Appendix A: FSI indicators

Figure A.1: Czech Republic – FSI indicators

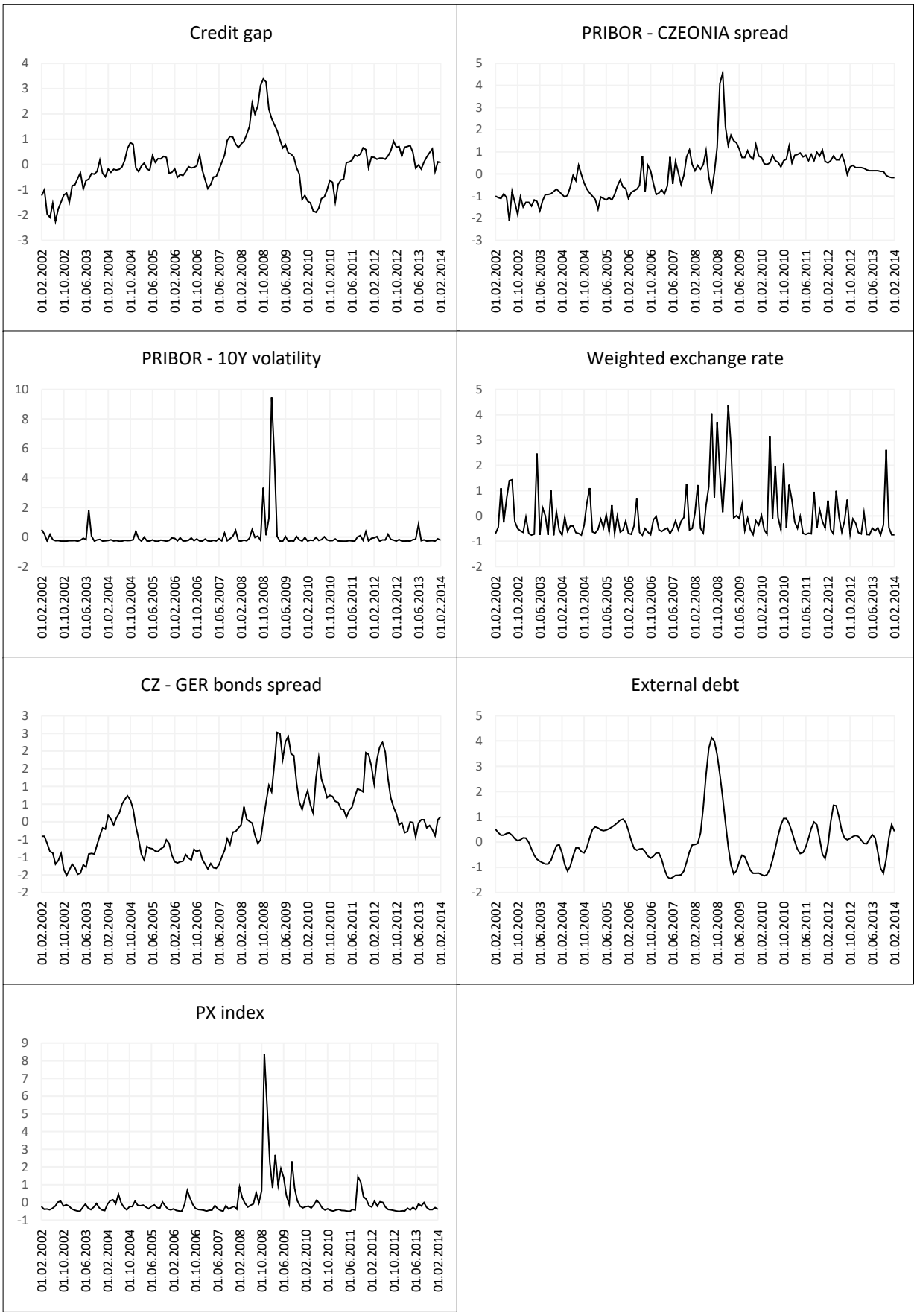
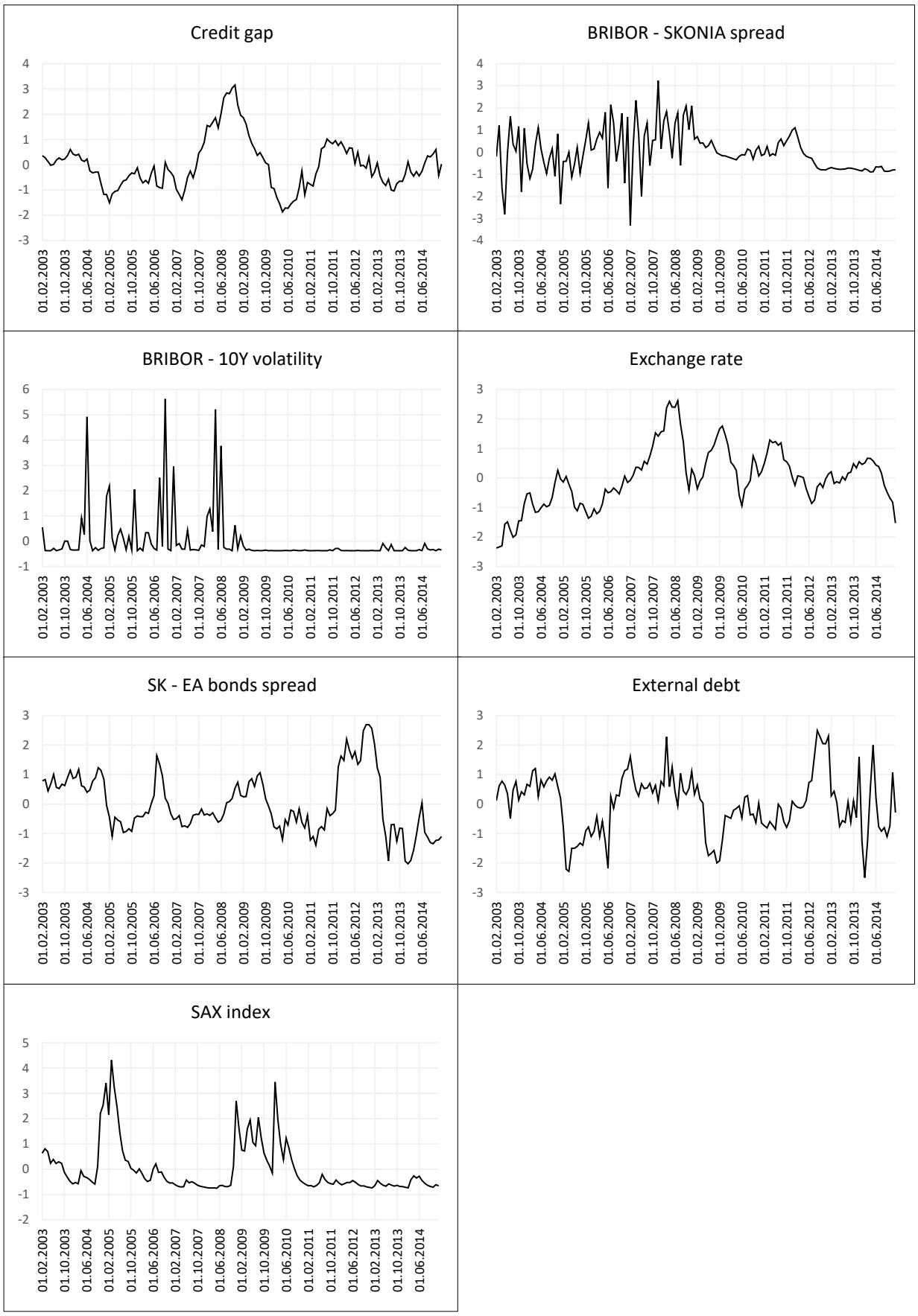


Figure A.2: Slovak Republic – FSI indicators



Appendix B: Conditional volatility tests
Case of the Czech Republic

Table B.1: Augumented Dickey-Fuller test for unit roots

AUGMENTED DICKEY-FULLER TEST FOR LD_AVERAGECLOSINGMONTHLYPXPRIC
INCLUDING 9 LAGS OF (1-L)LD_AVERAGECLOSINGMONTHLYPXPRIC
(MAX WAS 15, CRITERION MODIFIED AIC)
SAMPLE SIZE 238
UNIT-ROOT NULL HYPOTHESIS: A = 1

