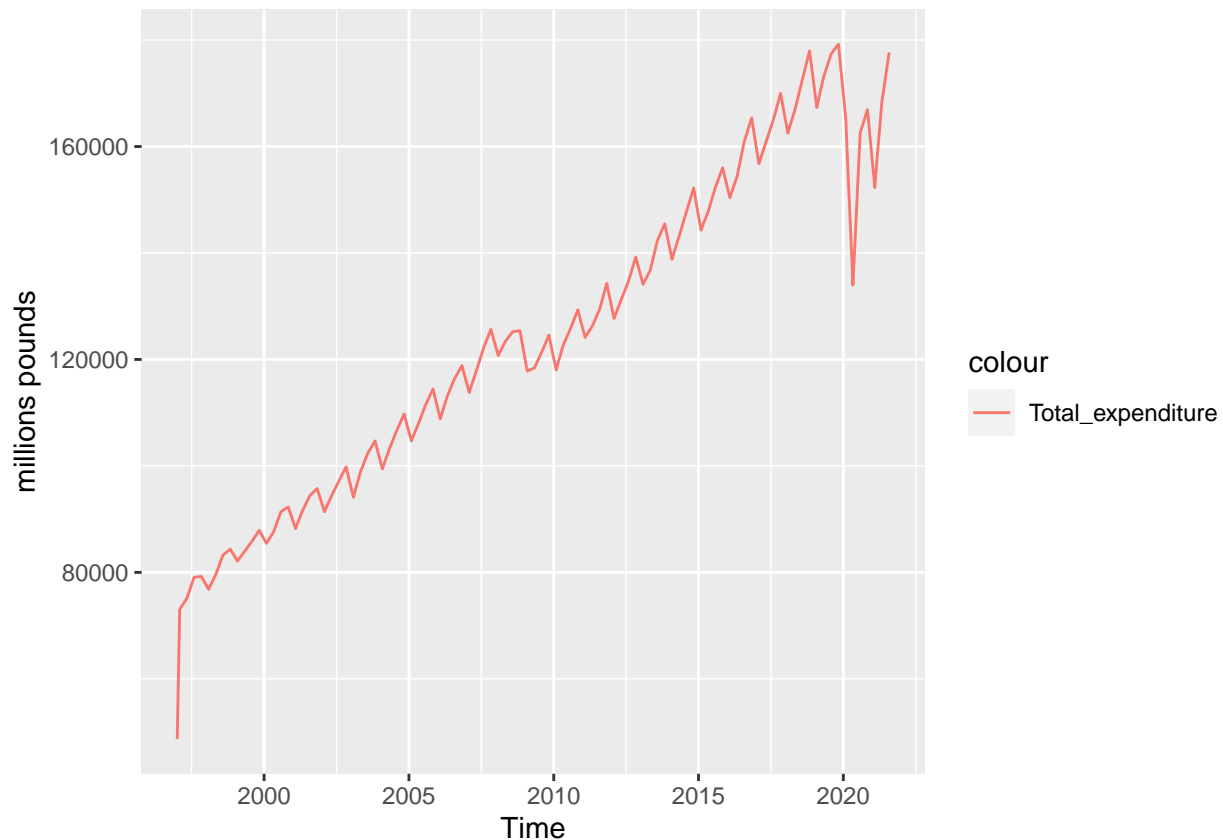


Figure 1: Total expenditure

```
##  
## Augmented Dickey-Fuller Test  
##  
## data: df.ts  
## Dickey-Fuller = -3.0187, Lag order = 6, p-value = 0.1469  
## alternative hypothesis: stationary
```

2 Augmented Dickey-Fuller Test

One way to test whether a time series is stationary is to perform an augmented Dickey-Fuller test, which uses the following null and alternative hypotheses:

H_0 : The time series is non-stationary. In other words, it has some time-dependent structure and does not have constant variance over time.

HA: The time series is stationary.

P-value: 0.1469

Since the p-value is 0.1469 not less than .05, we fail to reject the null hypothesis.

This means the time series is non-stationary. In other words, it has some time-dependent structure and does not have constant variance over time.

3 Growth rate

Since total expenditure monthly data is not stationary, I try to convert to a percentage growth rate.

```
##
## Augmented Dickey-Fuller Test
##
## data: df.ts
## Dickey-Fuller = -8.332, Lag order = 6, p-value = 0.01
## alternative hypothesis: stationary
```

We examine the growth rate stationary by applying the ADF test. The p-value is 0.01; we reject the null hypothesis. This means the time series is stationary now.

After we perform an augmented Dickey-Fuller test on the data, we can create a quick plot to visualize the data: There was a very clear fluctuation between March and August 2020.

4 CPI all items level

4.1 Model and data

The data set is monthly CPI all items and total expenditure for the UK from March 1997 to November 2019. We ignore the data after December 2019 since it is impacted by the Covid effect in 2020 Q1.

One of the significant differences between this model and the previous one is that we use total consumption as the demand variable for the overall CPI rate. This model for monthly data not only assumes inflation depends on 12 lagged inflation, dummies variables of each month, three VAT change announcements, and the great $D_{recession}$, but also Consumption C.

$$CPI_t = Constant + Trend_t + \beta_1 D_{Jan} + \dots + \beta_{11} D_{Dec} + \beta_{12} D_{recession} + \beta_{13} D_{VAT_1} + \beta_{14} D_{VAT_2} + \beta_{15} D_{TAT_3} + \sum_{j=1}^{12} \alpha_j C_{t-j} + \sum_{i=1}^{12} \lambda_i CPI_{t-i} + \sigma_t$$

Where CPI is the inflation for CPI all itmes, D_{JAN} to D_{Dec} are eleven dummy variables for each month. We define February as the base category against which the others are assessed to avoid the dummy variable trap. $D_{recession}$, the great recession that officially began in April 2008 and ended in June 2009, D_{VAT_1} , D_{VAT_2} and D_{VAT_3} are three Value-added tax change in the United Kingdom, which were December 2008, January 2010 and January 2011. $\sum_{j=1}^{12} \alpha_j C_{t-j}$ is the sum of 12 monthly lags consumption growth rate. $\sum_{i=1}^{12} \lambda_i CPI_{t-i}$ represents the sum of twelve months lags of the inflation rate of CPI ALL ITEMS.

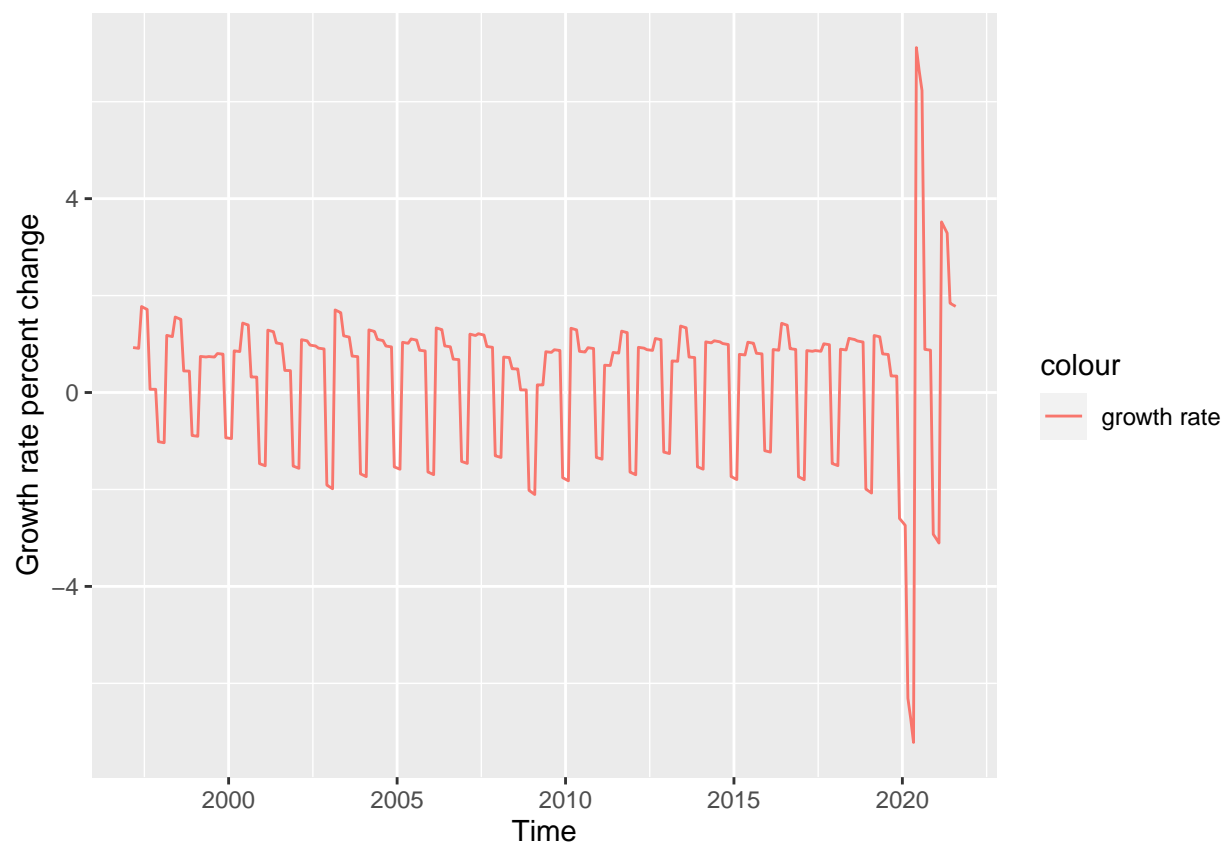


Figure 2: Growth rate

4.2 Stepwise function

To further discover the independent variables that have a more significant influence on inflation and remove less critical coefficients, we introduce stepwise regression. In our simplified process, we apply backward elimination selection based on P-value criteria. For CPI all items, we go through a systematic procedure to simplify the lag structure: Omit the least significant independent variable and rerun until all variables are significant at 5% or 1%. In this process, we always leave the dummy variables in (VAT, monthly, crisis etc.) in regression, even if insignificant.

4.3 Results

4.3.1 The original results

```
##
## =====
##                               Dependent variable:
##                               -----
##                               CPI ALL ITEMS
## -----
## Constant                      0.52**
## lag1                          0.11
## lag2                          -0.01
## lag3                          0.10
## lag4                          0.02
## lag5                          -0.01
## lag6                          0.06
## lag7                          0.04
## lag8                          0.04
## lag9                          0.02
## lag10                         -0.001
## lag11                         0.02
## lag12                         0.17**
## time_Aug                      -0.56
## time_Dec                      -0.61*
## time_Apr                      -0.44
## time_Jan                      -1.07**
## time_Jul                      -0.96**
## time_Jun                      -0.66**
## time_Mar                      -0.37
## time_May                      -0.36
## time_Nov                      -0.65*
## time_Oct                      -0.40
## time_Sep                      -0.31
## VAT1                         -0.94**
## VAT2                         0.51*
## VAT3                         0.48*
## Recession                     0.17*
## Trend                        0.0002
## growth lag1                   0.18*
## growth lag2                   -0.12
## growth lag3                   0.01
## growth lag4                   0.08
## growth lag5                   -0.01
```

```

## growth lag6          -0.05
## growth lag7          0.03
## growth lag8          -0.05
## growth lag9          0.14
## growth lag10         0.02
## growth lag11         -0.14
## growth lag12         0.06
## -----
## Observations          273
## R2                    0.76
## Adjusted R2           0.72
## Residual Std. Error   0.19
## F Statistic           18.37**
## =====
## Note:                  *p<0.05; **p<0.01; ***p<[0.***]

```

4.3.2 The simplified result

```

##
## =====
##                               Dependent variable:
##                               -----
##                               COPY[, 1]
##                               CPI ALL ITEMS
## -----
## Constant                 0.39**
## lag3                     0.12*
## lag12                    0.19**
## time_Aug                 -0.26*
## time_Dec                 -0.44**
## time_Apr                 -0.15
## time_Jan                 -1.06**
## time_Jul                 -0.75**
## time_Jun                 -0.52**
## time_Mar                 -0.13*
## time_May                 -0.36**
## time_Nov                 -0.39**
## time_Oct                 -0.17
## time_Sep                 -0.11
## VAT1                     -0.92**
## VAT2                     0.57**
## VAT3                     0.56**
## Recession                0.18**
## Trend                    0.0002
## growth lag2              0.09*
## growth lag10             0.11**
## growth lag12             -0.07*
## -----
## Observations             273
## R2                       0.75
## Adjusted R2              0.73
## Residual Std. Error      0.18
## F Statistic              35.24**

```

```
## =====
## Note:          *p<0.05; **p<0.01; ***p<[0.***]
```

4.3.2.1 Conclusions Comparing the results before and after simplification, we can see that after simplification, 2, 10 and 12 monthly lags consumption growth variables are significant. However, before stepwise, the results show that only one monthly lag consumption out of 12 is significant.

