Appendices

12.11-2020

1 Appendices

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#pmst peaks tegema mitmetasandilise, hetkel on ainult siis nö nende erinevate H12,H18

mudelid <- c("YIV","dum","DGS1", "DGS10", "DGS5", "DGS3MO", "TRM0503","TRM0506","TRM1003
x <- 1
df_total <- data.frame()

for (element in mudelid)
  {
  unnestedx <- df %>%
  select(H12, H18, H24, H30, H36, mudelid[1:x]) %>%
  gather(Var,Value,  -mudelid[1:x]) %>%
  nest(data=c(Value,  mudelid[1:x])) %>%
  mutate(model = map(data, ~lm(Value ~ ., data = .)),
         tidied = map(model, tidy),
         glanced = map(model, glance),
         augmented = map(model, augment),
         neweywest = map(model, ~tidy(coeftest(., vcov.=NeweyWest(., prewhite=FALSE))))
  select(-model, -data)

  df_total <- rbind(df_total, data.frame(unnestedx))
  x <- x+1
  remove(unnestedx)
}


regr_results <- function(a){
  results1 <- df_total[c(a:(a+4)),] %>%
    select(-augmented,-tidied, -glanced) %>%
    unnest(cols = c(neweywest)) %>%
    select(-statistic) %>%
    pivot_longer(cols=-c(1:2), names_to = "mdeea", values_to = "Delay") %>%
    mutate(x = paste(term,mdeea,sep = "_"))%>%
    select(-c(2:3)) %>%
```

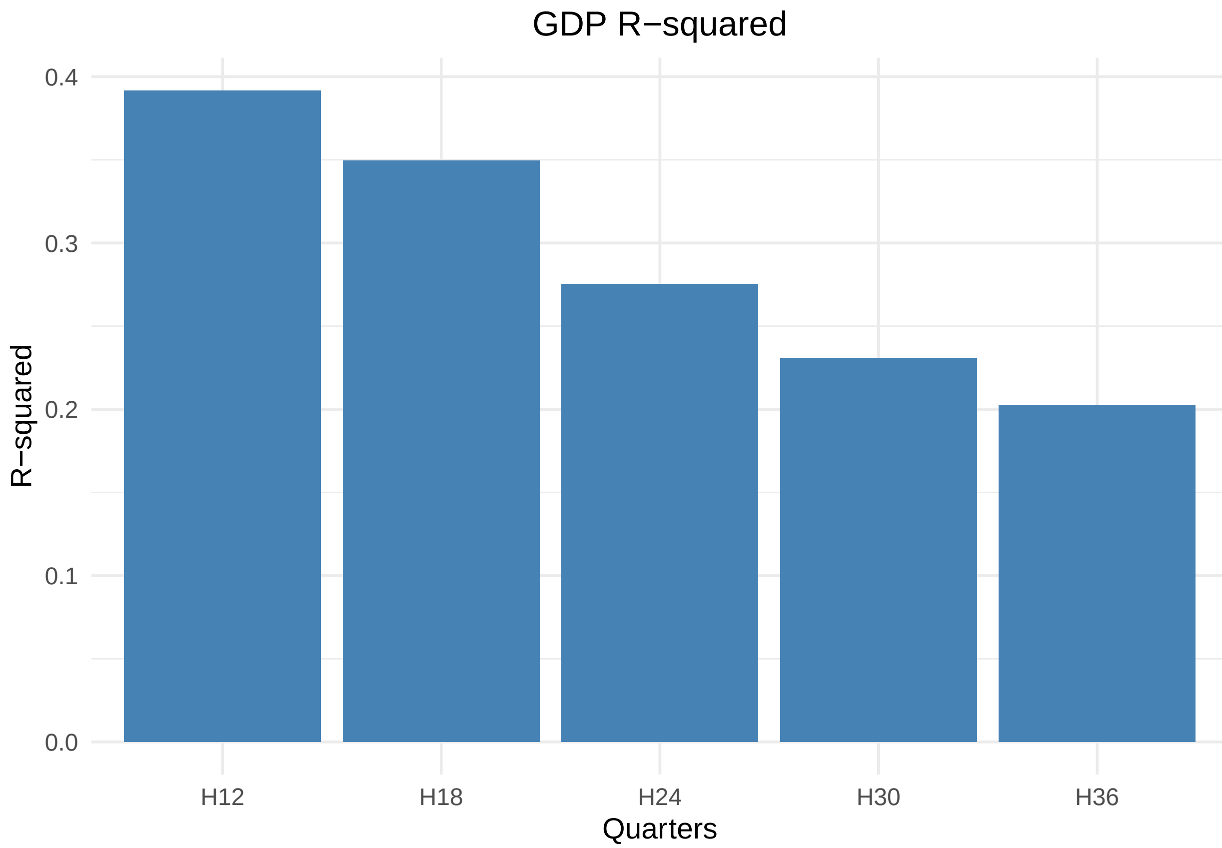
```
    pivot_wider(names_from = Var, values_from = Delay) %>%
    column_to_rownames(var = "x")