TEST WITH CONSTANT
MODEL: (1-L)Y = B0 + (A-1)*Y(-1) + ... + E
1ST-ORDER AUTOCORRELATION COEFF. FOR E: -0,001
LAGGED DIFFERENCES: F(9, 227) = 1,782 [0,0726]
ESTIMATED VALUE OF (A - 1): -0,584855
TEST STATISTIC: TAU_C(1) = -4,41854
ASYMPTOTIC P-VALUE 0,0001

WITH CONSTANT AND TREND
MODEL: (1-L)Y = B0 + B1*T + (A-1)*Y(-1) + ... + E
1ST-ORDER AUTOCORRELATION COEFF. FOR E: -0,001
LAGGED DIFFERENCES: F(9, 226) = 1,770 [0,0749]
ESTIMATED VALUE OF (A - 1): -0,58631
TEST STATISTIC: TAU_CT(1) = -4,41152
ASYMPTOTIC P-VALUE 0,002043

Figure B.1: ACF and PACF function

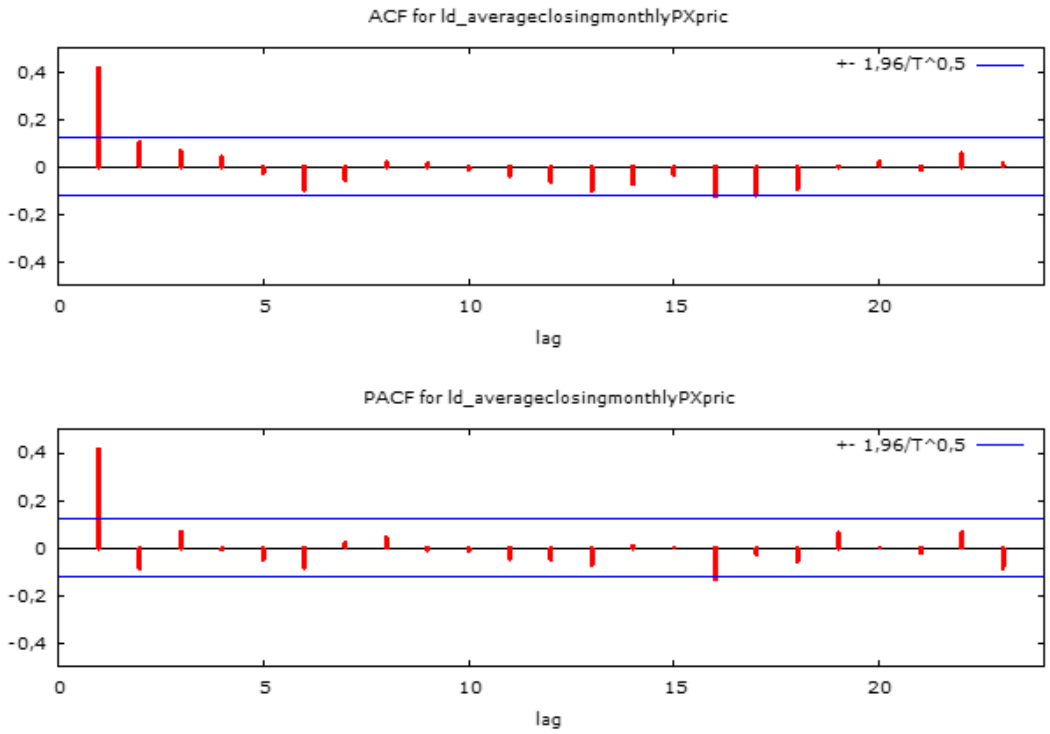


Table B.2: ARCH effect test

```
TEST FOR ARCH OF ORDER 2
        COEFFICIENT   STD. ERROR    T-RATIO    P-VALUE
 ------------------------------------------------------------
 ALPHA(0)  0,00262516   0,000670999   3,912   0,0001   ***
 ALPHA(1)  0,0566941    0,0375274     1,511   0,1322
 ALPHA(2)  0,287102     0,0373862     7,679   3,90E-013 ***

 NULL HYPOTHESIS: NO ARCH EFFECT IS PRESENT
 TEST STATISTIC: LM = 53,3568
 WITH P-VALUE = P(CHI-SQUARE(2) > 53,3568) = 2,59249E-012
```

Table B.3: GARCH tests

MODEL	ARCH (1)		ARCH (2)		GARCH (1,1)		GARCH (2,1)		GARCH (2,2)	
	COEFFICIENT	P-VALUE	COEFFICIENT	P-VALUE	COEFFICIENT	P-VALUE	COEFFICIENT	P-VALUE	COEFFICIENT	P-VALUE
INTERCEPT	0,0028272	7,29E-15	0,0023558	2,69E-13	0,0008565	0,0068	0,0008845	0,0035	0,0008398	0,4095
ALPHA (1)	0,558083	5,21E-05	0,471648	3,85E-05	0,388125	0,0002	0,426504	0,0001	0,315059	0,0011
ALPHA (2)			0,104944	0,0266					2,58E-12	1
BETA (1)					0,463505	3,33E-05	0,210491	0,0763	0,323413	0,7348
BETA (2)							0,205407	0,069	0,175594	0,6821
LOG LIKELIHOOD	320,2207		329,5829		334,3325		335,7923		335,054	

Case of the Slovak Republic

Table B.4: Augumented Dickey-Fuller test for unit roots

```
AUGMENTED DICKEY-FULLER TEST FOR D_L_PRICE
INCLUDING 3 LAGS OF (1-L)D_L_PRICE
(MAX WAS 14, CRITERION AIC)
SAMPLE SIZE 185
UNIT-ROOT NULL HYPOTHESIS: A = 1

  TEST WITH CONSTANT
  MODEL: (1-L)Y = B0 + (A-1)*Y(-1) + ... + E
  ESTIMATED VALUE OF (A - 1): -0,403385
  TEST STATISTIC: TAU_C(1) = -4,15185
  1ST-ORDER AUTOCORRELATION COEFF. FOR E: 0,013
  LAGGED DIFFERENCES: F(3, 180) = 6,354 [0,0004]
ASYMPTOTIC P-VALUE 0,0007927

  WITH CONSTANT AND TREND
  MODEL: (1-L)Y = B0 + B1*T + (A-1)*Y(-1) + ... + E
  ESTIMATED VALUE OF (A - 1): -0,437857
  TEST STATISTIC: TAU_CT(1) = -4,32707
  1ST-ORDER AUTOCORRELATION COEFF. FOR E: 0,013
  LAGGED DIFFERENCES: F(3, 179) = 5,778 [0,0009]
ASYMPTOTIC P-VALUE 0,002794
```

Figure B.2: ACF and PACF function

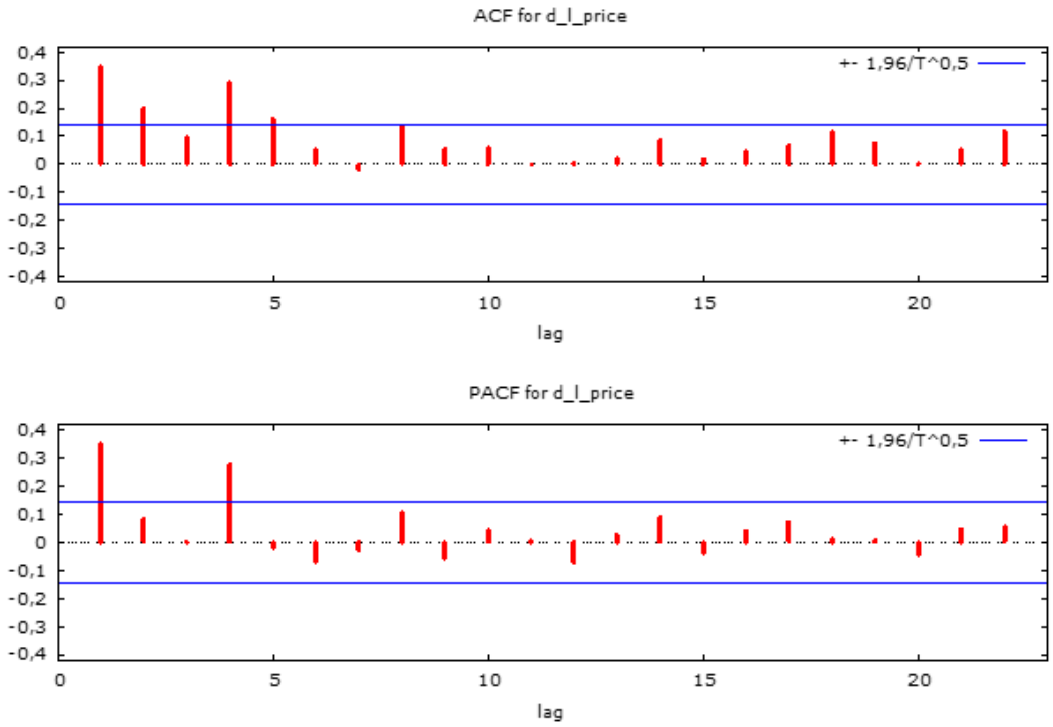


Table B.5: ARCH effect test

TEST FOR ARCH OF ORDER 3

	COEFFICIENT	STD. ERROR	T-RATIO	P-VALUE	
ALPHA(0)	0,00112311	0,000313355	3,584	0,0004	***
ALPHA(1)	0,0841147	0,0713217	1,179	0,2398	
ALPHA(2)	0,0310820	0,0714535	0,4350	0,6641	
ALPHA(3)	0,200656	0,0713079	2,814	0,0054	***

