Appendices

12.11-2020

1 Appendices

```
start <- as.Date("01/03/1990", format="%d/%m/%Y")
end <- as.Date("01/12/2015", format="%d/%m/%Y")

yivgdp <- read_csv("data/gdp_yiv.csv")
```

```
##
## -- Column specification --------------------------------------------------------
## cols(
##   Date = col_character(),
##   GDP = col_double(),
##   YIV = col_double()
## )
```

```
yivgdp$Date <- as.Date(yivgdp$Date, format="%d.%m.%Y")
yivgdp <- yivgdp %>%
  mutate(log_gdp=log(1+GDP/100)*100)


fred_quarterly <- fredqd(date_start=start,date_end=end)
fred_quarterly <- subset(fred_quarterly, select = -c(X91, X181, X183))

variable_names <- as.vector(colnames(fred_quarterly[,-1]))


varnames <- describe_qd(variable_names)
varnames
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## 200 First difference of percent change: (x(t)/x(t-1)-1)-(x(t-1)/x(t-2)-1)
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## 204                                    Level (i.e. no transformation): x(t)
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## 213   Second difference of natural log: (ln(x)-ln(x-1))-(ln(x-1)-ln(x-2))
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## 246                        First difference of natural log: ln(x)-ln(x-1)
## 247                                          First difference: x(t)-x(t-1)
## 248                        First difference of natural log: ln(x)-ln(x-1)
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1.1 Appendix A

Notes: This table includes summary statistics for main variables used in our research. Statistics include mean, standard deviation„ min, 1st quartile, median, 3rd quartile, max & number of valid data points. In Panel A, different YIV data is summarized. In Panel B, we have listed the main dependent variables which are used for predictions. GDP denotes the year-on-year growth rate(quarterly data), CON denotes YOY consumption growth(monthly data), EMP describes YOY growth rate for non-farm payroll and lastly IND stands for