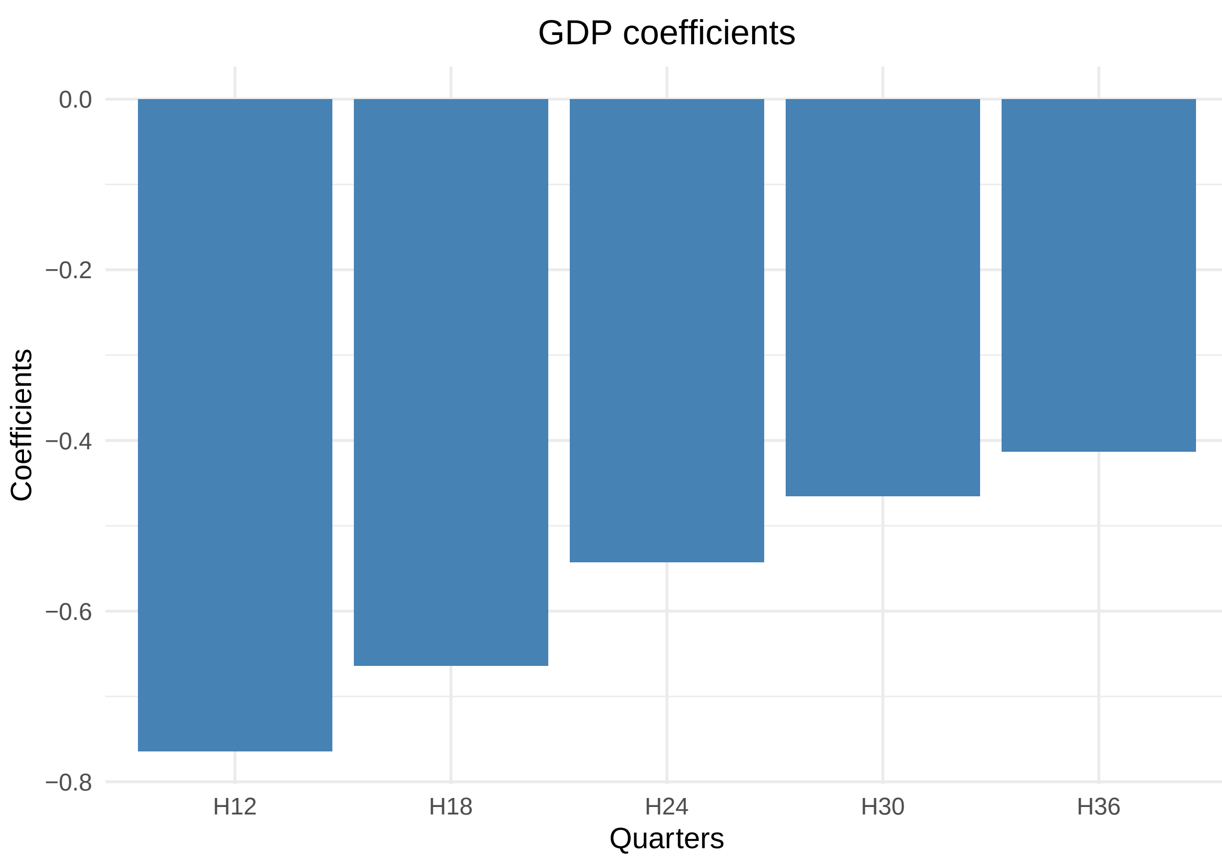
  results2 <- df_total[c(a:(a+4)),] %>%
    select(-augmented,-neweywest, -tidied) %>%
    unnest(cols = c(glanced)) %>%
    select(-df, -AIC, -BIC, -deviance, -nobs, -df.residual, -logLik, -statistic, -p.valu
    column_to_rownames(var = "Var")
  results2 <- as.data.frame(t(results2))

  results <- rbind(results1, results2)
  remove(results1, results2)
  rownames(results)[rownames(results) == "sigma"] <- "RMSE"