NULL HYPOTHESIS: NO ARCH EFFECT IS PRESENT
TEST STATISTIC: LM = 9,99668
WITH P-VALUE = P(CHI-SQUARE(3) > 9,99668) = 0,0185944

Table B.6: GARCH tests

MODEL	ARCH (1)		ARCH (2)		GARCH (1,1)		GARCH (2,1)		GARCH (2,2)	
	COEFFICIENT	P-VALUE	COEFFICIENT	P-VALUE	COEFFICIENT	P-VALUE	COEFFICIENT	P-VALUE	COEFFICIENT	P-VALUE
INTERCEPT	0,00119814	1,59E-09	0,00103911	2,50E-06	0,00015	0,0350	0,000156703	0,0463	0,000170	0,3464
ALPHA (1)	0,491839	0,0070	0,429543	0,0114	0,31058	0,0061	0,387943	0,0021	0,280772	0,0096
ALPHA (2)			0,143894	0,2157					1,056E-012	1,0000
BETA (1)					0,64667	5,93E-012	0,221108	0,1296	0,320820	0,4673
BETA (2)							0,352665	0,0116	0,319022	0,1857
LOG LIKELIHOOD	328,8135		330,1886		339,003		340,7257		340,1302	

Appendix C: Vector autoregression tests
Case of the Czech Republic

Table C.1: The final VAR model

VECTOR AUTOREGRESSION ESTIMATES DATE: 08/07/16 TIME: 20:55 SAMPLE (ADJUSTED): 2004M04 2014M03 INCLUDED OBSERVATIONS: 120 AFTER ADJUSTMENTS STANDARD ERRORS IN ( ) & T-STATISTICS IN [ ]				
	UNEM	INF	IR	FSI_PCA
UNEM(-1)	0.843514	-0.052923	-0.040827	-0.161478
	(0.08807)	(0.06023)	(0.07431)	(0.45551)
	[9.57821]	[-0.87866]	[-0.54943]	[-0.35450]
UNEM(-2)	0.179730	0.033607	0.013135	0.040086
	(0.09117)	(0.06235)	(0.07693)	(0.47156)
	[1.97141]	[0.53898]	[0.17075]	[0.08501]
INF(-1)	-0.130401	1.816743	0.042635	0.908381
	(0.06450)	(0.04412)	(0.05443)	(0.33364)
	[-2.02162]	[41.1809]	[0.78336]	[2.72268]
INF(-2)	0.134065	-0.860809	-0.046738	-0.751865
	(0.06297)	(0.04307)	(0.05313)	(0.32570)
	[2.12907]	[-19.9879]	[-0.87967]	[-2.30848]
IR(-1)	-0.003697	0.023680	1.301000	0.767344
	(0.10334)	(0.07068)	(0.08720)	(0.53453)
	[-0.03578]	[0.33503]	[14.9200]	[1.43554]
IR(-2)	0.005842	-0.001755	-0.310108	-0.855131
	(0.10467)	(0.07158)	(0.08831)	(0.54137)
	[0.05582]	[-0.02451]	[-3.51141]	[-1.57956]
FSI_PCA(-1)	0.013287	-0.007845	-0.005735	0.713790
	(0.01812)	(0.01239)	(0.01529)	(0.09372)
	[0.73332]	[-0.63305]	[-0.37514]	[7.61655]
FSI_PCA(-2)	0.058368	0.009351	-0.030463	0.134311
	(0.01862)	(0.01273)	(0.01571)	(0.09628)
	[3.13554]	[0.73445]	[-1.93950]	[1.39495]
C	-0.578538	4.603001	0.627839	-14.98812
	(1.70833)	(1.16838)	(1.44144)	(8.83608)
	[-0.33866]	[3.93963]	[0.43556]	[-1.69624]
R-SQUARED	0.987394	0.995850	0.990058	0.855437
ADJ. R-SQUARED	0.986486	0.995551	0.989342	0.845018
SUM SQ. RESIDS	1.883799	0.881180	1.341175	50.39799
S.E. EQUATION	0.130273	0.089099	0.109921	0.673822
F-STATISTIC	1086.813	3329.603	1381.728	82.10387
LOG LIKELIHOOD	78.97944	124.5665	99.36410	-118.2202
AKAIKE AIC	-1.166324	-1.926108	-1.506068	2.120337

Schwarz SC	-0.957262	-1.717046	-1.297006	2.329398
Mean dependent	6.801667	102.5275	1.967250	0.304203
S.D. dependent	1.120623	1.335801	1.064716	1.711609
Determinant resid covariance (dof adj.)		6.99E-07		
Determinant resid covariance		5.12E-07		
Log likelihood		188.0532		
Akaike information criterion		-2.534221		
Schwarz criterion		-1.697973		

Figure C.1: Stationarity test

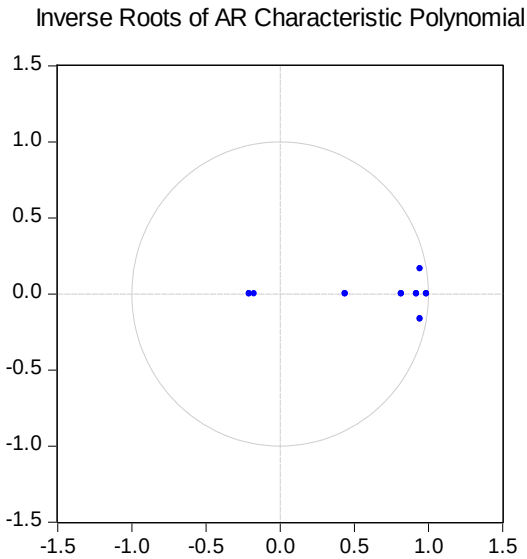


Table C.2: Lag length criteria test

VAR Lag Order Selection Criteria
Endogenous variables: UNEM INF IR FSI_PCA
Exogenous variables: C
Date: 07/31/16 Time: 21:34
Sample: 2004M02 2014M03
Included observations: 119

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-682.0944	NA	1.196610	11.53100	11.62441	11.56893
1	66.07618	1433.470	5.42e-06	-0.774390	-0.307310	-0.584723
2	186.3645	222.3817	9.40e-07	-2.527134	-1.686391*	-2.185734
3	218.0115	56.37962*	7.24e-07*	-2.790109*	-1.575703	-2.296977*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