5 Divisions level

Besides modelling CPI for all items and Consumption, we also try with the divisions level.

5.1 Model

$$\pi_t = \pi + \text{Trend}_t + \beta_1 D_{Jan} + \dots + \beta_{11} D_{Dec} + \beta_{12} D_{recession} + \beta_{13} D_{VAT_1} + \beta_{14} D_{VAT_2} + \beta_{15} D_{TAT_3} + \sum_{j=1}^{12} \alpha_j \pi_{t-j} + \sum_{i=1}^{12} \lambda_i CPI_{t-i} + \sum_{k=1}^{12} \theta_k C_{t-k} + \sigma_t$$

Where π is the inflation for each divisions, D_{JAN} to D_{Dec} are eleven dummy variables for each month. We define February as the base category against which the others are assessed to avoid the dummy variable trap. $D_{recession}$, the great recession that officially began in April 2008 and ended in June 2009, D_{VAT_1} , D_{VAT_2} and D_{VAT_3} are three Value-added tax change in the United Kingdom, which were December 2008, January 2010 and January 2011. $\sum_{k=1}^{12} \theta_k C_{t-k}$ is the sum of 12 monthly lags consumption growth rate. $\sum_{i=1}^{12} \lambda_i CPI_{t-i}$ represents the sum of twelve months lags of the inflation rate of CPI ALL ITEMS and $\sum_{j=1}^{12} \alpha_j \pi_{t-j}$ is the sum of twelve months lagged inflation dependent variables.

5.2 Output

Please see Table 3.

| Dependent variable: | | | | | | | | | | | | |
|---------------------|---------|---------|----------|---------|----------|----------|---------|---------|---------|---------|-----------|----------|
| | 01FB | 02AT | 03CF | 04HW | 05FH | 06HL | 07TR | 08CM | 09RC | 10ED | 11RH | 12MS |
| lag1 | 0.15* | -0.19** | -0.22** | 0.23** | -0.25** | -0.32** | | | -0.18** | | -0.23** | -0.13* |
| lag7 | | | | 0.14* | | -0.18** | | | | | | |
| CPI_lag4 | 0.36* | | | 0.46** | | | | | -0.22* | | 0.10* | |
| lag8 | | | | | | -0.12* | | | | | | |
| lag2 | | | -0.17** | | -0.23** | -0.25** | | | | | | |
| lag3 | | | -0.17** | | | | | 0.14* | | | | |
| lag4 | | | -0.18** | | | | | | 0.16* | | | |
| lag5 | | | | | | | | | 0.14* | | | |
| lag6 | | | 0.26** | | 0.22** | | | | 0.14* | | -0.15** | |
| CPI_lag8 | 0.44** | | 0.44* | | | | | | | | | |
| lag10 | | 0.14* | | | -0.13** | | | 0.14* | | | | |
| lag12 | | 0.23** | 0.31** | | 0.38** | 0.19** | | | 0.21** | 0.38** | 0.12* | |
| CPI_lag3 | | 0.50** | 0.67** | | | | | | | | | |
| CPI_lag5 | | | | 0.34* | | | | | | | | |
| CPI_lag1 | | | | | | | 0.66** | | | | 0.13** | 0.24** |
| CPI_lag6 | | 0.66** | | -0.35* | | | -0.48* | | | | | |
| CPI_lag7 | | -0.45* | | | 0.64** | 0.27** | | | | | | |
| CPI_lag12 | | | | | | | 0.55* | | | | | |
| time_Aug | -0.56** | 0.03 | 0.73** | -0.78* | -0.003 | 0.50** | -0.31 | 0.06 | -0.01 | -0.02 | -0.02 | -0.10 |
| time_Dec | -0.24 | -0.33 | 0.71 | 0.23 | 0.88** | -0.30* | -1.51* | -0.12 | 0.08 | -0.28 | -0.27** | -0.37** |
| time_Apr | -0.76** | 1.64** | 0.82 | -0.11 | -0.29 | 0.30** | -1.33* | 0.22 | 0.18 | 0.10 | 0.11 | -0.23 |
| time_Jan | -0.86** | 1.41** | -1.50** | -0.53** | -1.23** | 0.05 | -0.63 | -0.13 | -0.36** | 1.62* | -0.40** | -0.39** |
| time_Jul | -0.86** | 1.40** | -0.87 | -1.13** | -0.40 | -0.42 | -0.26 | -0.09 | -0.03 | -0.20 | 0.17 | -0.38** |
| time_Jun | -0.69** | -0.14 | 0.95* | -0.66 | -0.42 | -0.73** | -0.58 | -0.07 | 0.05 | 0.01 | 0.11 | -0.42** |
| time_Mar | -0.56** | 0.12 | 0.11 | -0.16 | -0.21 | -0.05 | -0.79* | -0.15 | 0.01 | -0.01 | -0.05 | -0.32* |
| time_May | 0.15 | 0.52* | 0.24 | -0.81* | -0.14 | -0.50** | -1.08* | -0.06 | -0.06 | 0.01 | 0.39** | -0.36** |
| time_Nov | -0.09 | -0.57* | 0.59 | 0.12 | -0.60** | -0.69** | -1.44* | -0.13 | 0.02 | -0.27 | -0.14* | -0.29** |
| time_Oct | -0.54** | -0.39 | 1.19* | 0.11 | 0.04 | -0.72** | -1.23* | 0.12 | 0.20 | 0.82 | 0.03 | -0.21 |
| time_Sep | -0.26 | 0.74 | 2.95** | -0.54 | -0.21 | -0.21 | -1.56* | -0.11 | 0.18 | 1.63** | 0.03 | -0.27* |
| VAT1 | -0.69 | -0.41 | -3.56** | -0.76 | -2.92** | -1.04** | -0.08 | -1.98** | -1.14** | 0.12 | -0.40* | -0.51 |
| VAT2 | -0.22 | 1.80** | -1.78* | 0.93 | 0.44 | 0.15 | 0.79 | 1.22 | 0.63* | -0.18 | 0.36* | 0.38 |
| VAT3 | 0.01 | 2.41** | -0.50 | 0.27 | 1.52** | 0.11 | 0.94 | 1.21 | 0.19 | 0.55 | 1.21** | -0.45 |
| Recession | 0.38* | 0.13 | -0.58** | 0.29 | 0.40** | -0.10 | -0.06 | 0.25 | 0.25** | -0.10 | 0.06 | 0.06 |
| Trend | -0.0003 | -0.0001 | 0.003** | -0.0001 | 0.0004 | -0.001** | 0.0000 | 0.001** | 0.0004 | -0.0004 | -0.0004** | -0.001** |
| growth6 | | | | | | -0.24** | | | | | 0.11** | |
| growth8 | | 0.41** | | | | 0.13* | | | | | | |
| growth9 | | -0.26* | | | | | | | | | 0.08** | |
| growth12 | | | -0.28* | | | | | | | 0.67* | | |
| growth2 | | | | 0.26* | | | 0.51** | | | | | |
| growth3 | | | | | | | -0.41* | | | | | |
| growth11 | | | | 0.29** | | | -0.59** | | | -0.78** | | |
| growth10 | | | | | | -0.19** | 0.66** | | | | | |
| Constant | 0.48** | -0.27 | -1.17** | 0.27 | 0.13 | 0.78** | 0.94* | -0.16 | -0.02 | 0.16 | 0.28** | 0.58** |
| Observations | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 |
| R2 | 0.28 | 0.64 | 0.93 | 0.33 | 0.92 | 0.49 | 0.63 | 0.20 | 0.37 | 0.60 | 0.56 | 0.18 |
| Adjusted R2 | 0.23 | 0.61 | 0.92 | 0.26 | 0.91 | 0.44 | 0.59 | 0.14 | 0.32 | 0.57 | 0.52 | 0.12 |
| Residual Std. Error | 0.55 | 0.57 | 0.70 | 0.53 | 0.46 | 0.33 | 0.72 | 0.62 | 0.30 | 1.21 | 0.15 | 0.29 |
| F statistic | 5.21** | 18.55** | 134.95** | 5.23** | 133.10** | 9.66** | 18.12** | 3.42** | 6.77** | 19.72** | 13.76** | 3.02** |

Note: *p<0.05; **p<0.01; ***p<[0.***]

Figure 3: consumption-division output

5.3 Conclusions

From divisions stepwise results, we can see that all consumption lags of output in 01FB, 05FH, 08CM, 09RC and 12MS is insignificant.

6 Unemployment (growth)

6.1 Data and methods

The data will be obtained from the ONS website of “Unemployment rate (aged 16 and over, seasonally adjusted)” in the Labor market statistics. To better examine how the unemployment rate affects monthly inflation, we turn the raw monthly unemployment data into monthly unemployment growth rates.

Then we add the unemployment rate to the equation, and we repeat the process.

$$\pi_t = \pi + \text{Trend}_t + \beta_1 D_{Jan} + \dots + \beta_{11} D_{Dec} + \beta_{12} D_{recession} + \beta_{13} D_{VAT_1} + \beta_{14} D_{VAT_2} + \beta_{15} D_{TAT_3} + \beta_{16} U_t + \sum_{j=1}^{12} \alpha_j \pi_{t-j} + \sum_{i=1}^{12} \lambda_i CPI_{t-i} + \sum_{k=1}^{12} \theta_k C_{t-k} + \sigma_t$$

The values of unemployment and inflation are entered into figure 4, which shows their development in the period from 01.03.1997 to 01.11.2019.