Industrial production YOY growth (monthly data). In Panel C, different control variables are listed: SVEN1F01 - 1 year treasury bond par yield.

Table 1.1: Summary Statistics

	Mean	Std.Dev	Min	Q1	Median	Q3	Max	N.Valid
Panel A: YIV								
YIV	3.34	1.31	1.39	2.60	3.00	3.62	9.21	103
Panel B: Dependent Variables								
GDP	2.50	1.78	-3.92	1.71	2.61	3.98	5.30	103
CON	4.88	1.95	-3.03	3.92	5.11	6.22	9.02	312
EMP	1.07	1.67	-5.00	0.20	1.60	2.20	3.50	312
IND	2.00	4.05	-15.33	1.19	2.74	4.16	8.54	312
Panel C: Control Variables								
SVEN1F01	3.89	2.40	0.21	1.38	4.35	5.88	9.29	6486
VIX	19.83	7.64	10.82	14.20	17.76	23.54	62.64	312
HOUSNG	1.01	18.36	-54.80	-7.25	2.80	12.70	50.00	312

Note:
Additional control variables will be added upon construction. Furthermore, currently the frequency of the datasets differs for different variables but this will be addressed in the research process.

1.2 Appendix B.

Notes: This table includes regression using GDP & YIV. Controls will be added during research process. The equation for the regression is the following:

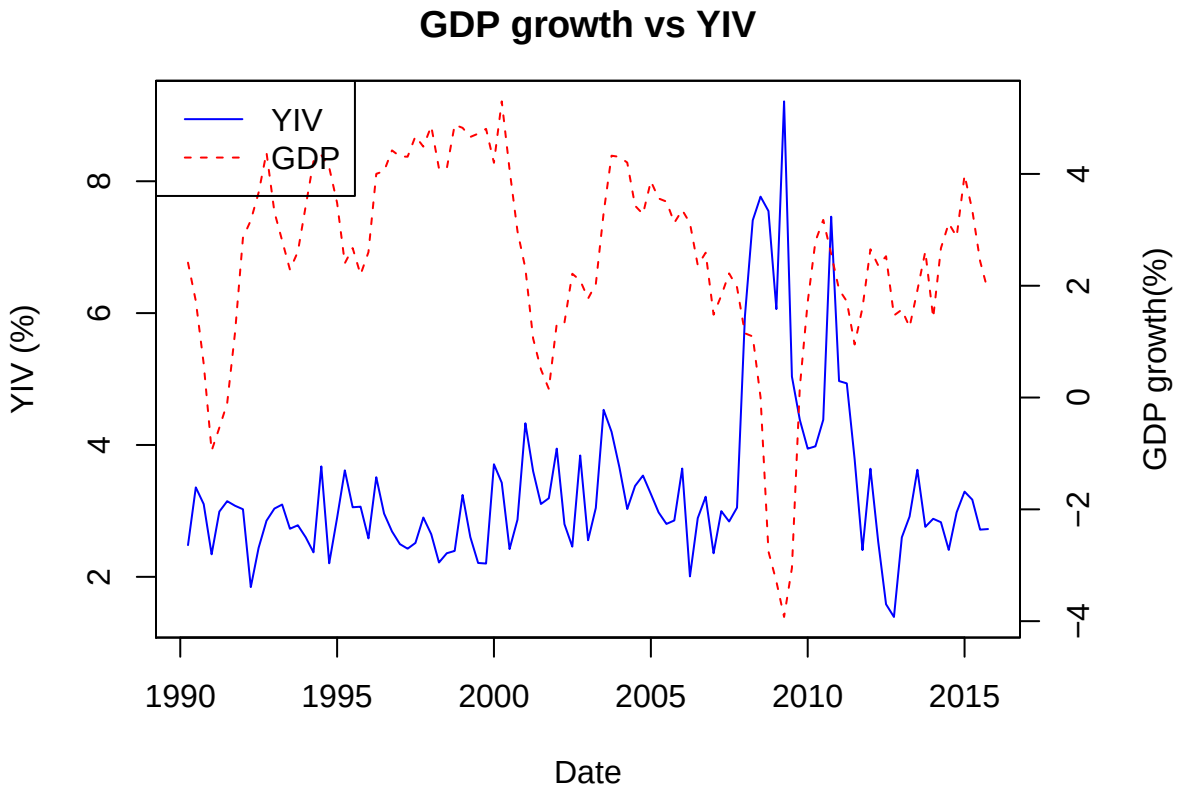
$$\sum_{j=1}^{j=H} log(1 + GDP_{i,t+j})/H = \alpha_H + \beta_H \sigma_{IV,t}^{INT} + Controls + \varepsilon_{t+H} \quad (1)$$

Table 1.2: Regression output

	H12	H18	H24	H30	H36
			Panel A: YIV		
R-Squared	39.18	34.97	27.53	23.09	20.26
Adj. R2	38.55	34.29	26.75	22.24	19.37
Intercept	5.02	4.71	4.33	4.08	3.92
Beta	-0.76	-0.66	-0.54	-0.47	-0.41
t-stat	-7.90	-7.15	-5.94	-5.23	-4.76
p-value	0	0	0	0	0
RMSE	1.27	1.22	1.20	1.16	1.13
Newey	-0.15	-0.13	-0.10	-0.10	-0.20
Significance	***	***	***	***	***

Note:
*** - p<0.01, ** - p<0.05, * - p<0.1

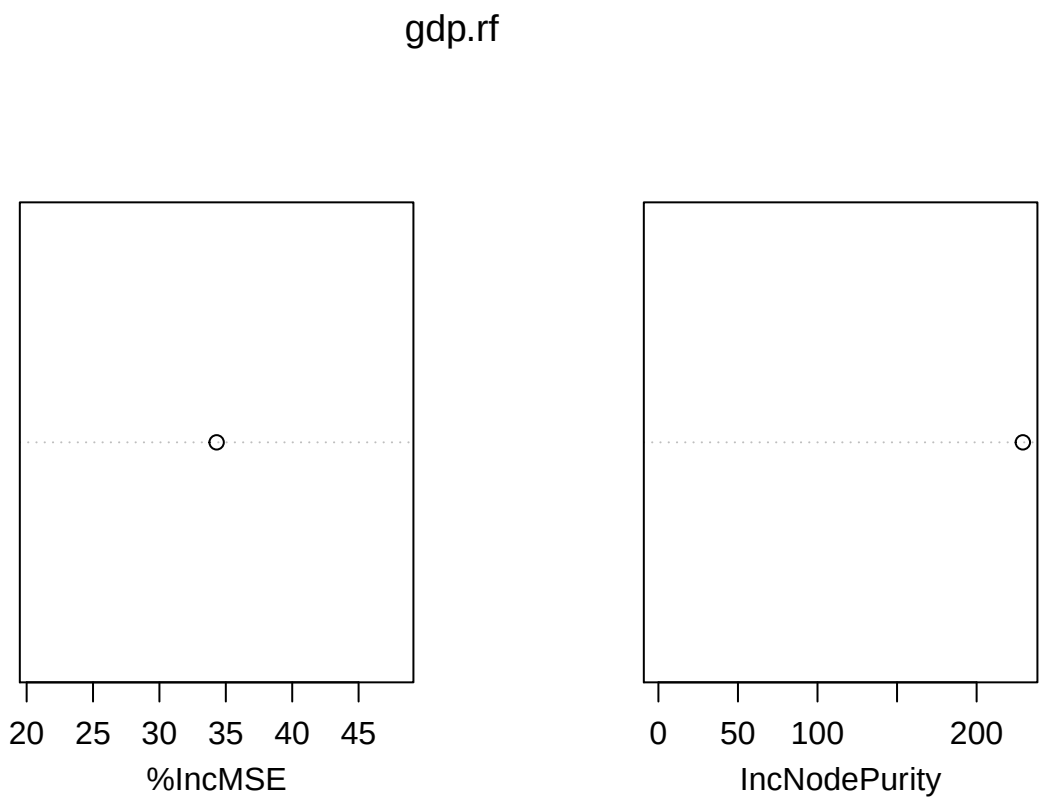
1.3 Appendix C



1.4 Appendix D