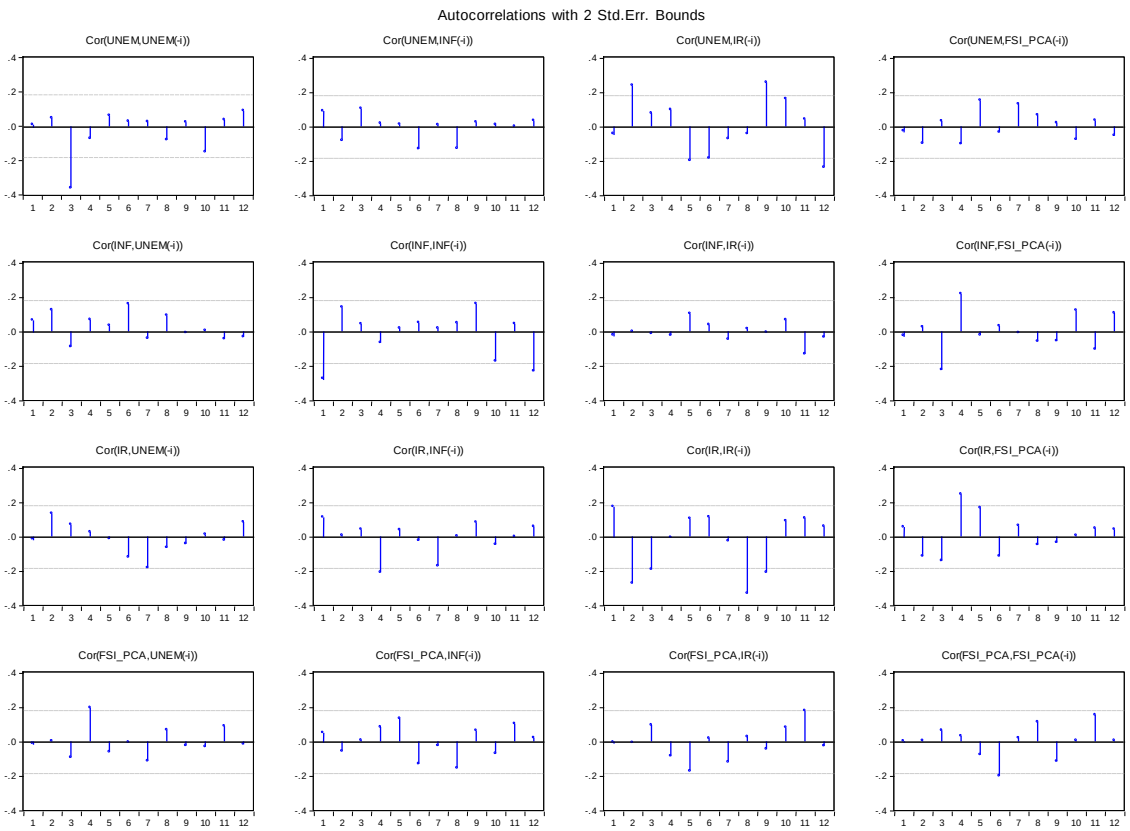
Table C.3: Lag exclusion test

VAR Lag Exclusion Wald Tests
Date: 07/31/16 Time: 21:35
Sample: 2004M02 2014M03
Included observations: 120

Chi-squared test statistics for lag exclusion:
Numbers in [ ] are p-values

	UNEM	INF	IR	FSI_PCA	Joint
Lag 1	110.4352 [0.000000]	1862.483 [0.000000]	241.8960 [0.000000]	83.96362 [0.000000]	2401.624 [0.000000]
Lag 2	20.52994 [0.000392]	451.5953 [0.000000]	28.49751 [9.89e-06]	9.636616 [0.047015]	539.4178 [0.000000]
df	4	4	4	4	16

Figure C.2: Correlogram



Case of the Slovak Republic

Table C.4: The final VAR model

VECTOR AUTOREGRESSION ESTIMATES
DATE: 08/07/16 TIME: 21:00
SAMPLE (ADJUSTED): 2004M04 2014M03
INCLUDED OBSERVATIONS: 120 AFTER ADJUSTMENTS
STANDARD ERRORS IN ( ) & T-STATISTICS IN [ ]

	UNEM	INF	IR	FSI_PCA
UNEM(-1)	1.410453	-0.008618	-0.209861	-0.120401
	(0.08950)	(0.01761)	(0.12362)	(0.26114)
	[15.7598]	[-0.48926]	[-1.69764]	[-0.46106]
UNEM(-2)	-0.450450	0.013599	0.144034	0.054497
	(0.08412)	(0.01656)	(0.11619)	(0.24546)
	[-5.35475]	[0.82141]	[1.23959]	[0.22202]
INF(-1)	-0.137144	1.740806	0.775971	1.237958
	(0.26068)	(0.05130)	(0.36007)	(0.76064)
	[-0.52610]	[33.9315]	[2.15505]	[1.62753]
INF(-2)	0.162687	-0.776630	-0.802113	-1.346113
	(0.24682)	(0.04858)	(0.34093)	(0.72021)
	[0.65912]	[-15.9877]	[-2.35272]	[-1.86907]
IR(-1)	0.003821	0.025596	0.521921	0.446626
	(0.06565)	(0.01292)	(0.09068)	(0.19157)
	[0.05821]	[1.98103]	[5.75543]	[2.33145]
IR(-2)	-0.095705	-0.001594	0.364507	-0.420957
	(0.06331)	(0.01246)	(0.08745)	(0.18474)
	[-1.51159]	[-0.12794]	[4.16799]	[-2.27860]
FSI_PCA(-1)	0.048945	-0.002486	-0.043055	0.520372
	(0.03095)	(0.00609)	(0.04275)	(0.09030)
	[1.58161]	[-0.40812]	[-1.00724]	[5.76284]
FSI_PCA(-2)	0.000486	0.017194	-0.049198	0.309257
	(0.03155)	(0.00621)	(0.04358)	(0.09207)
	[0.01540]	[2.76901]	[-1.12886]	[3.35911]
C	-1.793493	3.503992	3.866900	11.76769
	(2.96658)	(0.58384)	(4.09764)	(8.65614)
	[-0.60457]	[6.00163]	[0.94369]	[1.35946]
R-SQUARED	0.990556	0.998255	0.948458	0.813343
ADJ. R-SQUARED	0.989876	0.998129	0.944743	0.799890
SUM SQ. RESIDS	5.498253	0.212962	10.49012	46.81246
S.E. EQUATION	0.222562	0.043802	0.307418	0.649410
F-STATISTIC	1455.353	7936.785	255.3223	60.45919
LOG LIKELIHOOD	14.71106	209.7755	-24.04913	-113.7921
AKAIKE AIC	-0.095184	-3.346258	0.550819	2.046535
SCHWARZ SC	0.113878	-3.137197	0.759881	2.255597

MEAN DEPENDENT	11.63997	102.3315	3.973133	0.029635
S.D. DEPENDENT	2.211907	1.012657	1.307782	1.451727

DETERMINANT RESID COVARIANCE (DOF ADJ.)	3.19E-06
DETERMINANT RESID COVARIANCE	2.33E-06
LOG LIKELIHOOD	96.98838
AKAIKE INFORMATION CRITERION	-1.016473
SCHWARZ CRITERION	-0.180225

Figure C.3: Stationarity test

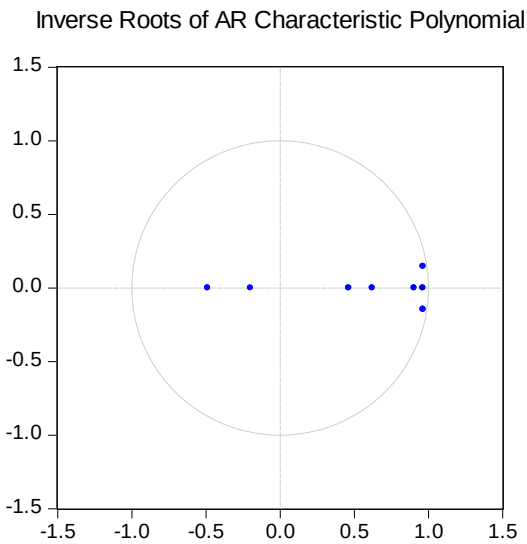


Table C.5: Lag length criteria test

VAR LAG ORDER SELECTION CRITERIA
ENDOGENOUS VARIABLES: UNEM INF IR FSI_PCA
EXOGENOUS VARIABLES: C
DATE: 07/31/16 TIME: 19:35
SAMPLE: 2004M02 2014M03
INCLUDED OBSERVATIONS: 119

LAG	LOGL	LR	FPE	AIC	SC	HQ
0	-754.1819	NA	4.019054	12.74255	12.83597	12.78049
1	-14.45185	1417.298	2.10E-05	0.579023	1.046102	0.768689
2	95.25283	202.8154	4.35E-06	-0.995846	-0.155103*	-0.654447*
3	112.4159	30.57622*	4.27E-06*	-1.015393*	0.199014	-0.522261

* INDICATES LAG ORDER SELECTED BY THE CRITERION
LR: SEQUENTIAL MODIFIED LR TEST STATISTIC (EACH TEST AT 5% LEVEL)
FPE: FINAL PREDICTION ERROR
AIC: AKAIKE INFORMATION CRITERION
SC: SCHWARZ INFORMATION CRITERION
HQ: HANNAN-QUINN INFORMATION CRITERION