Figure 4: Unemployment and inflation

6.2 Regression output (grwoth rate)

The results are in (Table 5). As we can see, The unemployment change rate is not significant for the 12 divisions and aggregate CPI.

| | Dependent variable: | | | | | | | | | | | | |
|---------------------|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|
| | CPI | 01FB | 02AT | 03CF | 04HW | 05FH | 06HL | 07TR | 08CM | 09RC | 10ED | 11RH | 12MS |
| Constant | 0.52** | 1.55** | 0.01 | -1.26 | -0.20 | -0.37 | 0.77* | 0.94 | -1.21 | -0.03 | -0.15 | 0.54** | 0.62* |
| lag1 | 0.10 | 0.09 | -0.23** | -0.28** | 0.21** | -0.32** | -0.31** | -0.05 | 0.02 | -0.20** | -0.04 | -0.27** | -0.11 |
| lag2 | -0.01 | -0.05 | -0.10 | -0.15* | 0.08 | -0.26** | -0.24** | 0.06 | 0.07 | 0.03 | 0.01 | -0.09 | 0.02 |
| lag3 | 0.09 | -0.04 | 0.05 | -0.18** | -0.10 | -0.14* | -0.05 | 0.08 | 0.12 | 0.01 | -0.01 | -0.06 | 0.06 |
| lag4 | 0.02 | -0.14 | -0.03 | -0.15* | 0.03 | -0.12 | -0.01 | -0.04 | -0.10 | 0.15* | 0.001 | -0.04 | 0.03 |
| lag5 | -0.01 | 0.05 | -0.06 | 0.08 | -0.02 | -0.13 | -0.14* | -0.02 | -0.03 | 0.17* | 0.02 | -0.01 | 0.02 |
| lag6 | 0.06 | 0.02 | -0.03 | 0.29** | 0.01 | 0.17* | -0.09 | 0.04 | -0.03 | 0.18* | -0.02 | -0.18** | 0.02 |
| lag7 | 0.04 | 0.03 | -0.04 | 0.08 | 0.17* | 0.01 | -0.24** | 0.05 | -0.04 | -0.05 | -0.02 | -0.02 | -0.07 |
| lag8 | 0.03 | -0.01 | -0.07 | -0.01 | -0.13 | -0.05 | -0.21** | 0.05 | -0.06 | 0.01 | -0.01 | -0.02 | -0.09 |
| lag9 | 0.01 | -0.02 | -0.03 | 0.15* | 0.01 | 0.03 | 0.01 | -0.11 | 0.08 | 0.08 | 0.02 | -0.09 | 0.10 |
| lag10 | -0.003 | 0.09 | 0.11 | 0.01 | -0.04 | -0.16* | -0.11 | -0.01 | 0.18** | -0.02 | -0.03 | -0.01 | 0.001 |
| lag11 | 0.02 | -0.07 | 0.06 | 0.01 | -0.03 | -0.11 | 0.05 | 0.10 | -0.04 | 0.02 | -0.05 | -0.09 | -0.05 |
| lag12 | 0.17** | 0.11 | 0.22** | 0.31** | 0.11 | 0.33** | 0.12* | 0.04 | -0.003 | 0.15* | 0.34** | 0.10 | 0.06 |
| CPI_lag1 | | 0.24 | -0.02 | 0.43 | 0.004 | -0.10 | -0.06 | 0.81* | -0.19 | 0.03 | 0.05 | 0.14* | 0.23* |
| CPI_lag2 | | 0.12 | -0.02 | -0.26 | 0.09 | 0.08 | 0.21 | 0.05 | 0.02 | -0.10 | -0.37 | 0.05 | -0.12 |
| CPI_lag3 | | -0.02 | 0.40 | 0.79** | 0.33 | 0.25 | -0.11 | -0.52 | 0.27 | 0.01 | 0.83 | 0.03 | 0.05 |
| CPI_lag4 | | 0.45* | 0.28 | 0.21 | 0.43* | 0.14 | 0.01 | -0.10 | -0.22 | -0.17 | -0.40 | 0.12* | 0.01 |
| CPI_lag5 | | -0.07 | 0.05 | -0.44 | 0.30 | 0.15 | -0.01 | -0.07 | 0.34 | -0.13 | -0.70 | -0.01 | -0.06 |
| CPI_lag6 | | 0.36 | 0.65** | -0.002 | -0.40* | 0.14 | 0.13 | -0.43 | -0.01 | -0.10 | 0.72 | -0.01 | -0.02 |
| CPI_lag7 | | 0.05 | -0.34 | -0.06 | -0.14 | 0.54** | 0.21 | -0.03 | -0.10 | -0.06 | -0.15 | 0.04 | 0.15 |
| CPI_lag8 | | 0.53* | 0.06 | 0.50 | 0.17 | 0.14 | 0.15 | -0.47 | 0.31 | 0.03 | 0.15 | 0.05 | 0.04 |
| CPI_lag9 | | -0.11 | 0.08 | -0.08 | 0.06 | -0.14 | -0.01 | 0.37 | -0.11 | 0.01 | 0.19 | 0.02 | -0.07 |
| CPI_lag10 | | -0.08 | 0.11 | 0.24 | 0.17 | 0.28 | -0.11 | 0.11 | -0.06 | -0.02 | 0.41 | -0.004 | -0.05 |
| CPI_lag11 | | -0.05 | 0.03 | 0.04 | 0.07 | 0.14 | -0.10 | -0.05 | 0.21 | 0.13 | -0.04 | 0.01 | 0.02 |
| CPI_lag12 | | 0.04 | 0.03 | -0.23 | -0.35 | -0.08 | 0.09 | 0.33 | -0.09 | 0.06 | -0.05 | -0.02 | 0.06 |
| time_Aug | -0.55 | -2.87** | -0.59 | 1.12 | 0.08 | 0.84 | 0.61 | -0.17 | 1.30 | -0.06 | -0.25 | -0.18 | -0.32 |
| time_Dec | -0.61* | -2.23** | -0.40 | 1.74 | 0.66 | 1.51* | 0.28 | -1.45 | 1.66* | 0.13 | -1.92 | -0.40 | -0.48 |
| time_Apr | -0.43 | | | | | | | | | | | | |
| time_Feb | | -2.19** | 1.66 | 1.37 | 0.38 | 0.86 | 0.46 | -1.21 | 1.69* | 0.35 | -0.16 | -0.08 | -0.54 |
| time_Jan | -1.06** | -2.01* | 0.90 | -2.30* | 0.01 | -0.99 | -0.29 | -1.16 | 0.54 | 0.20 | 3.35 | -0.51* | -0.82* |
| time_Jul | -0.96** | -2.08** | 0.71 | -0.03 | -1.43 | 0.04 | 0.16 | 0.26 | 1.12 | -0.49 | -0.55 | -0.03 | -0.25 |
| time_Jun | -0.67** | -1.82* | -0.66 | 0.93 | -0.26 | -0.51 | -0.93* | -0.75 | 1.12 | 0.10 | -0.55 | -0.13 | -0.60 |
| time_Mar | -0.30 | -1.71* | -0.51 | 0.17 | -0.33 | 0.37 | -0.13 | 0.62 | 1.18 | -0.12 | -0.11 | -0.17 | -0.43 |
| time_May | -0.34 | -1.11 | 0.65 | 1.33 | -0.16 | 0.14 | -0.39 | -0.27 | 1.33 | 0.21 | -0.04 | 0.10 | -0.47 |
| time_Nov | -0.65* | -2.17** | -0.77 | 1.68 | 0.30 | 0.73 | -0.82 | -0.97 | 0.87 | -0.12 | -0.56 | -0.41 | -0.34 |
| time_Oct | -0.39 | -2.30** | -1.00 | 3.55** | 0.87 | 0.46 | -0.70 | -0.57 | 0.74 | 0.03 | 1.84 | -0.25 | -0.09 |
| time_Sep | -0.34 | -1.84* | 0.83 | 3.06** | 0.98 | 0.40 | 0.31 | -2.80** | 1.28 | 0.26 | 2.42 | -0.15 | -0.53 |
| VAT1 | -0.92** | -0.68 | -0.46 | -3.72** | -0.24 | -3.49** | -1.21** | 0.62 | -2.20** | -0.99** | -0.43 | -0.37* | -0.53 |
| VAT2 | 0.50* | -0.14 | 1.81** | -1.64* | 0.72 | 0.49 | 0.11 | 0.88 | 0.40 | 0.56 | 0.38 | 0.28 | 0.45 |
| VAT3 | 0.48* | -0.24 | 2.47** | -1.08 | 0.16 | 1.61** | 0.20 | 0.78 | 0.84 | 0.37 | 0.09 | 1.26** | -0.50 |
| Recession | 0.16* | 0.70** | 0.06 | -0.63* | 0.22 | 0.35* | -0.13 | -0.12 | 0.14 | 0.21 | 0.37 | 0.07 | 0.03 |
| Trend | 0.0002 | -0.0001 | -0.0003 | 0.002 | -0.0001 | 0.001 | -0.001* | -0.0000 | 0.002* | 0.0004 | -0.0003 | -0.001** | -0.001* |
| growth_lag1 | 0.18** | 0.39 | -0.18 | -0.42 | 0.49* | -0.24 | -0.08 | 0.30 | 0.21 | 0.13 | 0.77 | 0.03 | -0.01 |
| growth_lag2 | -0.12 | -0.07 | 0.03 | 0.04 | -0.33 | 0.21 | 0.06 | -0.47 | -0.49 | -0.20 | -0.66 | 0.06 | -0.10 |
| growth_lag3 | 0.04 | -0.09 | 0.05 | 0.19 | -0.22 | -0.09 | -0.13 | 0.73 | 0.23 | 0.04 | 0.28 | -0.05 | 0.20 |
| growth_lag4 | 0.06 | 0.39 | 0.22 | -0.54 | 0.52 | -0.01 | 0.17 | -0.85* | 0.27 | 0.23 | 0.13 | 0.02 | -0.15 |
| growth_lag5 | -0.01 | -0.02 | -0.18 | 0.32 | -0.24 | -0.18 | -0.24 | 0.20 | -0.38 | -0.19 | -0.17 | 0.13 | -0.02 |
| growth_lag6 | -0.03 | -0.02 | -0.15 | 0.09 | -0.26 | -0.07 | -0.27 | 0.67 | -0.11 | -0.02 | 0.32 | -0.03 | 0.17 |
| growth_lag7 | 0.02 | 0.17 | 0.70* | -0.56 | 0.28 | 0.11 | 0.50** | -0.83* | 0.56 | 0.06 | -0.30 | 0.05 | -0.02 |
| growth_lag8 | -0.05 | -0.30 | -0.47 | 0.20 | 0.17 | -0.05 | -0.05 | -0.12 | -0.43 | -0.03 | 0.09 | 0.09 | -0.20 |
| growth_lag9 | 0.14 | 0.24 | 0.06 | -0.08 | -0.13 | -0.15 | -0.47** | 1.07** | -0.26 | -0.02 | 0.61 | -0.05 | 0.20 |
| growth_lag10 | 0.02 | 0.23 | 0.05 | 0.15 | 0.33 | 0.08 | 0.38** | -0.72* | 0.47 | -0.10 | -1.13* | 0.03 | 0.15 |
| growth_lag11 | -0.14 | -0.59** | -0.14 | -0.39 | 0.03 | 0.19 | -0.18 | -0.29 | -0.22 | 0.07 | 0.53 | 0.02 | -0.26* |
| growth_lag12 | 0.05 | 0.34* | 0.32 | -0.04 | -0.08 | -0.25 | 0.01 | 0.16 | -0.21 | 0.05 | 0.18 | 0.01 | 0.16 |
| Unemployment | 0.01 | -0.01 | -0.02 | -0.04 | 0.03 | -0.02 | 0.01 | -0.01 | 0.01 | 0.01 | -0.05 | 0.01 | 0.01 |
| Observations | 272 | 272 | 272 | 272 | 272 | 272 | 272 | 272 | 272 | 272 | 272 | 272 | 272 |
| R2 | 0.76 | 0.36 | 0.67 | 0.94 | 0.39 | 0.93 | 0.55 | 0.66 | 0.28 | 0.43 | 0.63 | 0.59 | 0.26 |
| Adjusted R2 | 0.72 | 0.21 | 0.59 | 0.92 | 0.25 | 0.91 | 0.44 | 0.57 | 0.11 | 0.29 | 0.54 | 0.49 | 0.08 |
| Residual Std. Error | 0.19 | 0.55 | 0.59 | 0.70 | 0.54 | 0.46 | 0.32 | 0.73 | 0.63 | 0.31 | 1.25 | 0.16 | 0.30 |
| F Statistic | 17.87** | 2.35** | 8.35** | 63.22** | 2.66** | 55.60** | 4.98** | 7.90** | 1.62** | 3.09** | 7.08** | 5.98** | 1.44* |
| Note: | *p<0.05; **p<0.01; ***p<[0.***] | | | | | | | | | | | | |