return(results)
}
```

1.1 Appendix A





1.2 Appendix B

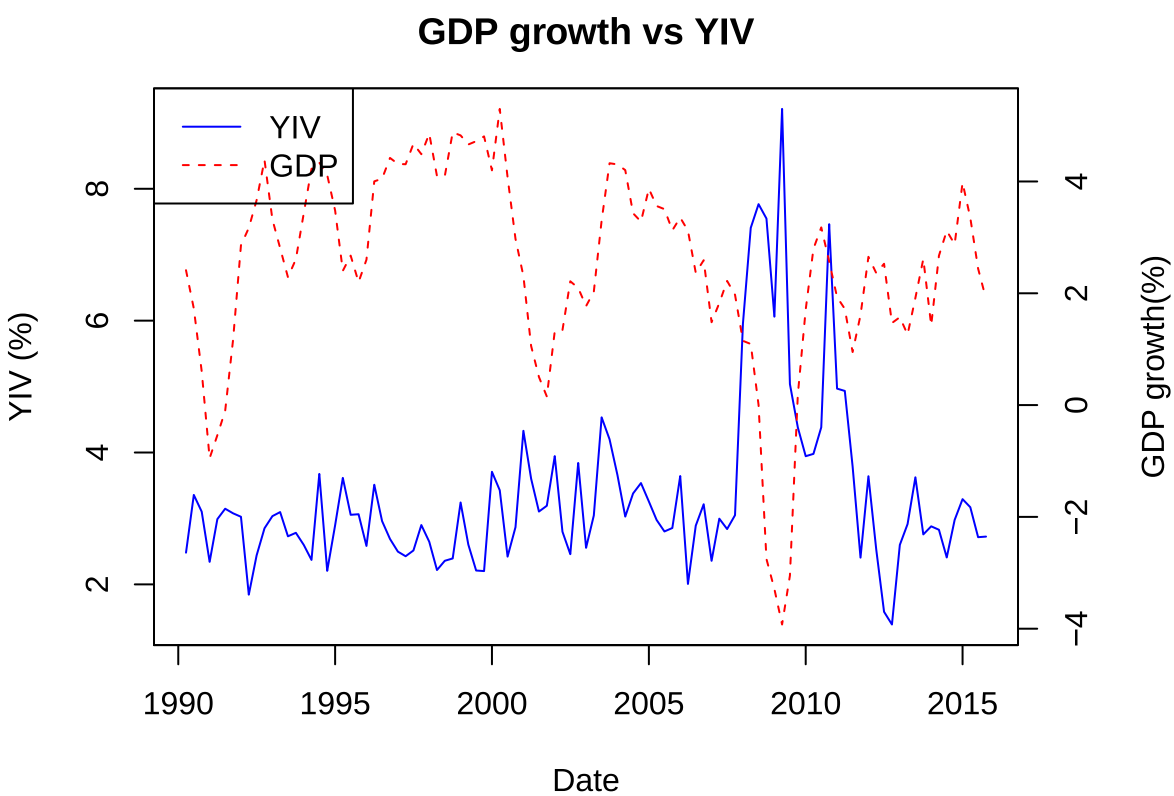


Figure 1.1: GDP Growth(%) vs 5-year Treasury Implied Volatility

1.3 Appendix C

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

Variable	Mean	Std.Dev	Min	Q1	Median	Q3	Max	N.Valid
Panel A: YIV								
AAA	6.22	1.52	3.46	5.20	6.00	7.43	9.40	103
Panel B: Dependent Variables								
CON	14.57	5.73	-8.73	11.42	15.51	18.49	25.12	103
DBAA	7.18	1.47	4.50	6.18	7.25	8.22	10.61	103
DGS1	3.22	2.35	0.10	0.47	3.43	5.32	8.27	103
DGS10	4.81	1.81	1.64	3.46	4.74	6.18	8.70	103
Panel C: Control Variables								
DGS3MO	2.95	2.32	0.01	0.16	3.14	5.11	8.01	103
DGS5	4.23	2.11	0.67	2.25	4.51	5.90	8.64	103
DGS6MO	3.09	2.36	0.05	0.32	3.26	5.17	8.17	103
EMP	3.18	5.03	-14.70	0.80	4.80	6.50	10.20	103
F12	2.51	1.74	-4.00	1.71	2.64	3.92	5.16	99
F15	2.54	1.72	-4.00	1.76	2.64	3.92	5.16	98
F18	2.57	1.71	-4.00	1.81	2.64	3.92	5.16	97
F21	2.59	1.71	-4.00	1.85	2.70	3.95	5.16	96
F24	2.58	1.72	-4.00	1.81	2.64	3.97	5.16	95
F27	2.58	1.73	-4.00	1.81	2.64	3.97	5.16	94
F3	2.45	1.76	-4.00	1.70	2.60	3.90	5.16	102
F30	2.57	1.74	-4.00	1.81	2.64	3.97	5.16	93
F33	2.55	1.74	-4.00	1.78	2.63	3.95	5.16	92
F36	2.54	1.75	-4.00	1.76	2.62	3.97	5.16	91
F6	2.46	1.77	-4.00	1.70	2.62	3.90	5.16	101
F9	2.48	1.77	-4.00	1.70	2.63	3.91	5.16	100
GDP	2.50	1.78	-3.92	1.71	2.61	3.98	5.30	103
housng	3.18	51.49	-151.80	-16.80	14.10	36.10	117.70	103
IND	6.06	12.06	-45.35	4.56	8.20	12.66	25.17	103
SRT03M	-0.08	0.42	-1.39	-0.16	-0.01	0.08	0.83	102
TRM0503	1.28	0.83	-0.64	0.61	1.38	1.96	2.88	103
TRM0506	1.14	0.81	-0.64	0.53	1.25	1.75	2.72	103

Table 1.1: Summary Statistics *(continued)*

Variable	Mean	Std.Dev	Min	Q1	Median	Q3	Max	N.Valid
TRM1003	1.86	1.13	-0.63	0.84	2.03	2.74	3.61	103
TRM1006	1.73	1.14	-0.63	0.73	1.88	2.61	3.53	103
TRM1012	1.59	1.06	-0.36	0.66	1.74	2.52	3.35	103
VIX	19.81	7.35	11.03	14.17	17.56	24.01	58.74	103
YIV	3.34	1.31	1.39	2.60	3.00	3.62	9.21	103

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.