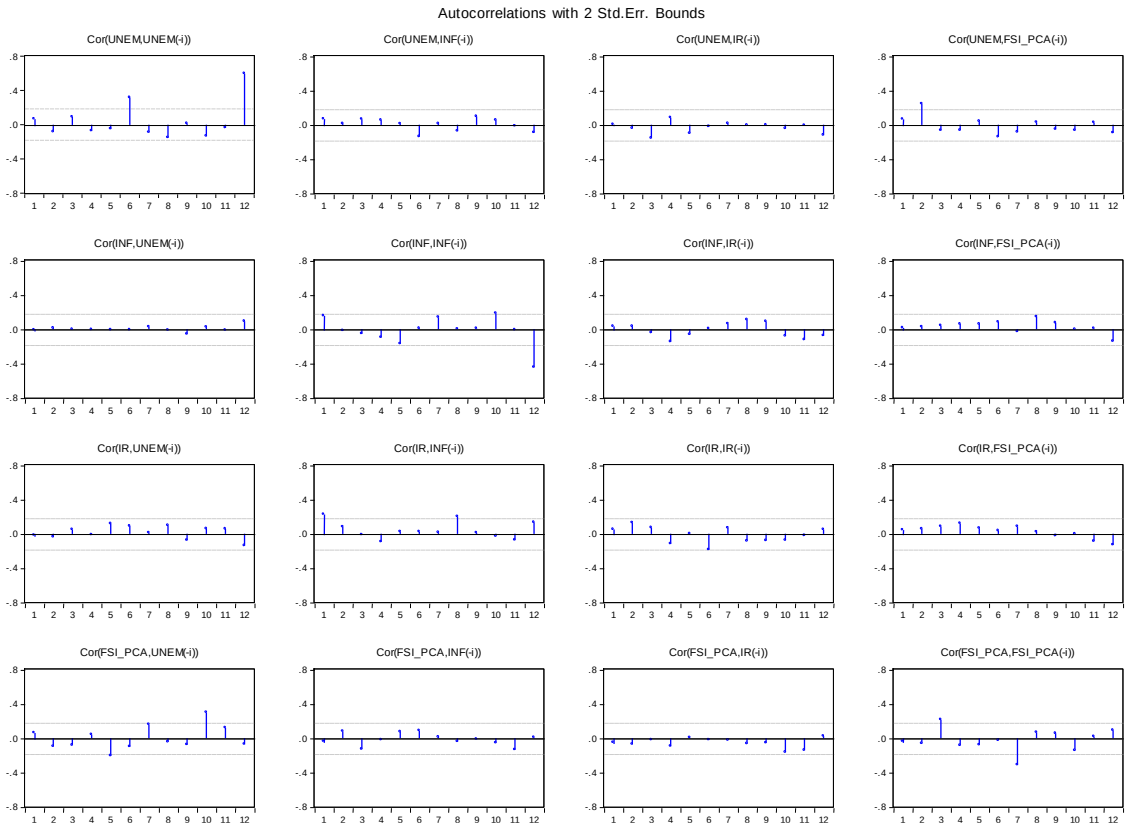
Table C.6: Lag exclussion test

VAR LAG EXCLUSION WALD TESTS
DATE: 07/31/16 TIME: 19:33
SAMPLE: 2004M02 2014M03
INCLUDED OBSERVATIONS: 120

CHI-SQUARED TEST STATISTICS FOR LAG EXCLUSION:
NUMBERS IN [ ] ARE P-VALUES

	UNEM	INF	IR	FSI_PCA	JOINT
LAG 1	284.8923 [0.000000]	1303.253 [0.000000]	59.58257 [3.55E-12]	53.42928 [6.93E-11]	1679.602 [0.000000]
LAG 2	32.96836 [1.21E-06]	302.2596 [0.000000]	27.08403 [1.91E-05]	25.29500 [4.39E-05]	378.2332 [0.000000]
DF	4	4	4	4	16

Figure C.4: Correlogram



Appendix D: VAR model variables

Figure D.1: Czech Republic – VAR model variables

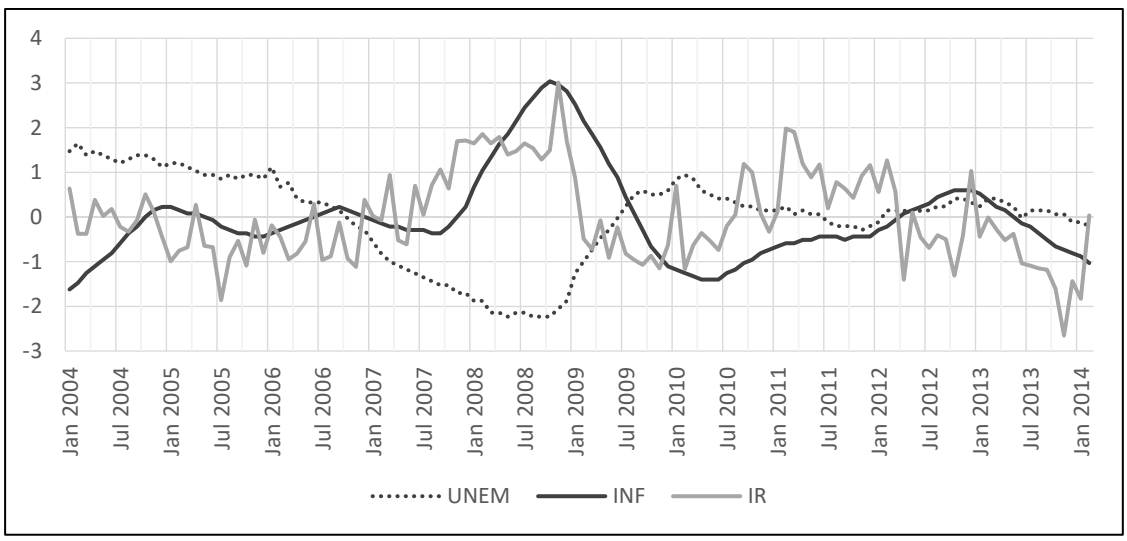
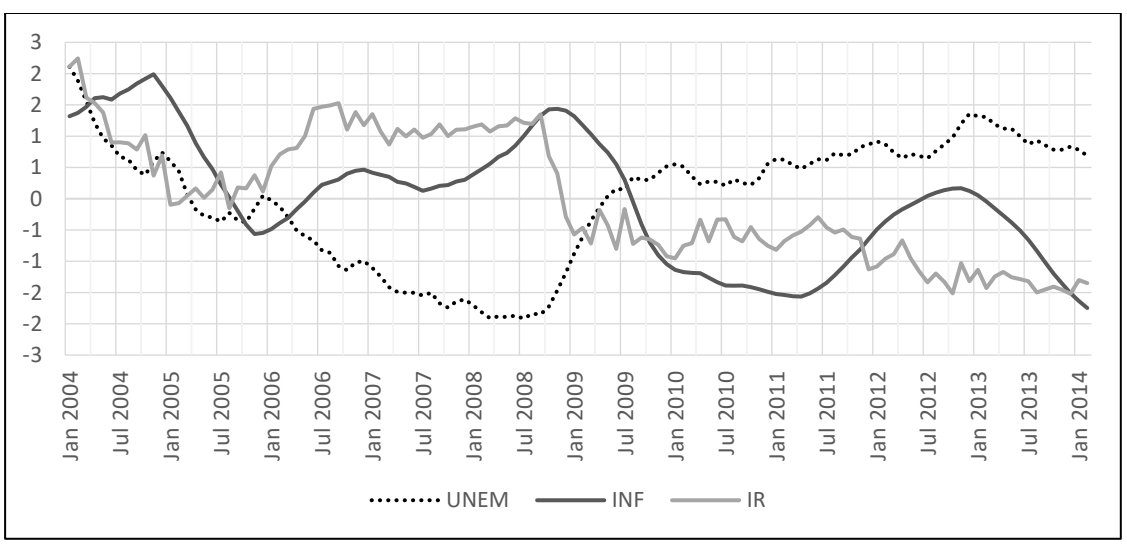