Note: *p<0.05; **p<0.01; ***p<[0.***]

Figure 5: Consumption-Unemployment growth rate output

6.3 The simplified result (grwoth rate)

Stepwise regression results (Table 6) confirm the previous conclusion that unemployment rate in the same period has no significant effect on CPI, no matter division or aggregate CPI level.

| | Dependent variable: | | | | | | | | | | | | |
|---------------------|---------------------------------|---------|---------|----------|---------|----------|----------|---------|---------|---------|---------|-----------|----------|
| | CPI | 01FB | 02AT | 03CF | 04HW | 05FH | 06HL | 07TR | 08CM | 09RC | 10ED | 11RH | 12MS |
| lag1 | 0.10 | 0.15* | -0.19** | -0.22** | 0.23** | -0.25** | -0.32** | | | -0.18** | | -0.23** | -0.13* |
| lag2 | -0.01 | | | -0.17** | | -0.23** | -0.25** | | | | | | |
| lag3 | 0.10 | | | -0.17** | | | | | 0.14* | | | | |
| lag4 | 0.03 | | | -0.18** | | | | | | 0.16* | | | |
| lag5 | -0.01 | | | | | | | | | 0.14* | | | |
| lag6 | 0.05 | | | 0.26** | | 0.22** | | | | 0.14* | | -0.15** | |
| lag7 | 0.03 | | | | 0.14* | | -0.18** | | | | | | |
| lag8 | 0.04 | | | | | | -0.12* | | | | | | |
| lag9 | 0.03 | | | | | | | | | | | | |
| lag10 | -0.01 | | 0.14* | | | -0.13** | | | 0.14* | | | | |
| lag11 | 0.02 | | | | | | | | | | | | |
| lag12 | 0.17** | | 0.23** | 0.31** | | 0.38** | 0.19** | | | 0.21** | 0.38** | 0.12* | |
| CPI_lag1 | | | | | | | | 0.66** | | | | 0.13** | 0.24** |
| CPI_lag2 | | | | | | | | | | | | | |
| CPI_lag3 | | | 0.50** | 0.67** | | | | | | | | | |
| CPI_lag4 | | 0.36* | | | 0.46** | | | | | -0.22* | | 0.10* | |
| CPI_lag5 | | | | | 0.34* | | | | | | | | |
| CPI_lag6 | | | 0.66** | | -0.35* | | | -0.48* | | | | | |
| CPI_lag7 | | | -0.45* | | | 0.64** | 0.27** | | | | | | |
| CPI_lag8 | | 0.44** | | 0.44* | | | | | | | | | |
| CPI_lag9 | | | | | | | | | | | | | |
| CPI_lag10 | | | | | | | | | | | | | |
| CPI_lag11 | | | | | | | | | | | | | |
| CPI_lag12 | | | | | | | | 0.55* | | | | | |
| growth_lag1 | 0.09* | | | | 0.26* | | | 0.51** | | | | | |
| growth_lag2 | | | | | | | | -0.41* | | | | | |
| growth_lag5 | | | | | | | -0.24** | | | | | 0.11** | |
| growth_lag7 | | | 0.41** | | | | 0.13* | | | | | | |
| growth_lag8 | | | -0.26* | | | | | | | | | 0.08** | |
| growth_lag9 | 0.10** | | | | | | | | | | | | |
| growth_lag10 | | | | | 0.29** | | -0.19** | 0.66** | | | -0.78** | | |
| growth_lag11 | -0.07* | | | -0.28* | | | -0.59** | | | | 0.67* | | |
| time_Aug | -0.31* | -0.56** | 0.03 | 0.73** | -0.78* | -0.003 | 0.50** | -0.31 | 0.06 | -0.01 | -0.02 | -0.02 | -0.10 |
| time_Dec | -0.52** | -0.24 | -0.33 | 0.71 | 0.23 | 0.88** | -0.30* | -1.51* | -0.12 | 0.08 | -0.28 | -0.27** | -0.37** |
| time_Apr | -0.27 | -0.76** | 1.64** | 0.82 | -0.11 | -0.29 | 0.30** | -1.33* | 0.22 | 0.18 | 0.10 | 0.11 | -0.23 |
| time_Jan | -1.16** | -0.86** | 1.41** | -1.50** | -0.53** | -1.23** | 0.05 | -0.63 | -0.13 | -0.36** | 1.62* | -0.40** | -0.39** |
| time_Jul | -0.80** | -0.86** | 1.40** | -0.87 | -1.13** | -0.40 | -0.42 | -0.26 | -0.09 | -0.03 | -0.20 | 0.17 | -0.38** |
| time_Jun | -0.63** | -0.69** | -0.14 | 0.95* | -0.66 | -0.42 | -0.73** | -0.58 | -0.07 | 0.05 | 0.01 | 0.11 | -0.42** |
| time_Mar | -0.24* | -0.56** | 0.12 | 0.11 | -0.16 | -0.21 | -0.05 | -0.79* | -0.15 | 0.01 | -0.01 | -0.05 | -0.32** |
| time_May | -0.46** | 0.15 | 0.52* | 0.24 | -0.81* | -0.14 | -0.50** | -1.08* | -0.06 | -0.06 | 0.01 | 0.39** | -0.36** |
| time_Nov | -0.52** | -0.09 | -0.57* | 0.59 | 0.12 | -0.60** | -0.69** | -1.44* | -0.13 | 0.02 | -0.27 | -0.14* | -0.29** |
| time_Oct | -0.31 | -0.54** | -0.39 | 1.19* | 0.11 | 0.04 | -0.72** | -1.23* | 0.12 | 0.20 | 0.82 | 0.03 | -0.21 |
| time_Sep | -0.24 | -0.26 | 0.74 | 2.95** | -0.54 | -0.21 | -0.21 | -1.56* | -0.11 | 0.18 | 1.63** | 0.03 | -0.27* |
| VAT1 | -0.93** | -0.69 | -0.41 | -3.56** | -0.76 | -2.92** | -1.04** | -0.08 | -1.98** | -1.14** | 0.12 | -0.40* | -0.51 |
| VAT2 | 0.51* | -0.22 | 1.80** | -1.78* | 0.93 | 0.44 | 0.15 | 0.79 | 1.22 | 0.63* | -0.18 | 0.36* | 0.38 |
| VAT3 | 0.51* | 0.01 | 2.41** | -0.50 | 0.27 | 1.52** | 0.11 | 0.94 | 1.21 | 0.19 | 0.55 | 1.21** | -0.45 |
| Recession | 0.15* | 0.38* | 0.13 | -0.58** | 0.29 | 0.40** | -0.10 | -0.06 | 0.25 | 0.25** | -0.10 | 0.06 | 0.06 |
| Trend | 0.0002 | -0.0003 | -0.0001 | 0.003** | -0.0001 | 0.0004 | -0.001** | 0.0000 | 0.001** | 0.0004 | -0.0004 | -0.0004** | -0.001** |
| Constant | 0.46** | 0.48** | -0.27 | -1.17** | 0.27 | 0.13 | 0.78** | 0.94* | -0.16 | -0.02 | 0.16 | 0.28** | 0.58** |
| Observations | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 |
| R2 | 0.75 | 0.28 | 0.64 | 0.93 | 0.33 | 0.92 | 0.49 | 0.63 | 0.20 | 0.37 | 0.60 | 0.56 | 0.18 |
| Adjusted R2 | 0.72 | 0.23 | 0.61 | 0.92 | 0.26 | 0.91 | 0.44 | 0.59 | 0.14 | 0.32 | 0.57 | 0.52 | 0.12 |
| Residual Std. Error | 0.19 | 0.55 | 0.57 | 0.70 | 0.53 | 0.46 | 0.33 | 0.72 | 0.62 | 0.30 | 1.21 | 0.15 | 0.29 |
| F Statistic | 23.72** | 5.21** | 18.55** | 134.95** | 5.23** | 133.10** | 9.66** | 18.12** | 3.42** | 6.77** | 19.72** | 13.76** | 3.02** |
| Note: | *p<0.05; **p<0.01; ***p<[0.***] | | | | | | | | | | | | |

Note:

*p<0.05; **p<0.01; ***p<[0.***]

Figure 6: Consumption-Unemployment stepwise output

6.4 Some more lags of unemployment (Growth rate)

6.4.1 Model and data

Since unemployment is not significant for division and aggregate CPI, we try 12 more lags of unemployment. I'm using the unemployment growth rate instead of level .

$$\pi_t = \pi + \text{Trend}_t + \beta_1 D_{Jan} + \dots + \beta_{11} D_{Dec} + \beta_{12} D_{recession} + \\ \beta_{13} D_{VAT_1} + \beta_{14} D_{VAT_2} + \beta_{15} D_{TAT_3} + \sum_{h=1}^{12} \psi_h U_{t-h} + \sum_{j=1}^{12} \alpha_j \pi_{t-j} + \sum_{i=1}^{12} \lambda_i CPI_{t-i} + \sum_{k=1}^{12} \theta_k C_{t-k} + \sigma_t$$

6.4.2 Regression output (growth)

The results are in Table 7.

