



Federal Reserve
Bank of Dallas

Supplementary Appendix: Monetary Policy Expectations and Economic Fluctuations at the Zero Lower Bound

Rachel Doehr and Enrique Martínez-García

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Supplementary Appendix: Monetary Policy Expectations and Economic Fluctuations at the Zero Lower Bound*

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Econometric Models

Model	Estimation Method	Variables (If Cholesky, in Recursive Order)	Expectations Data Source
1	Cholesky VAR	$i_{e,t+4}, \pi_t, UR_t, FFR_t$	SPF
2	Cholesky VAR	$i_{e,t+4}, \pi_t, UR_t, FFR_t$	BCEI
3	Cholesky VAR	$i_{e,t+4}, \pi_t, UR_t, FFR_t$	Livingston
4	Cholesky VAR	$i_{e,t+4}, \pi_t, UR_t, FFR_t$	WSJ
5	Cholesky VAR	$i_{e,t+3}, \pi_t, UR_t, FFR_t$	SPF
6	Cholesky VAR	$i_{e,t+2}, \pi_t, UR_t, FFR_t$	SPF
7	Cholesky VAR	$i_{e,t+1}, \pi_t, UR_t, FFR_t$	SPF
8	Cholesky VAR	$i_{e,t+4}, \pi_t, IP_t, FFR_t$	SPF
9	FAVAR Cholesky VAR	<i>See paper</i>	SPF
10	Panel Cholesky VAR	$i_{e,t+4}^j, \pi_t, UR_t, FFR_t$	SPF
11	Cholesky TVP - VAR	$i_{e,t+4}, \pi_t, UR_t, FFR_t$	SPF
12	Sign / Zero Restriction VAR	$i_{e,t+4}, \pi_t, UR_t, FFR_t$	SPF
13	Sign / Zero Restriction VAR	$i_{e,t+4}, \pi_t, UR_t, NBR_t$	SPF
14	Sign / Zero Restriction VAR	$i_{e,t+4}, \pi_t, UR_t, Slope_t$	SPF
15	Sign / Zero Restriction VAR	$i_{e,t+4}, \pi_t, UR_t, SR_t$	SPF

Note: SPF stands for Survey of Professional Forecasters, BCEI stands for Blue Chip Economic Indicators, Livingston refers to the Livingston survey, and WSJ indicates forecasts from the Wall Street Journal.

Model 1
Lag Selection Criteria

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-395.03	.	.	.	0.037	8.061	8.104	8.166
1	10.19	810.42	16	0.000	0.000	0.198	0.410	0.723
2	88.12	155.87*	16	0.000	0.0000041*	-1.05291*	-.671091*	-0.109226*
3	94.93	13.63	16	0.627	0.000	-0.867	-0.316	0.496
4	103.38	16.90	16	0.392	0.000	-0.715	0.006	1.068

Note: Computed over the full sample from 1990:Q1 to 2015:Q2.

Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

VAR Output

	Coefficient	Std. Error	z	P > z	[95% Confidence Interval]	
<i>Interest Rate Expectations</i>						
Interest Rate Expectations						
L1.	0.972	0.220	4.41	0.000	0.540	1.404
L2.	-0.285	0.186	-1.53	0.126	-0.650	0.080
Core Inflation						
L1.	0.262	0.450	0.58	0.561	-0.621	1.144
L2.	0.495	0.416	1.19	0.234	-0.320	1.311
Unemployment						
L1.	-0.478	0.395	-1.21	0.227	-1.253	0.297
L2.	0.401	0.365	1.10	0.272	-0.314	1.117
Federal Funds Rate						
L1.	0.282	0.303	0.93	0.353	-0.312	0.875
L2.	-0.191	0.222	-0.86	0.390	-0.627	0.245
_Constant	0.878	0.460	1.91	0.057	-0.024	1.780
<i>Core Inflation</i>						
Interest Rate Expectations						
L1.	0.054	0.058	0.94	0.349	-0.059	0.168
L2.	-0.074	0.049	-1.51	0.131	-0.170	0.022
Core Inflation						
L1.	0.213	0.119	1.79	0.073	-0.020	0.445
L2.	0.358	0.110	3.26	0.001	0.143	0.573
Unemployment						
L1.	0.032	0.104	0.31	0.760	-0.172	0.236
L2.	0.008	0.096	0.09	0.930	-0.180	0.197
Federal Funds Rate						
L1.	0.034	0.080	0.43	0.666	-0.122	0.191
L2.	0.010	0.059	0.16	0.869	-0.105	0.124
_Constant	-0.050	0.121	-0.41	0.682	-0.287	0.188
<i>Unemployment</i>						
Interest Rate Expectations						
L1.	0.128	0.084	1.52	0.129	-0.037	0.293
L2.	-0.067	0.071	-0.94	0.347	-0.206	0.073
Core Inflation						
L1.	-0.030	0.172	-0.17	0.863	-0.367	0.307
L2.	0.323	0.159	2.03	0.042	0.012	0.635
Unemployment						
L1.	1.068	0.151	7.07	0.000	0.772	1.364
L2.	-0.173	0.139	-1.24	0.215	-0.446	0.100
Federal Funds Rate						
L1.	-0.337	0.116	-2.91	0.004	-0.564	-0.111
L2.	0.273	0.085	3.22	0.001	0.107	0.440
_Constant	0.359	0.176	2.04	0.042	0.014	0.703
<i>Federal Funds Rate</i>						
Interest Rate Expectations						
L1.	0.368	0.162	2.28	0.023	0.051	0.685
L2.	-0.128	0.137	-0.93	0.351	-0.395	0.140
Core Inflation						
L1.	-0.206	0.330	-0.62	0.534	-0.853	0.442
L2.	0.028	0.305	0.09	0.927	-0.571	0.626
Unemployment						
L1.	-0.616	0.290	-2.12	0.034	-1.185	-0.048
L2.	0.599	0.268	2.24	0.025	0.074	1.124
Federal Funds Rate						
L1.	1.118	0.222	5.03	0.000	0.682	1.554
L2.	-0.351	0.163	-2.15	0.031	-0.671	-0.031
_Constant	0.087	0.338	0.26	0.796	-0.575	0.749