Figure D.2: Slovak Republic – VAR model variables



Appendix E: Impulse responses
Case of the Czech Republic

Figure E.1: Final model based on equal variance

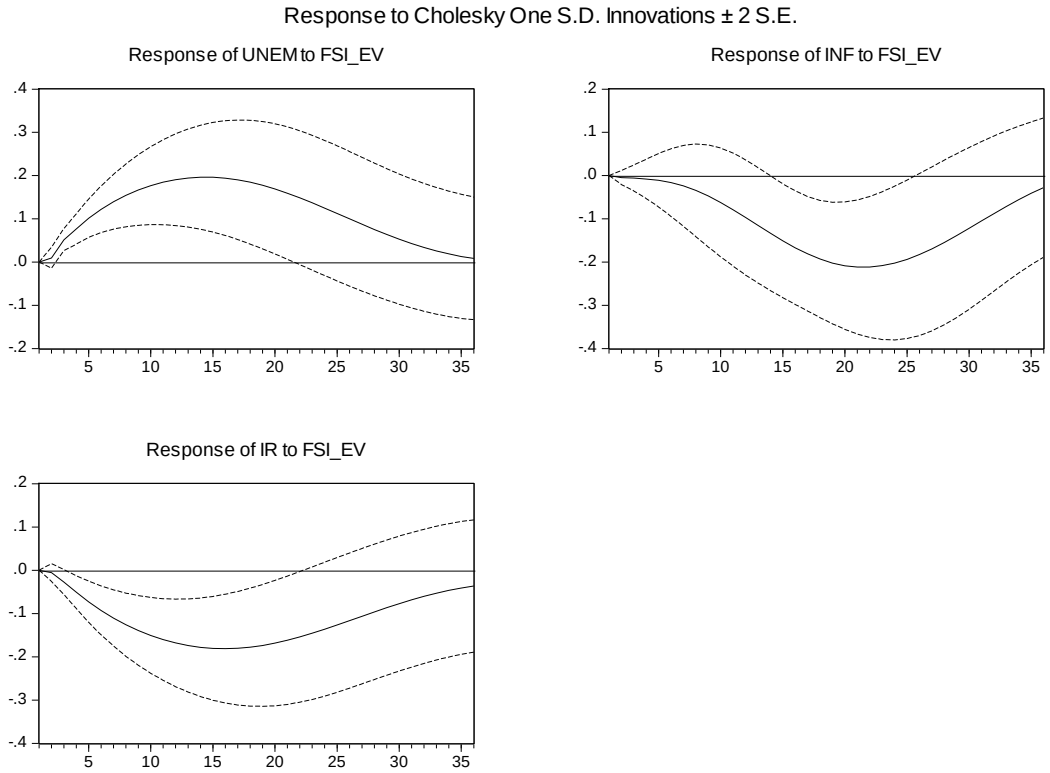


Figure E.2: Final model based on cumulative distribution function

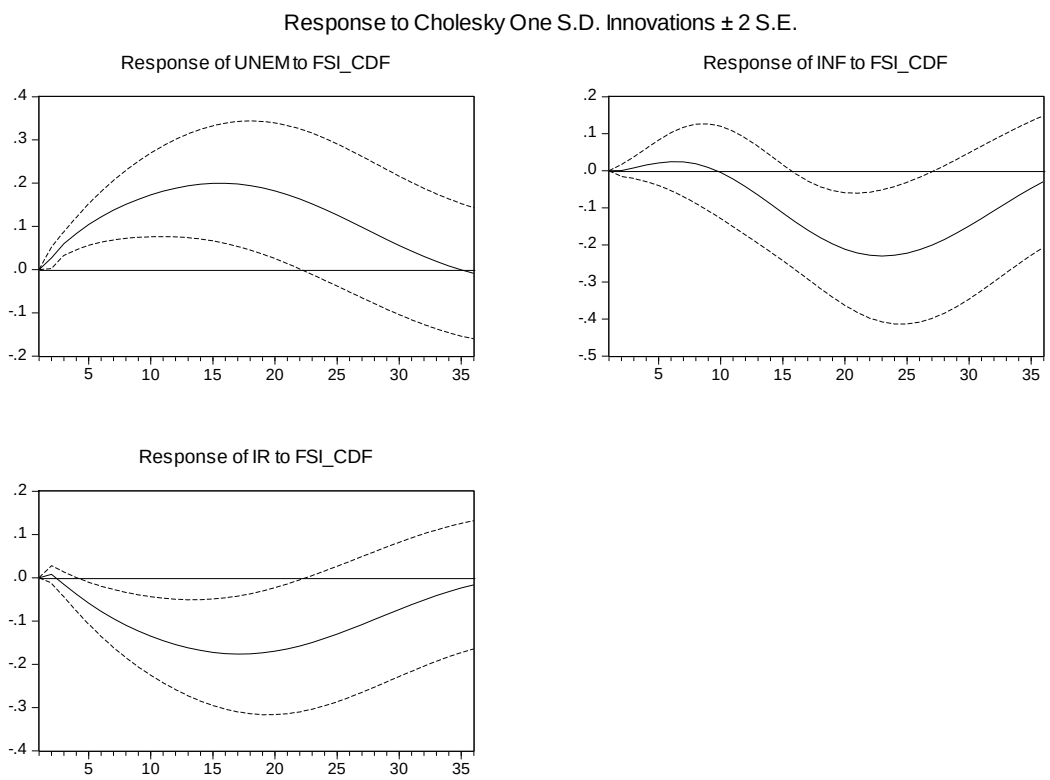


Figure E.3: Final model containing GDP growth

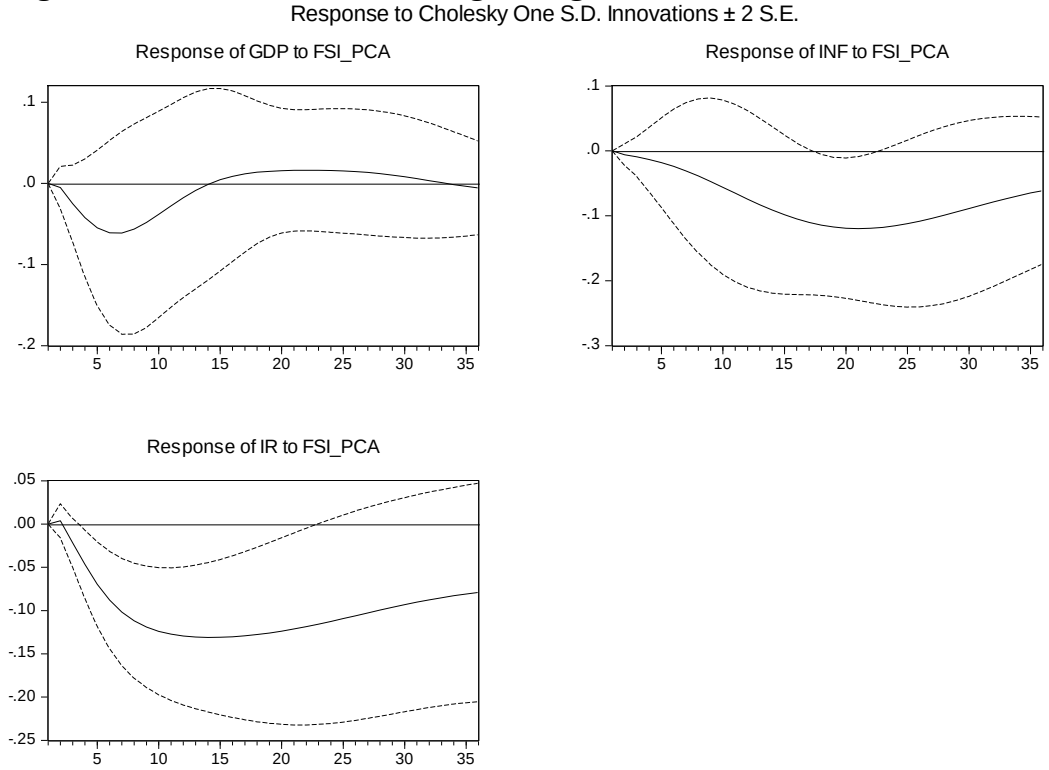


Figure E.4: Bivariate model

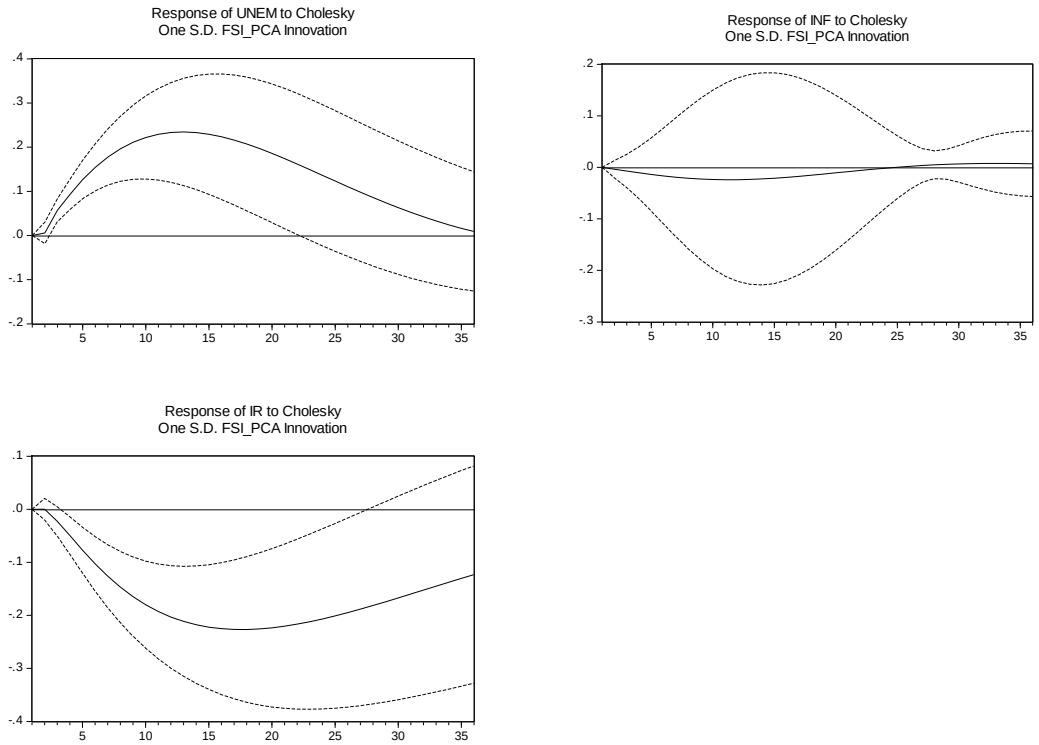
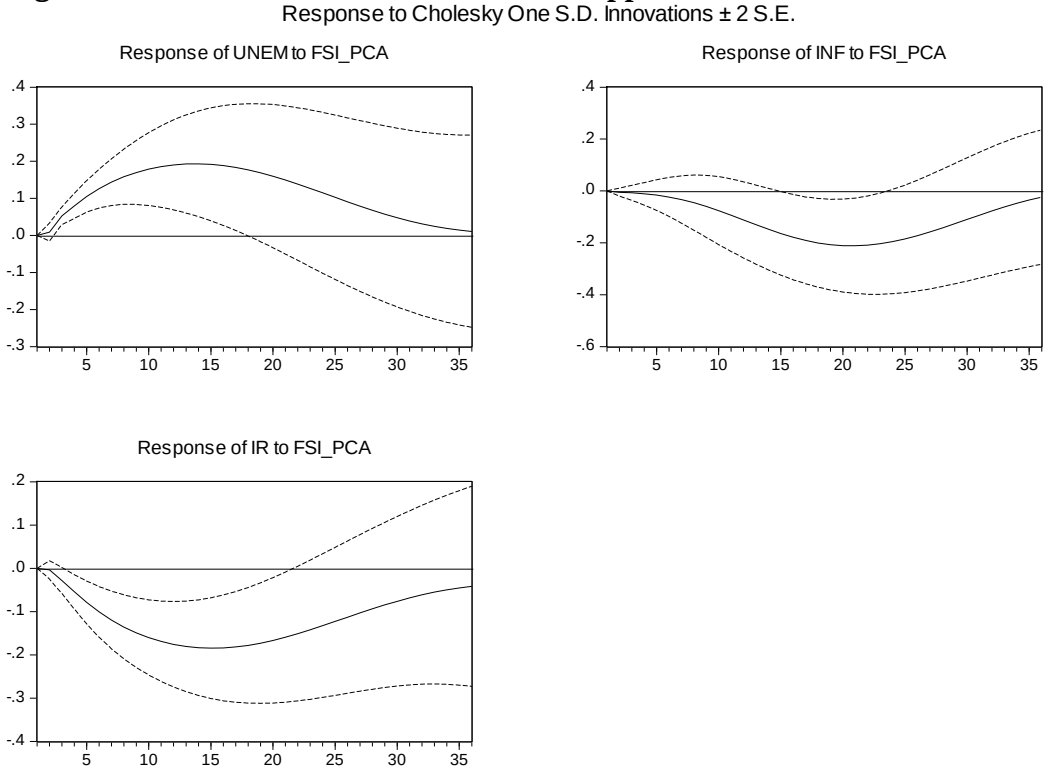