| | Dependent variable: | | | | | | | | | | | | |
|----------------------------|---------------------------------|---------|---------|---------|---------|---------|----------|---------|---------|---------|--------|---------|---------|
| | CPI | 01FB | 02AT | 03CF | 04HW | 05FH | 06HL | 07TR | 08CM | 09RC | 10ED | 11RH | 12MS |
| constant | 0.41* | 1.36* | -0.08 | -1.32 | -0.44 | -0.56 | 0.94* | 0.66 | -1.43* | -0.03 | 0.12 | 0.48* | 0.66* |
| lag1 | 0.09 | 0.11 | -0.22** | -0.28** | 0.21** | -0.32** | -0.32** | -0.09 | 0.04 | -0.20** | -0.04 | -0.25** | -0.13 |
| lag2 | -0.03 | -0.05 | -0.09 | -0.13 | 0.04 | -0.23** | -0.27** | -0.01 | 0.05 | 0.05 | 0.01 | -0.08 | -0.01 |
| lag3 | 0.09 | -0.04 | 0.07 | -0.16** | -0.12 | -0.14* | -0.05 | 0.04 | 0.12 | 0.01 | -0.02 | -0.04 | 0.05 |
| lag4 | 0.02 | -0.15 | -0.02 | -0.12 | 0.005 | -0.12 | -0.02 | -0.03 | -0.13 | 0.12 | 0.02 | -0.04 | 0.004 |
| lag5 | -0.03 | 0.06 | -0.04 | 0.11 | -0.01 | -0.13 | -0.15* | -0.03 | -0.02 | 0.17* | 0.01 | 0.005 | -0.01 |
| lag6 | 0.08 | 0.01 | -0.003 | 0.32** | 0.001 | 0.17* | -0.12 | 0.04 | -0.06 | 0.17* | -0.02 | -0.17* | -0.01 |
| lag7 | 0.004 | 0.03 | -0.03 | 0.10 | 0.15* | -0.001 | -0.27** | 0.06 | 0.0003 | -0.06 | -0.03 | -0.02 | -0.09 |
| lag8 | 0.04 | -0.01 | -0.05 | -0.001 | -0.16* | -0.05 | -0.22** | 0.09 | -0.08 | 0.02 | -0.01 | 0.003 | -0.12 |
| lag9 | -0.01 | -0.02 | -0.01 | 0.13 | 0.03 | 0.02 | 0.01 | -0.06 | 0.09 | 0.10 | 0.03 | -0.10 | 0.07 |
| lag10 | -0.04 | 0.09 | 0.13* | -0.02 | -0.03 | -0.15* | -0.10 | -0.02 | 0.15* | -0.03 | -0.05 | 0.03 | -0.06 |
| lag11 | 0.03 | -0.09 | 0.06 | -0.01 | 0.02 | -0.12 | 0.07 | 0.11 | -0.04 | 0.02 | -0.04 | -0.09 | -0.08 |
| lag12 | 0.15* | 0.11 | 0.24** | 0.31** | 0.11 | 0.33** | 0.14* | 0.10 | 0.01 | 0.18* | 0.36** | 0.13* | 0.02 |
| CPI_lag1 | 0.13 | -0.13 | 0.50 | 0.005 | -0.11 | -0.03 | 0.78* | -0.28 | 0.08 | 0.002 | 0.16** | 0.24* | 0.02 |
| CPI_lag2 | 0.14 | -0.03 | -0.33 | 0.17 | 0.04 | 0.28* | 0.17 | -0.004 | -0.14 | -0.35 | 0.02 | -0.14 | -0.14 |
| CPI_lag3 | -0.001 | 0.34 | 0.64* | 0.46* | 0.22 | -0.07 | -0.56 | 0.24 | -0.01 | 0.69 | 0.04 | 0.05 | 0.05 |
| CPI_lag4 | 0.48* | 0.29 | 0.24 | 0.47* | 0.15 | 0.02 | -0.11 | -0.19 | -0.20 | -0.62 | 0.13* | 0.01 | 0.01 |
| CPI_lag5 | -0.11 | 0.04 | -0.52 | 0.26 | 0.14 | -0.05 | -0.20 | 0.28 | -0.12 | -0.90* | -0.02 | -0.09 | -0.09 |
| CPI_lag6 | 0.37 | 0.56* | 0.01 | -0.42* | 0.23 | 0.14 | -0.48 | -0.03 | -0.02 | 0.86 | 0.04 | -0.004 | 0.04 |
| CPI_lag7 | -0.02 | -0.33 | -0.06 | -0.13 | 0.48** | 0.25* | -0.15 | -0.08 | -0.11 | -0.10 | 0.01 | 0.14 | 0.14 |
| CPI_lag8 | 0.53* | -0.01 | 0.45 | 0.27 | 0.14 | 0.16 | -0.62 | 0.28 | 0.05 | 0.04 | 0.06 | 0.08 | 0.08 |
| CPI_lag9 | -0.13 | -0.01 | -0.15 | 0.03 | -0.17 | 0.03 | 0.09 | -0.11 | 0.003 | 0.16 | 0.03 | -0.06 | -0.06 |
| CPI_lag10 | -0.12 | 0.06 | 0.26 | 0.08 | 0.25 | -0.10 | 0.03 | -0.09 | -0.04 | 0.33 | -0.01 | -0.06 | -0.06 |
| CPI_lag11 | 0.01 | -0.01 | 0.03 | 0.04 | 0.18 | -0.09 | -0.04 | 0.18 | 0.16 | -0.14 | 0.02 | -0.02 | -0.02 |
| CPI_lag12 | 0.04 | 0.03 | -0.27 | -0.45* | -0.10 | 0.10 | 0.17 | -0.14 | 0.04 | 0.05 | -0.02 | 0.02 | 0.02 |
| time_Aug | -0.52 | -2.84** | -0.66 | 1.62 | 0.44 | 0.98 | 0.54 | -0.08 | 1.47 | -0.06 | -0.64 | -0.17 | -0.29 |
| time_Dec | -0.55* | -2.03* | -0.44 | 1.72 | 0.80 | 1.81** | 0.05 | -1.34 | 1.79* | 0.22 | -2.64 | -0.33 | -0.51 |
| time_Feb | -0.35 | -1.92* | 1.81* | 1.22 | 0.80 | 1.03 | 0.38 | -1.19 | 1.91* | 0.23 | -0.42 | -0.06 | -0.52 |
| time_Jan | -0.97** | -1.80* | 0.69 | -2.20* | 0.01 | -0.72 | -0.45 | -0.84 | 0.56 | 0.36 | 3.16 | -0.40 | -0.83* |
| time_Jul | -0.93** | -2.10** | 0.80 | 0.47 | -1.34 | 0.23 | 0.01 | -0.08 | 1.20 | -0.50 | -0.64 | 0.03 | -0.25 |
| time_Jun | -0.60* | -1.56* | -0.60 | 1.31 | -0.22 | -0.45 | -1.22** | -0.54 | 1.22 | 0.05 | -1.11 | -0.10 | -0.68 |
| time_Mar | -0.22 | -1.73* | -0.29 | 0.18 | 0.51 | 0.87 | 0.15 | 0.06 | 1.27 | -0.16 | -0.67 | -0.14 | -0.37 |
| time_May | -0.26 | -0.84 | 0.72 | 1.54 | 0.12 | 0.32 | -0.56 | -0.08 | 1.63 | 0.12 | -0.80 | 0.15 | -0.47 |
| time_Nov | -0.59* | -1.97* | -0.70 | 1.74 | 0.55 | 0.90 | -0.93 | -1.04 | 0.94 | -0.24 | -1.39 | -0.37 | -0.34 |
| time_Oct | -0.35 | -2.04* | -1.16 | 3.49** | 1.33 | 0.38 | -0.67 | -0.88 | 0.91 | -0.10 | 0.88 | -0.21 | -0.06 |
| time_Sep | -0.31 | -1.48 | 0.67 | 3.30** | 1.01 | 0.29 | 0.13 | -2.25* | 1.41 | 0.18 | 2.11 | -0.17 | -0.53 |
| VAT1 | -0.94** | -0.82 | -0.22 | -3.87** | -0.07 | -3.48** | -1.13** | 0.32 | -2.21** | -1.07** | -0.44 | -0.41* | -0.55 |
| VAT2 | 0.39 | -0.19 | 1.61* | -1.66* | 1.09 | 0.08 | 0.18 | 0.33 | 0.31 | 0.40 | -0.33 | 0.18 | 0.58 |
| VAT3 | 0.54** | -0.05 | 2.57** | -1.14 | 0.32 | 1.71** | 0.15 | 1.04 | 0.87 | 0.33 | -0.31 | 1.24** | -0.49 |
| Recession | 0.14 | 0.60* | 0.12 | -0.69* | 0.04 | 0.37* | -0.09 | -0.02 | 0.09 | 0.28* | 0.54 | 0.10 | -0.09 |
| Trend | 0.0004* | 0.0001 | 0.0000 | 0.002 | -0.0001 | 0.001 | -0.001** | 0.001 | 0.002** | 0.0004 | 0.0004 | -0.001* | -0.001* |
| growth_lag1 | 0.20** | 0.41 | -0.22 | -0.39 | 0.41 | -0.17 | -0.12 | 0.47 | 0.17 | 0.19 | 0.82 | 0.04 | -0.01 |
| growth_lag2 | -0.13 | -0.09 | 0.12 | -0.04 | -0.32 | 0.15 | 0.08 | -0.57 | -0.47 | -0.24 | -0.48 | 0.02 | -0.09 |
| growth_lag3 | 0.09 | -0.16 | 0.12 | 0.21 | 0.09 | 0.06 | -0.03 | 0.67 | 0.29 | 0.05 | 0.18 | -0.03 | 0.27 |
| growth_lag4 | 0.09 | 0.54 | 0.19 | -0.52 | 0.27 | -0.03 | 0.01 | -0.36 | 0.30 | 0.26 | 0.34 | 0.01 | -0.17 |
| growth_lag5 | -0.03 | -0.05 | -0.15 | 0.27 | -0.27 | -0.25 | -0.25 | -0.02 | -0.36 | -0.22 | -0.18 | 0.11 | -0.02 |
| growth_lag6 | 0.02 | -0.07 | -0.08 | 0.18 | -0.01 | 0.02 | -0.19 | 0.66 | -0.07 | -0.02 | 0.28 | -0.02 | 0.22 |
| growth_lag7 | 0.01 | 0.21 | 0.74* | -0.52 | 0.01 | 0.14 | 0.37* | -0.48 | 0.56 | 0.08 | -0.01 | 0.03 | -0.03 |
| growth_lag8 | -0.05 | -0.27 | -0.56 | 0.17 | 0.27 | -0.11 | -0.05 | -0.21 | -0.36 | -0.01 | -0.02 | 0.08 | -0.17 |
| growth_lag9 | 0.17* | 0.26 | 0.12 | -0.04 | -0.05 | -0.19 | -0.42** | 1.14** | -0.26 | -0.07 | 0.76 | -0.05 | 0.24 |
| growth_lag10 | 0.02 | 0.25 | 0.09 | 0.12 | 0.27 | 0.14 | 0.32* | -0.58 | 0.50 | -0.09 | -1.16* | 0.02 | 0.15 |
| growth_lag11 | -0.12 | -0.58* | -0.16 | -0.40 | 0.08 | 0.23 | -0.22 | -0.27 | -0.19 | 0.10 | 0.47 | 0.03 | -0.23 |
| growth_lag12 | 0.07 | 0.34* | 0.33 | -0.05 | -0.11 | -0.27 | 0.01 | 0.33 | -0.17 | 0.05 | 0.36 | 0.01 | 0.19* |
| unemployment_growth_lag 1 | 0.01 | 0.04 | -0.001 | 0.002 | 0.06* | -0.02 | -0.01 | -0.002 | 0.01 | -0.001 | -0.04 | -0.01 | 0.01 |
| unemployment_growth_lag 2 | 0.01 | 0.01 | 0.02 | 0.03 | 0.01 | 0.01 | -0.005 | -0.003 | 0.002 | -0.01 | 0.06 | 0.01 | 0.02 |
| unemployment_growth_lag 3 | -0.01 | -0.02 | 0.01 | 0.003 | 0.05* | -0.01 | -0.01 | -0.03 | 0.05 | -0.01 | -0.10 | -0.01 | 0.01 |
| unemployment_growth_lag 4 | 0.004 | 0.003 | -0.05 | 0.02 | 0.01 | 0.01 | -0.01 | -0.01 | -0.04 | 0.02 | 0.005 | 0.01 | 0.02 |
| unemployment_growth_lag 5 | -0.02 | -0.001 | -0.03 | -0.01 | -0.05** | -0.02 | -0.003 | -0.02 | 0.02 | 0.0005 | 0.04 | -0.01 | -0.0003 |
| unemployment_growth_lag 6 | 0.01 | -0.03 | 0.004 | 0.03 | 0.02 | -0.001 | 0.01 | 0.05 | -0.02 | 0.005 | -0.004 | -0.01 | 0.02 |
| unemployment_growth_lag 7 | 0.02* | 0.03 | 0.004 | -0.03 | 0.03 | 0.03 | 0.01 | 0.07* | 0.02 | 0.01 | 0.03 | -0.01 | 0.01 |
| unemployment_growth_lag 8 | 0.01 | 0.02 | 0.01 | -0.07* | 0.02 | -0.001 | 0.003 | 0.01 | 0.02 | -0.01 | 0.03 | 0.01 | 0.01 |
| unemployment_growth_lag 9 | 0.02* | 0.03 | 0.01 | 0.004 | 0.01 | -0.0003 | -0.01 | 0.09* | 0.03 | -0.01 | -0.05 | 0.003 | 0.0005 |
| unemployment_growth_lag 10 | -0.004 | -0.01 | 0.04 | -0.01 | -0.04 | 0.02 | -0.02 | -0.0004 | -0.03 | 0.01 | -0.02 | -0.001 | -0.01 |
| unemployment_growth_lag 11 | 0.01 | -0.004 | -0.01 | 0.02 | -0.03 | 0.04* | -0.02 | 0.04 | 0.04 | 0.04** | 0.06 | 0.01 | -0.004 |
| unemployment_growth_lag 12 | -0.01 | -0.02 | 0.02 | 0.02 | -0.02 | -0.03 | 0.01 | 0.02 | -0.002 | -0.02 | 0.11 | -0.01 | -0.003 |
| Observations | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 |
| R2 | 0.78 | 0.39 | 0.68 | 0.94 | 0.44 | 0.93 | 0.57 | 0.68 | 0.32 | 0.46 | 0.65 | 0.61 | 0.29 |
| Adjusted R2 | 0.73 | 0.20 | 0.58 | 0.92 | 0.27 | 0.91 | 0.44 | 0.59 | 0.11 | 0.29 | 0.54 | 0.50 | 0.07 |
| Residual Std. Error | 0.18 | 0.55 | 0.59 | 0.71 | 0.53 | 0.46 | 0.33 | 0.72 | 0.62 | 0.31 | 1.25 | 0.16 | 0.30 |
| F Statistic | 15.36** | 2.08** | 6.98** | 51.87** | 2.59** | 46.34** | 4.30** | 7.01** | 1.55* | 2.77** | 6.03** | 5.18** | 1.33 |
| Note: | *p<0.05; **p<0.01; ***p<[0.***] | | | | | | | | | | | | |
| > | | | | | | | | | | | | | |