1.4 Appendix D.

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

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

Table 1.2: Regression output

	H12	H18	H24	H30	H36
Panel A: YIV					
(Intercept)_estimate	5.02	4.71	4.33	4.08	3.92
(Intercept)_std.error	0.68	0.62	0.55	0.52	0.53
(Intercept)_p.value	0.00	0.00	0.00	0.00	0.00
YIV_estimate	-0.76	-0.66	-0.54	-0.47	-0.41
YIV_std.error	0.19	0.17	0.14	0.11	0.10
YIV_p.value	0.00	0.00	0.00	0.00	0.00
r.squared	0.39	0.35	0.28	0.23	0.20
adj.r.squared	0.39	0.34	0.27	0.22	0.19
RMSE	1.27	1.22	1.20	1.16	1.13

Note:

*** - p<0.01, ** - p<0.05, * - p<0.1. Reported standard error is adjusted for heteroskedasticity

1.5 Appendix E.

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

$$\sum_{j=1}^{j=H} log(1 + GDP_{i,t+j})/H = \alpha_H + \beta_H \sigma_{IV,t}^{INT} + Dummy + \varepsilon_{t+H} \quad (2)$$

Table 1.3: Regression with state-dependency

	H12	H18	H24	H30	H36
			Panel A		
(Intercept)_estimate	4.17	3.99	3.78	3.71	3.64
(Intercept)_std.error	0.44	0.45	0.45	0.46	0.47
(Intercept)_p.value	0.00	0.00	0.00	0.00	0.00
YIV_estimate	-0.41	-0.36	-0.32	-0.31	-0.29
YIV_std.error	0.11	0.10	0.09	0.08	0.07
YIV_p.value	0.00	0.00	0.00	0.00	0.00
dum_estimate	-2.72	-2.31	-1.75	-1.22	-0.93
dum_std.error	0.40	0.38	0.30	0.27	0.28
dum_p.value	0.00	0.00	0.00	0.00	0.00
r.squared	0.61	0.54	0.40	0.30	0.25
adj.r.squared	0.60	0.53	0.39	0.29	0.23
RMSE	1.02	1.03	1.09	1.12	1.11

Note:

*** - p<0.01, ** - p<0.05, * - p<0.1. Reported standard error is adjusted for heteroskedasticity

1.6 Appendix F.

	H3	H6	H9	H12	H15	H18	H21	H24	H27	H30	H33	H36
Out-of-sample RMSFE	1.68	1.74	1.85	1.98	2.09	2.12	2.07	2.01	1.98	1.99	1.94	1.93
Recessionary	3.29	3.42	3.74	3.79	3.73	3.17	2.30	1.84	2.15	2.31	1.63	1.44
Expansionary	1.28	1.33	1.37	1.55	1.73	1.92	2.04	2.03	1.96	1.94	1.98	1.99
Naive	0.93	1.50	1.95	2.21	2.28	2.29	2.28	2.20	2.11	1.96	1.81	1.74
TRM	1.79	1.69	1.64	1.76	1.73	1.60	1.56	1.48	1.56	1.62	1.77	1.95
CRS	1.47	1.92	2.49	2.82	2.61	2.27	1.93	1.81	1.79	1.77	1.74	1.69