Figure E.5: Final model with Monte Carlo approach



Case of the Slovak Republic

Figure E.6: Final model based on equal variance

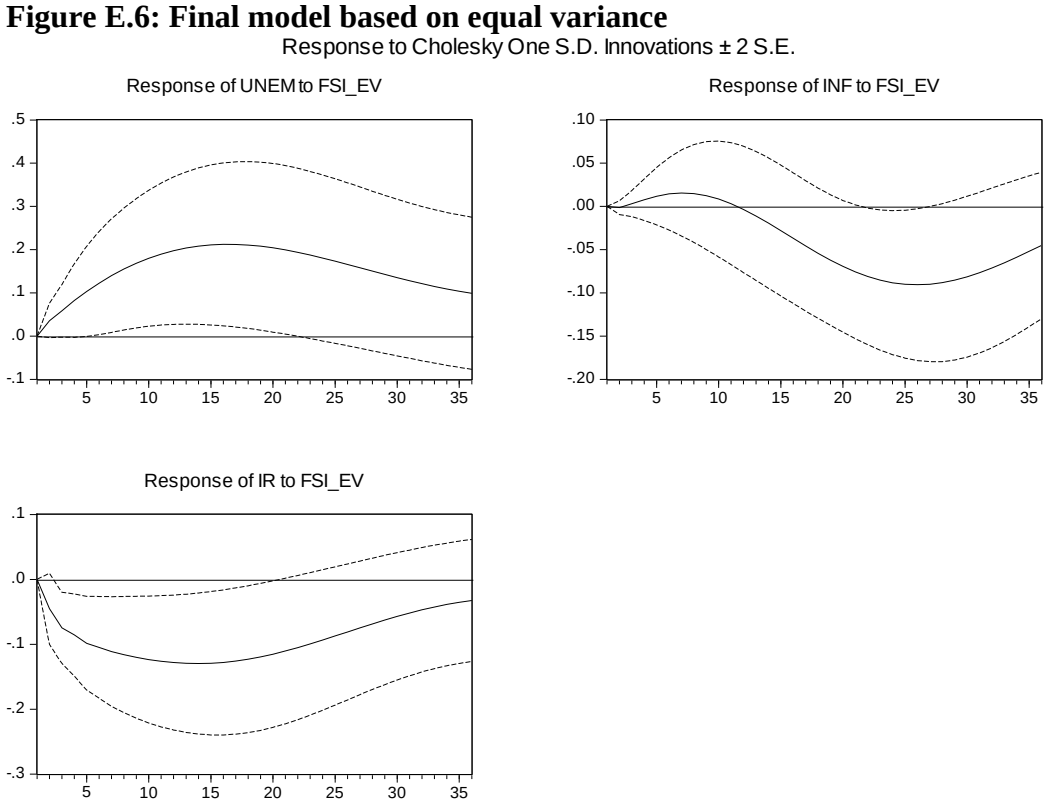


Figure E.7: Final model based on cumulative distribution function

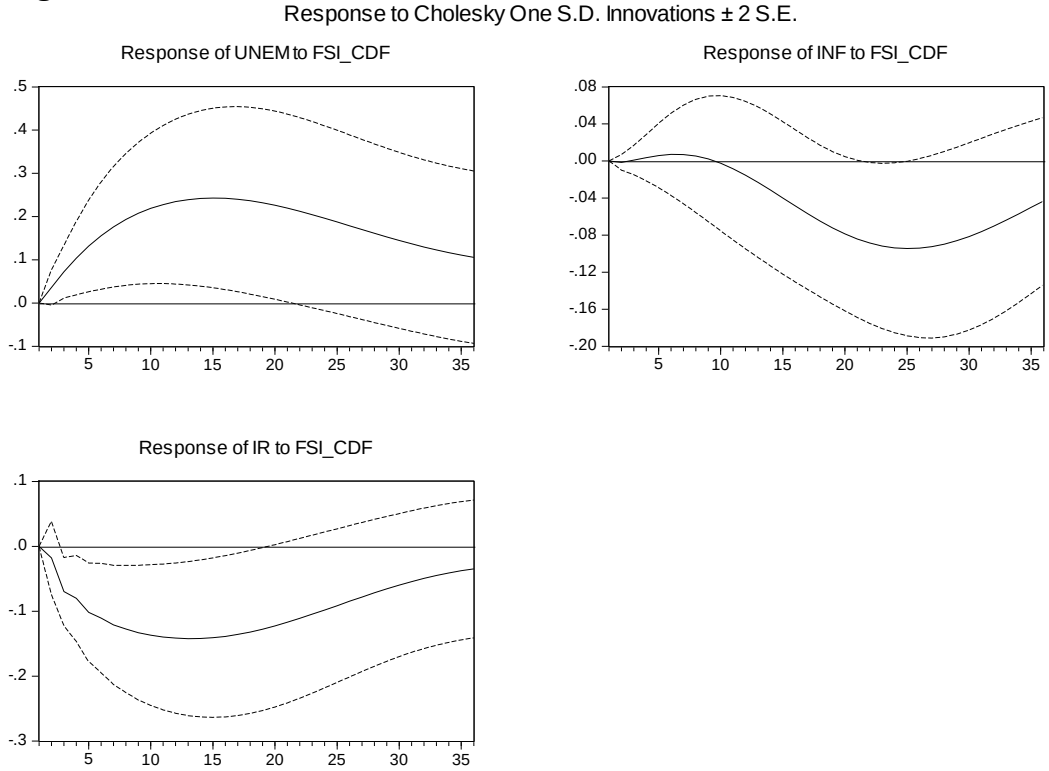