Figure 7: Consumption-12 lag Unemployment growth rate output

6.4.3 The simplified result (growth)

The results are in Table 8. Only 2 lagged variables of unemployment growth rate have significant influence on CPI aggregate, and the remaining 12 sectors have no influence at all.

| | Dependent variable: | | | | | | | | | | | | |
|---------------------------------------|---------------------|---------|---------|----------|---------|----------|----------|---------|---------|---------|---------|-----------|----------|
| | CPI | 01FB | 02AT | 03CF | 04HW | 05FH | 06HL | 07TR | 08CM | 09RC | 10ED | 11RH | 12MS |
| lag1 | 0.06 | 0.15* | -0.19** | -0.22** | 0.23** | -0.25** | -0.32** | | | -0.18** | | -0.23** | -0.13* |
| lag2 | -0.03 | | | -0.17** | | -0.23** | -0.25** | | | | | | |
| lag3 | 0.07 | | | -0.17** | | | | | 0.14* | | | | |
| lag4 | 0.04 | | | -0.18** | | | | | | 0.16* | | | |
| lag5 | -0.01 | | | | | | | | | 0.14* | | | |
| lag6 | 0.05 | | | 0.26** | | 0.22** | | | | 0.14* | | -0.15** | |
| lag7 | 0.03 | | | | 0.14* | | -0.18** | | | | | | |
| lag8 | 0.03 | | | | | | -0.12* | | | | | | |
| lag9 | 0.03 | | | | | | | | | | | | |
| lag10 | -0.04 | | 0.14* | | | -0.13** | | | 0.14* | | | | |
| lag11 | 0.03 | | | | | | | | | | | | |
| lag12 | 0.14* | | 0.23** | 0.31** | | 0.38** | 0.19** | | | 0.21** | 0.38** | 0.12* | |
| CPI_lag1 | | | | | | | | 0.66** | | | | 0.13** | 0.24** |
| CPI_lag2 | | | | | | | | | | | | | |
| CPI_lag3 | | | 0.50** | 0.67** | | | | | | | | | |
| CPI_lag4 | | 0.36* | | | 0.46** | | | | | -0.22* | | 0.10* | |
| CPI_lag5 | | | | | 0.34* | | | | | | | | |
| CPI_lag6 | | | 0.66** | | -0.35* | | | -0.48* | | | | | |
| CPI_lag7 | | | -0.45* | | | 0.64** | 0.27** | | | | | | |
| CPI_lag8 | | 0.44** | | 0.44* | | | | | | | | | |
| CPI_lag9 | | | | | | | | | | | | | |
| CPI_lag10 | | | | | | | | | | | | | |
| CPI_lag11 | | | | | | | | | | | | | |
| CPI_lag12 | | | | | | | | 0.55* | | | | | |
| growth_lag1 | 0.15** | | | | 0.26* | | | 0.51** | | | | | |
| growth_lag2 | | | | | | | | -0.41* | | | | | |
| growth_lag4 | 0.08* | | | | | | | | | | | | |
| growth_lag5 | | | | | | | -0.24** | | | | | 0.11** | |
| growth_lag7 | | | 0.41** | | | | 0.13* | | | | | | |
| growth_lag8 | | | -0.26* | | | | | | | | | 0.08** | |
| growth_lag9 | 0.12** | | | | | | | | | | | | |
| growth_lag10 | | | | | 0.29** | | -0.19** | 0.66** | | | -0.78** | | |
| growth_lag11 | | | | -0.28* | | | -0.59** | | | | 0.67* | | |
| time_Aug | -0.45** | -0.56** | 0.03 | 0.73** | -0.78* | -0.003 | 0.50** | -0.31 | 0.06 | -0.01 | -0.02 | -0.02 | -0.10 |
| time_Dec | -0.47** | -0.24 | -0.33 | 0.71 | 0.23 | 0.88** | -0.30* | -1.51* | -0.12 | 0.08 | -0.28 | -0.27** | -0.37** |
| time_Apr | -0.22 | -0.76** | 1.64** | 0.82 | -0.11 | -0.29 | 0.30** | -1.33* | 0.22 | 0.18 | 0.10 | 0.11 | -0.23 |
| time_Jan | -0.98** | -0.86** | 1.41** | -1.50** | -0.53** | -1.23** | 0.05 | -0.63 | -0.13 | -0.36** | 1.62* | -0.40** | -0.39** |
| time_Jul | -0.96** | -0.86** | 1.40** | -0.87 | -1.13** | -0.40 | -0.42 | -0.26 | -0.09 | -0.03 | -0.20 | 0.17 | -0.38** |
| time_Jun | -0.55** | -0.69** | -0.14 | 0.95* | -0.66 | -0.42 | -0.73** | -0.58 | -0.07 | 0.05 | 0.01 | 0.11 | -0.42** |
| time_Mar | -0.20 | -0.56** | 0.12 | 0.11 | -0.16 | -0.21 | -0.05 | -0.79* | -0.15 | 0.01 | -0.01 | -0.05 | -0.32* |
| time_May | -0.37* | 0.15 | 0.52* | 0.24 | -0.81* | -0.14 | -0.50** | -1.08* | -0.06 | -0.06 | 0.01 | 0.39** | -0.36** |
| time_Nov | -0.45** | -0.09 | -0.57* | 0.59 | 0.12 | -0.60** | -0.69** | -1.44* | -0.13 | 0.02 | -0.27 | -0.14* | -0.29** |
| time_Oct | -0.38* | -0.54** | -0.39 | 1.19* | 0.11 | 0.04 | -0.72** | -1.23* | 0.12 | 0.20 | 0.82 | 0.03 | -0.21 |
| time_Sep | -0.34* | -0.26 | 0.74 | 2.95** | -0.54 | -0.21 | -0.21 | -1.56* | -0.11 | 0.18 | 1.63** | 0.03 | -0.27* |
| VAT1 | -0.99** | -0.69 | -0.41 | -3.56** | -0.76 | -2.92** | -1.04** | -0.08 | -1.98** | -1.14** | 0.12 | -0.40* | -0.51 |
| VAT2 | 0.47* | -0.22 | 1.80** | -1.78* | 0.93 | 0.44 | 0.15 | 0.79 | 1.22 | 0.63* | -0.18 | 0.36* | 0.38 |
| VAT3 | 0.60** | 0.01 | 2.41** | -0.50 | 0.27 | 1.52** | 0.11 | 0.94 | 1.21 | 0.19 | 0.55 | 1.21** | -0.45 |
| Recession | 0.19** | 0.38* | 0.13 | -0.58** | 0.29 | 0.40** | -0.10 | -0.06 | 0.25 | 0.25** | -0.10 | 0.06 | 0.06 |
| Trend | 0.0003* | -0.0003 | -0.0001 | 0.003** | -0.0001 | 0.0004 | -0.001** | 0.0000 | 0.001** | 0.0004 | -0.0004 | -0.0004** | -0.001** |
| unemployment_growth8 | 0.02** | | | | | | | | | | | | |
| unemployment_growth10 | 0.02* | | | | | | | | | | | | |
| Constant | 0.38** | 0.48** | -0.27 | -1.17** | 0.27 | 0.13 | 0.78** | 0.94* | -0.16 | -0.02 | 0.16 | 0.28** | 0.58** |
| Observations | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 |
| R2 | 0.76 | 0.28 | 0.64 | 0.93 | 0.33 | 0.92 | 0.49 | 0.63 | 0.20 | 0.37 | 0.60 | 0.56 | 0.18 |
| Adjusted R2 | 0.73 | 0.23 | 0.61 | 0.92 | 0.26 | 0.91 | 0.44 | 0.59 | 0.14 | 0.32 | 0.57 | 0.52 | 0.12 |
| Residual Std. Error | 0.18 | 0.55 | 0.57 | 0.70 | 0.53 | 0.46 | 0.33 | 0.72 | 0.62 | 0.30 | 1.21 | 0.15 | 0.29 |
| F Statistic | 23.46** | 5.21** | 18.55** | 134.95** | 5.23** | 133.10** | 9.66** | 18.12** | 3.42** | 6.77** | 19.72** | 13.76** | 3.02** |
| Note: *p<0.05; **p<0.01; ***p<[0.***] | | | | | | | | | | | | | |

Note: *p<0.05; **p<0.01; ***p<[0.***]

Figure 8: Consumption-12 lag Unemployment growth rate simplified output

7 Unemployment (level)

Now we repeat all the calculations using the level of the unemployment rate instead of growth.

The values of unemployment and inflation are entered into figure 9, which shows their development in the period from 01.03.1997 to 01.11.2019.