```
##
## Call:
##  randomForest(formula = H12 ~ . - log_gdp - GDP, data = train,      importance = TRUE
##                Type of random forest: regression
##                      Number of trees: 500
## No. of variables tried at each split: 1
##
##           Mean of squared residuals: 1.827493
##                     % Var explained: 29.91

##     %IncMSE
## YIV  34.307
```

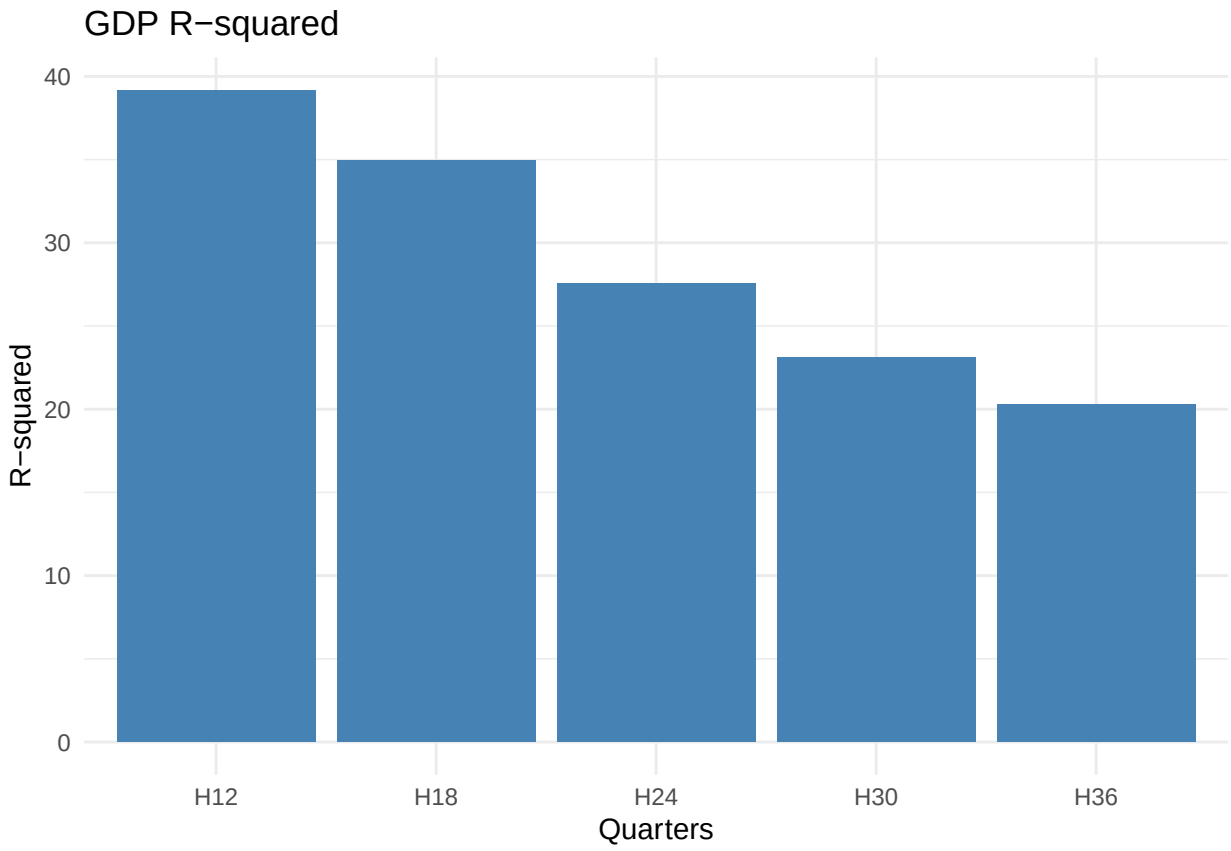


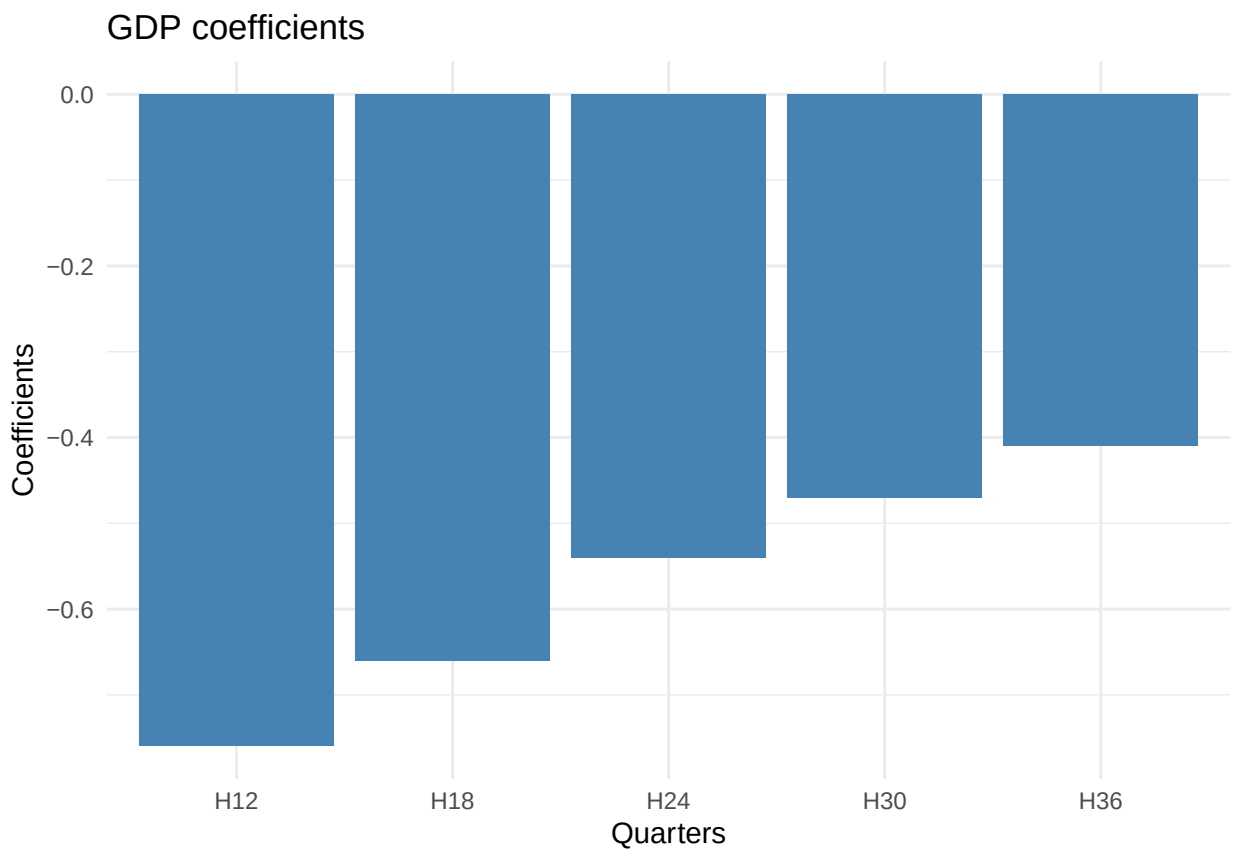

```
##         1         2         3         4         5         6         7         8
## 2.3015413 1.7349930 0.8890817 1.4208569 1.8502451 1.3337087 2.6458063 3.2613418
##         9        10        11        12        13        14        15
## 2.9481313 3.3978196 2.7196849 2.9992115 1.9923596 3.0979888 3.0329875

## [1] 0.841158
```

1.5 Appendix E

```
## Warning: Use of ‘df_results$"R-Squared"‘ is discouraged. Use ‘R-Squared‘
## instead.
```




GDP coefficients
0.0
−0.2
−0.4
−0.6
Coefficients
H12
H18
H24
H30
H36
Quarters