Figure E.8: Final model containing GDP growth

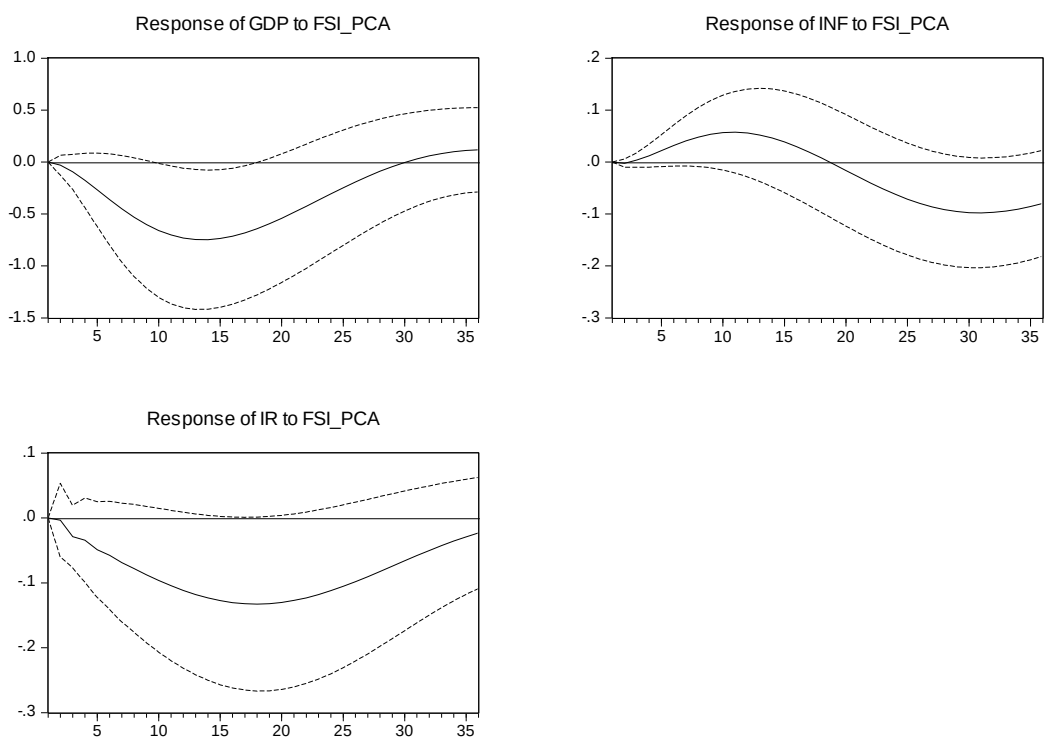


Figure E.9: Bivariate model

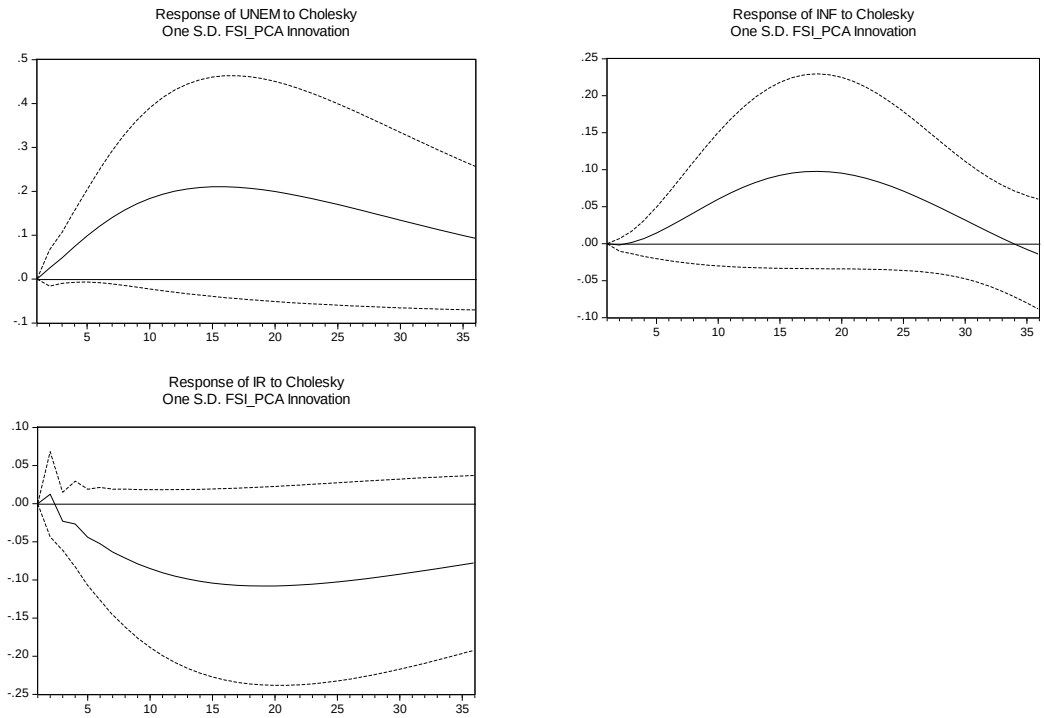


Figure E.10: Final model with Monte Carlo approach

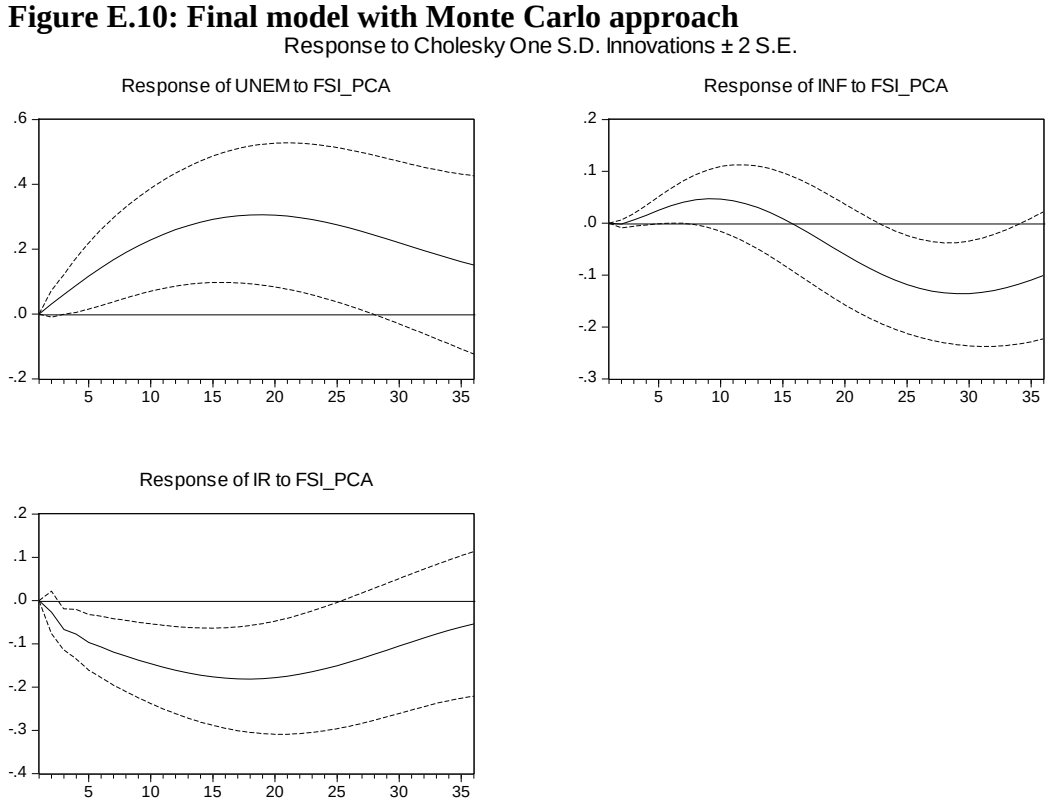


Figure E.11: Final model including dummy for structural break