Figure 9: Unemployment and inflation

7.1 Regression output

The results are in Table 10. Some of unemployment lag variables are significant, especially for 06HL.

| Dependent variable: | | | | | | | | | | | | | |
|---------------------|---------|---------|---------|---------|--------|---------|----------|--------|---------|---------|--------|----------|---------|
| | CPI | 01FB | 02AT | 03CF | 04HW | 05FH | 06HL | 07TR | 08CM | 09RC | 10ED | 11RH | 12MS |
| constant | 0.57* | 2.09** | -0.38 | -1.69 | -0.25 | -0.41 | 0.69* | 1.07 | -1.64* | -0.05 | -0.76 | 0.57** | 0.64 |
| lag1 | 0.11 | 0.12 | -0.23** | -0.28** | 0.18* | -0.32** | -0.16* | -0.10 | -0.003 | -0.23** | -0.05 | -0.28** | -0.11 |
| lag2 | -0.02 | -0.08 | -0.11 | -0.15* | 0.04 | -0.26** | -0.11 | 0.02 | 0.06 | 0.02 | -0.01 | -0.09 | 0.03 |
| lag3 | 0.10 | -0.04 | 0.001 | -0.21** | -0.13 | -0.16* | -0.07 | 0.04 | 0.11 | 0.01 | -0.03 | -0.07 | 0.08 |
| lag4 | 0.01 | -0.15 | -0.07 | -0.20** | 0.01 | -0.14 | -0.01 | -0.03 | -0.13 | 0.14* | -0.02 | -0.04 | 0.02 |
| lag5 | -0.01 | 0.04 | -0.08 | 0.03 | 0.001 | -0.14 | -0.18** | -0.004 | -0.05 | 0.17* | -0.01 | -0.0004 | -0.001 |
| lag6 | 0.06 | 0.06 | -0.01 | 0.27** | 0.02 | 0.16* | -0.11 | 0.04 | -0.06 | 0.18* | -0.04 | -0.18* | -0.001 |
| lag7 | 0.03 | 0.004 | -0.08 | 0.04 | 0.16* | -0.01 | -0.20** | 0.09 | -0.05 | -0.06 | -0.03 | -0.04 | -0.07 |
| lag8 | 0.03 | 0.005 | -0.11 | -0.07 | -0.13 | -0.06 | -0.17** | 0.09 | -0.09 | -0.01 | -0.02 | -0.05 | -0.06 |
| lag9 | 0.002 | -0.03 | -0.03 | 0.12 | 0.01 | 0.02 | -0.04 | -0.07 | 0.07 | 0.08 | 0.001 | -0.10 | 0.13 |
| lag10 | -0.001 | 0.09 | 0.09 | 0.005 | -0.03 | -0.16* | -0.05 | -0.04 | 0.17* | -0.002 | -0.05 | 0.01 | 0.004 |
| lag11 | 0.003 | -0.05 | 0.02 | 0.004 | -0.03 | -0.12 | 0.04 | 0.07 | -0.03 | 0.02 | -0.06 | -0.08 | -0.07 |
| lag12 | 0.16* | 0.06 | 0.20** | 0.29** | 0.10 | 0.33** | 0.04 | 0.05 | -0.02 | 0.14 | 0.34** | 0.09 | 0.07 |
| CPI_lag1 | | 0.26 | -0.07 | 0.37 | 0.06 | -0.13 | -0.11 | 0.89** | -0.21 | 0.03 | 0.04 | 0.14* | 0.25* |
| CPI_lag2 | | 0.17 | -0.08 | -0.29 | 0.17 | 0.08 | 0.23* | 0.11 | -0.06 | -0.12 | -0.37 | 0.06 | -0.12 |
| CPI_lag3 | | 0.004 | 0.42* | 0.67** | 0.48* | 0.25 | -0.06 | -0.45 | 0.25 | 0.03 | 0.71 | 0.05 | 0.06 |
| CPI_lag4 | | 0.45* | 0.26 | 0.19 | 0.46* | 0.17 | -0.03 | -0.15 | -0.23 | -0.16 | -0.52 | 0.14* | -0.003 |
| CPI_lag5 | | -0.07 | 0.01 | -0.47 | 0.31 | 0.14 | 0.02 | -0.10 | 0.33 | -0.13 | -0.77 | -0.01 | -0.06 |
| CPI_lag6 | | 0.35 | 0.60** | -0.05 | -0.36 | 0.15 | 0.19* | -0.50 | 0.0001 | -0.10 | 0.62 | -0.01 | 0.01 |
| CPI_lag7 | | 0.05 | -0.31 | -0.13 | -0.13 | 0.59** | 0.22* | -0.15 | -0.09 | -0.08 | -0.23 | 0.03 | 0.17 |
| CPI_lag8 | | 0.55** | 0.04 | 0.41 | 0.19 | 0.10 | -0.001 | -0.54 | 0.28 | 0.03 | -0.09 | 0.10 | 0.02 |
| CPI_lag9 | | -0.17 | -0.03 | -0.06 | 0.09 | -0.18 | 0.11 | 0.17 | -0.18 | 0.02 | 0.08 | 0.06 | -0.09 |
| CPI_lag10 | | 0.01 | 0.19 | 0.15 | 0.09 | 0.27 | -0.04 | 0.19 | -0.02 | -0.05 | 0.27 | -0.004 | -0.05 |
| CPI_lag11 | | -0.09 | -0.02 | -0.11 | 0.12 | 0.11 | -0.08 | 0.03 | 0.18 | 0.10 | -0.23 | 0.04 | 0.05 |
| CPI_lag12 | | 0.08 | -0.11 | -0.33 | -0.26 | -0.11 | 0.14 | 0.32 | -0.18 | 0.05 | -0.11 | -0.001 | 0.10 |
| time_Aug | -0.76* | -3.76** | -0.86 | 0.05 | 0.38 | 0.80 | 0.33 | -0.68 | 1.04 | -0.21 | -0.36 | -0.07 | -0.30 |
| time_Dec | -0.65* | -2.55** | -0.25 | 0.76 | 0.93 | 1.62* | -0.26 | -1.57 | 2.07* | 0.26 | -2.72 | -0.25 | -0.37 |
| time_Feb | -0.55 | -2.89** | 2.58* | 0.41 | 0.07 | 1.07 | 0.59 | -0.97 | 2.21* | 0.40 | -1.14 | 0.05 | -0.78 |
| time_Jan | -1.23** | -2.92** | 0.08 | -2.71* | 0.43 | -0.77 | -0.13 | -1.25 | 0.45 | 0.34 | 3.57 | -0.58* | -0.76 |
| time_Jul | -0.99** | -2.05* | 0.88 | -0.69 | -1.23 | -0.23 | 0.82 | -0.16 | 1.29 | -0.78 | -0.67 | 0.02 | 0.13 |
| time_Jun | -0.88** | -2.68** | -1.16 | 0.44 | -0.57 | -0.77 | -0.29 | -0.40 | 1.01 | -0.03 | -0.54 | -0.15 | -0.59 |
| time_Mar | -0.47 | -2.48** | -0.25 | 0.16 | 0.05 | 0.57 | 0.56 | -0.42 | 1.19 | -0.20 | 0.01 | -0.15 | -0.48 |
| time_May | -0.46 | -1.82 | 0.57 | 0.96 | -0.17 | -0.01 | -0.37 | 0.03 | 1.66 | 0.20 | -0.86 | 0.26 | -0.44 |
| time_Nov | -0.69* | -2.42* | -0.21 | 1.08 | 0.46 | 0.84 | -0.15 | -1.50 | 1.36 | 0.02 | -0.54 | -0.48 | -0.29 |
| time_Oct | -0.48 | -2.91** | -1.83 | 3.62** | 1.46 | 0.18 | -0.19 | -1.38 | 0.34 | 0.15 | 1.92 | -0.07 | -0.12 |
| time_Sep | -0.33 | -1.91* | 0.83 | 2.09 | 1.37 | 0.19 | -0.18 | -2.57* | 1.23 | 0.34 | 1.81 | 0.05 | -0.48 |
| VAT1 | -0.95** | -0.87 | -0.47 | -3.20** | -0.17 | -3.50** | -0.94** | 0.29 | -2.32** | -1.05** | 0.06 | -0.42* | -0.59 |
| VAT2 | 0.53* | -0.09 | 1.36* | -1.49 | 1.04 | 0.35 | 0.30 | 0.54 | 0.18 | 0.66 | 0.41 | 0.32 | 0.49 |
| VAT3 | 0.46* | -0.30 | 2.40** | -1.10 | 0.14 | 1.67** | 0.26 | 0.90 | 0.81 | 0.38 | -0.20 | 1.26** | -0.52 |
| Recession | 0.16* | 0.65** | 0.11 | -0.86** | 0.27 | 0.30 | -0.11 | -0.08 | 0.16 | 0.20 | 0.42 | 0.09 | 0.05 |
| Trend | 0.0002 | -0.0003 | 0.0001 | 0.003** | -0.001 | 0.001 | -0.001** | 0.0004 | 0.002** | 0.001 | 0.0003 | -0.001** | -0.001* |
| growth lag1 | 0.18* | 0.43 | -0.10 | -0.55 | 0.47* | -0.21 | -0.13 | 0.38 | 0.29 | 0.10 | 0.78 | 0.01 | 0.04 |
| growth lag2 | -0.13 | -0.16 | -0.15 | 0.19 | -0.29 | 0.18 | 0.05 | -0.50 | -0.69* | -0.21 | -0.62 | 0.10 | -0.14 |
| growth lag3 | 0.04 | -0.14 | 0.33 | 0.48 | -0.13 | 0.003 | 0.15 | 0.34 | 0.34 | 0.06 | 0.50 | -0.10 | 0.17 |
| growth lag4 | 0.07 | 0.45 | 0.49 | -1.04* | 0.20 | 0.02 | -0.22 | -0.27 | 0.52 | 0.24 | -0.26 | 0.04 | -0.19 |
| growth lag5 | -0.01 | -0.11 | -0.74 | 0.70 | -0.04 | -0.35 | -0.14 | 0.13 | -0.66 | -0.21 | -0.04 | 0.19 | 0.05 |
| growth lag6 | -0.07 | -0.10 | 0.01 | 0.39 | -0.30 | -0.01 | 0.24 | 0.23 | -0.15 | -0.06 | 0.84 | -0.15 | 0.13 |
| growth lag7 | 0.09 | 0.55 | 1.29** | -1.18** | 0.12 | 0.15 | 0.02 | -0.38 | 0.93* | 0.01 | -0.79 | 0.10 | 0.07 |
| growth lag8 | -0.12 | -0.73* | -1.34** | 0.47 | 0.45 | -0.16 | -0.28 | -0.24 | -0.91* | -0.001 | 0.21 | 0.19 | -0.26 |
| growth lag9 | 0.18 | 0.43 | 0.36 | 0.32 | -0.16 | -0.13 | 0.07 | 0.86 | -0.20 | 0.02 | 1.09 | -0.17 | 0.17 |
| growth lag10 | 0.07 | 0.49 | 0.46 | -0.14 | 0.23 | 0.09 | 0.13 | -0.59 | 0.74* | -0.14 | -1.47* | 0.08 | 0.21 |
| growth lag11 | -0.21* | -0.99** | -0.62* | -0.39 | 0.21 | 0.23 | -0.27 | -0.34 | -0.41 | 0.12 | 0.62 | 0.04 | -0.28 |
| growth lag12 | 0.11 | 0.57** | 0.47* | 0.24 | -0.14 | -0.24 | 0.06 | 0.17 | -0.15 | 0.09 | 0.36 | -0.04 | 0.14 |
| unemployment lag 1 | 0.02 | 0.06 | -0.15 | 0.27 | 0.13 | -0.09 | -0.04 | -0.11 | -0.08 | -0.002 | 0.30 | -0.01 | 0.07 |
| unemployment lag 2 | -0.01 | -0.03 | 0.29 | -0.18 | -0.14 | 0.17 | 0.08 | -0.002 | 0.10 | 0.01 | -0.02 | -0.04 | -0.05 |
| unemployment lag 3 | 0.04 | 0.07 | 0.02 | -0.05 | 0.12 | -0.01 | -0.27** | 0.04 | 0.08 | 0.05 | -0.28 | 0.07 | -0.02 |
| unemployment lag 4 | -0.06 | -0.31* | -0.29 | 0.20 | -0.10 | 0.01 | 0.12 | 0.09 | -0.18 | 0.06 | 0.16 | -0.03 | -0.13 |
| unemployment lag 5 | 0.07 | 0.37* | 0.38* | 0.06 | -0.12 | -0.03 | 0.31** | 0.07 | 0.29 | -0.05 | 0.02 | -0.06 | 0.14 |
| unemployment lag 6 | -0.07 | -0.27 | -0.23 | -0.13 | -0.13 | -0.01 | -0.21** | 0.04 | -0.05 | -0.08 | -0.05 | 0.01 | -0.02 |
| unemployment lag 7 | 0.02 | 0.11 | 0.07 | -0.22 | 0.19 | 0.03 | -0.23** | 0.01 | -0.06 | 0.04 | -0.01 | 0.01 | 0.05 |
| unemployment lag 8 | 0.01 | -0.07 | -0.11 | 0.22 | -0.04 | -0.02 | 0.20** | -0.02 | -0.15 | -0.04 | 0.03 | 0.05 | -0.02 |
| unemployment lag 9 | -0.01 | -0.005 | 0.13 | 0.10 | -0.03 | -0.04 | 0.21** | -0.06 | 0.13 | 0.01 | 0.11 | -0.04 | -0.06 |
| unemployment lag 10 | 0.02 | 0.11 | 0.18 | -0.26 | 0.02 | -0.01 | -0.39** | 0.08 | 0.07 | 0.05 | -0.33 | 0.07 | 0.002 |
| unemployment lag 11 | -0.01 | -0.23 | -0.21 | 0.08 | 0.07 | 0.07 | 0.36** | -0.05 | -0.03 | -0.01 | 0.15 | -0.03 | 0.12 |
| unemployment lag 12 | -0.002 | 0.18* | -0.01 | 0.02 | 0.01 | -0.06 | -0.17** | -0.07 | -0.08 | -0.02 | 0.10 | -0.02 | -0.09 |
| Observations | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 |
| R2 | 0.77 | 0.41 | 0.70 | 0.94 | 0.43 | 0.93 | 0.71 | 0.66 | 0.32 | 0.45 | 0.64 | 0.62 | 0.31 |
| Adjusted R2 | 0.71 | 0.23 | 0.61 | 0.93 | 0.25 | 0.91 | 0.62 | 0.56 | 0.11 | 0.28 | 0.53 | 0.50 | 0.10 |
| Residual Std. Error | 0.19 | 0.55 | 0.57 | 0.70 | 0.53 | 0.47 | 0.27 | 0.75 | 0.63 | 0.31 | 1.26 | 0.16 | 0.29 |
| F Statistic | 13.85** | 2.25** | 7.63** | 53.52** | 2.44** | 44.96** | 7.93** | 6.36** | 1.52* | 2.64** | 5.81** | 5.31** | 1.45* |

Note: *p<0.05; **p<0.01; ***p<[0.***]

Figure 10: Consumption-12 lag Unemployment output

7.2 The simplified result

The results are in Table 11. The unemployment lag variables for 02AT, 03CF, 06HL, 09RC, 11RH and 12MS are significant. It is worth noting that except for period lag of 1 and 2, which is not significant to 06HL, the other unemployment time lag variables are significant.

The most interesting thing is that 2 period lag unemployment is insignificant for all divisions and aggregate CPI.

| Dependent variable: | | | | | | | | | | | | | |
|---------------------|---------|---------|---------|----------|---------|----------|----------|---------|---------|---------|---------|-----------|----------|
| | CPI | 01FB | 02AT | 03CF | 04HW | 05FH | 06HL | 07TR | 08CM | 09RC | 10ED | 11RH | 12MS |
| lag1 | 0.10 | 0.15* | -0.23** | -0.26** | 0.22** | -0.25** | -0.16** | | | -0.21** | | -0.23** | -0.13* |
| lag2 | -0.01 | | -0.12* | -0.21** | | -0.23** | -0.13* | | | | | | |
| lag3 | 0.10 | | | -0.20** | | | | | 0.14* | | | | |
| lag4 | 0.03 | | | -0.20** | | | | | | 0.16** | | | |
| lag5 | -0.01 | | | | | | -0.18** | | | 0.15* | | | |
| lag6 | 0.05 | | | 0.23** | | 0.22** | -0.12* | | | 0.16* | | -0.16** | |
| lag7 | 0.03 | | | | 0.13* | | -0.22** | | | | | | |
| lag8 | 0.04 | | | | | | -0.14** | | | | | | |
| lag9 | 0.03 | | | | | | | | | | | | |
| lag10 | -0.01 | | 0.11* | | | -0.13** | | | 0.14* | | | | |
| lag11 | 0.02 | | | | | | | | | | | | |
| lag12 | 0.17** | | 0.22** | 0.31** | | 0.38** | | | | 0.20** | 0.38** | 0.14* | |
| CPI_lag1 | | | | | | | 0.22* | 0.66** | | | | 0.15** | 0.24** |
| CPI_lag2 | | | | | | | | | | | | | |
| CPI_lag3 | | | 0.46** | 0.60** | | | | | | | | | |
| CPI_lag4 | | 0.36* | | | 0.51** | | | | | -0.21* | | 0.10* | |
| CPI_lag5 | | | | | | | | | | | | | |
| CPI_lag6 | | | 0.64** | | | | 0.21* | -0.48* | | | | | |
| CPI_lag7 | | | -0.43* | | | 0.64** | 0.20* | | | | | | |
| CPI_lag8 | | 0.44** | | | | | | | | | | | |
| CPI_lag9 | | | | | | | | | | | | | |
| CPI_lag10 | | | | | | | | | | | | | |
| CPI_lag11 | | | | | | | | | | | | | |
| CPI_lag12 | | | | | | | | | | | | | |
| growth lag1 | 0.09* | | | | 0.27* | | | 0.55* | | | | | |
| growth lag2 | | | | | | | | 0.51** | | | | | |
| growth lag4 | | | | | | | -0.11* | -0.41* | | | | | |
| growth lag5 | | | | | | | | | | | | 0.10** | |
| growth lag6 | | | | | | | | | | -0.15* | | | |
| growth lag7 | | | 0.43** | | | | | | | | | | |
| growth lag8 | | | -0.30* | | | | | | | | | 0.09** | |
| growth lag9 | 0.10** | | | | | | | 0.66** | | | | | |
| growth lag10 | | | | | 0.29** | | | -0.59** | | | -0.78** | | |
| growth lag11 | -0.07* | | | | | | -0.14** | | | | 0.67* | | |
| growth lag12 | | | | | | | | | | 0.14* | | | |
| unemployment lag 1 | | | | 0.12** | | | | | | | | | |
| unemployment lag 3 | | | | | | | -0.23** | | | 0.08** | | | |
| unemployment lag 4 | | | | | | | 0.13* | | | | | | |
| unemployment lag 5 | | | | | | | 0.27** | | | | | | |
| unemployment lag 6 | | | 0.06* | | | | -0.21** | | | -0.09** | | -0.03* | |
| unemployment lag 7 | | | | | | | -0.20** | | | | | | |
| unemployment lag 8 | | | | | | | 0.19** | | | | | | |
| unemployment lag 9 | | | | | | | 0.20** | | | | | | |
| unemployment lag 10 | | | | | | | -0.39** | | | | | | |
| unemployment lag 11 | | | | | | | 0.41** | | | | | 0.07** | 0.09* |
| unemployment lag 12 | | | | | | | -0.21** | | | | | -0.05* | -0.09* |
| time_Aug | -0.31* | -0.56** | -0.04 | 0.93** | -0.78* | -0.003 | 0.24* | -0.31 | 0.06 | -0.77** | -0.02 | 0.03 | -0.07 |
| time_Dec | -0.52** | -0.24 | -0.41 | 1.90** | 0.18 | 0.88** | -0.51** | -1.51* | -0.12 | 0.10 | -0.28 | -0.27** | -0.35** |
| time_Apr | -0.27 | -0.76** | 1.60** | 1.01* | -0.07 | -0.29 | 0.17 | -1.33* | 0.22 | -0.19 | 0.10 | 0.09 | -0.21 |
| time_Jan | -1.16** | -0.86** | 1.30** | -0.59 | -0.27 | -1.23** | 0.09 | -0.63 | -0.13 | -0.36** | 1.62* | -0.42** | -0.37** |
| time_Jul | -0.80** | -0.86** | 1.44** | -0.81 | -0.73* | -0.40 | 0.30* | -0.26 | -0.09 | -0.77** | -0.20 | 0.16 | -0.35** |
| time_Jun | -0.63** | -0.69** | 0.001 | 1.20** | -0.93** | -0.42 | -0.38* | -0.58 | -0.07 | -0.69** | 0.01 | 0.09 | -0.39** |
| time_Mar | -0.24* | -0.56** | 0.33 | 0.11 | -0.16 | -0.21 | 0.21 | -0.79* | -0.15 | -0.37* | -0.01 | -0.07 | -0.30* |
| time_May | -0.46** | 0.15 | 0.56* | 0.51 | -0.65 | -0.14 | -0.27 | -1.08* | -0.06 | -0.42* | 0.01 | 0.38** | -0.34** |
| time_Nov | -0.52** | -0.09 | -0.55* | 1.71** | 0.11 | -0.60** | -0.48** | -1.44* | -0.13 | -0.28 | -0.27 | -0.14* | -0.27* |
| time_Oct | -0.31 | -0.54** | -0.52 | 1.63** | 0.12 | 0.04 | -0.19 | -1.23* | 0.12 | -0.11 | 0.82 | 0.08 | -0.18 |
| time_Sep | -0.24 | -0.26 | 0.66 | 2.83** | -0.45 | -0.21 | 0.15 | -1.56* | -0.11 | -0.13 | 1.63** | 0.07 | -0.24 |
| VAT1 | -0.93** | -0.69 | -0.44 | -3.53** | -0.92 | -2.92** | -0.88** | -0.08 | -1.98** | -1.22** | 0.12 | -0.40* | -0.51 |
| VAT2 | 0.51* | -0.22 | 1.64** | -1.72* | 0.89 | 0.44 | 0.31 | 0.79 | 1.22 | 0.70* | -0.18 | 0.40* | 0.34 |
| VAT3 | 0.51* | 0.01 | 2.33** | -0.64 | 0.33 | 1.52** | 0.24 | 0.94 | 1.21 | 0.23 | 0.55 | 1.23** | -0.45 |
| Recession | 0.15* | 0.38* | 0.15 | -0.65** | 0.29 | 0.40** | -0.07 | -0.06 | 0.25 | 0.17 | -0.10 | 0.06 | 0.06 |
| Trend | 0.0002 | -0.0003 | -0.0002 | 0.004** | -0.0002 | 0.0004 | -0.001** | 0.0000 | 0.001** | 0.0004 | -0.0004 | -0.0004** | -0.001** |
| Constant | 0.46** | 0.48** | -0.51 | -2.38** | 0.22 | 0.13 | 0.78** | 0.94* | -0.16 | 0.34* | 0.16 | 0.31** | 0.58** |
| Observations | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 | 273 |
| R2 | 0.75 | 0.28 | 0.65 | 0.93 | 0.31 | 0.92 | 0.68 | 0.63 | 0.20 | 0.40 | 0.60 | 0.58 | 0.19 |
| Adjusted R2 | 0.72 | 0.23 | 0.62 | 0.93 | 0.25 | 0.91 | 0.63 | 0.59 | 0.14 | 0.34 | 0.57 | 0.53 | 0.13 |
| Residual Std. Error | 0.19 | 0.55 | 0.57 | 0.69 | 0.53 | 0.46 | 0.27 | 0.72 | 0.62 | 0.30 | 1.21 | 0.15 | 0.29 |
| F Statistic | 23.72** | 5.21** | 17.91** | 142.71** | 5.27** | 133.10** | 13.40** | 18.12** | 3.42** | 6.36** | 19.72** | 12.95** | 3.05** |

Note: *p<0.05; **p<0.01; ***p<[0.***]

Figure 11: Consumption-12 lag Unemployment simplified output