Forecast Error Variance Decompositions (Tables)

Variance Decomposition: Core Inflation

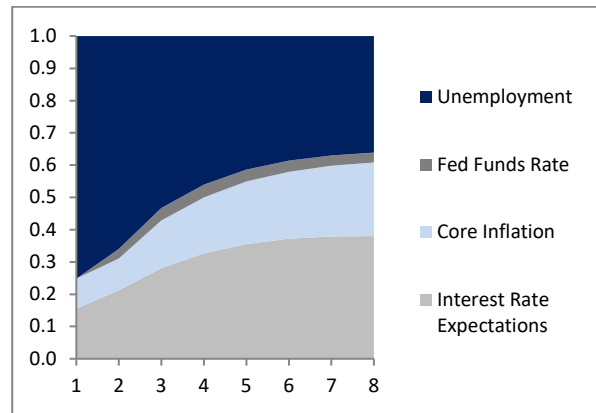
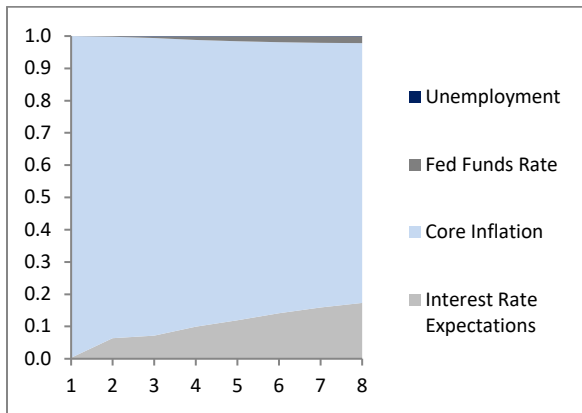
Step	Core Inflation	Fed Funds Rate	Unemployment	Interest Rate Expectations
1	99.7%	0.0%	0.0%	0.3%
2	93.4%	0.2%	0.1%	6.3%
3	92.1%	0.6%	0.1%	7.2%
4	88.9%	1.1%	0.1%	9.9%
5	86.5%	1.5%	0.1%	11.9%
6	83.9%	1.8%	0.1%	14.2%
7	82.0%	2.0%	0.1%	15.9%
8	80.5%	2.1%	0.1%	17.3%

Variance Decomposition: Unemployment

Step	Core Inflation	Fed Funds Rate	Unemployment	Interest Rate Expectations
1	9.4%	0.0%	75.2%	15.5%
2	9.8%	3.0%	65.9%	21.2%
3	14.8%	3.9%	53.3%	28.1%
4	17.4%	4.0%	46.1%	32.6%
5	19.4%	3.7%	41.3%	35.5%
6	20.8%	3.5%	38.6%	37.2%
7	21.8%	3.2%	37.0%	37.9%
8	22.8%	3.1%	36.2%	38.0%

Forecast Error Variance Decompositions (Graphs)

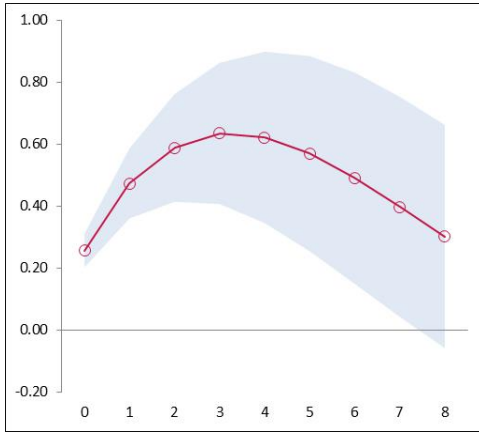
Core Inflation (Left) | Unemployment (Right)



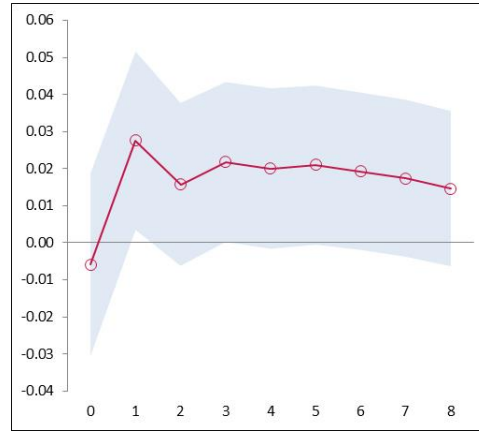
Impulse-Response Functions

Shock: Interest Rate Expectations

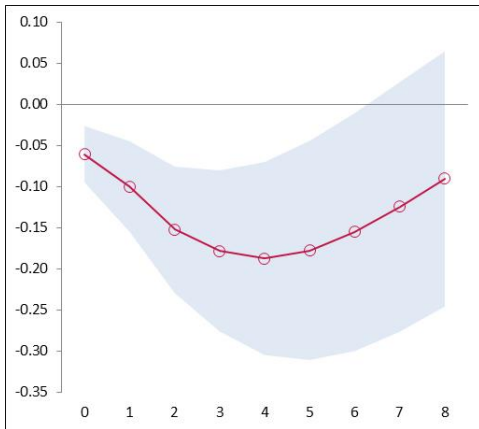
Response: Interest Rate Expectations



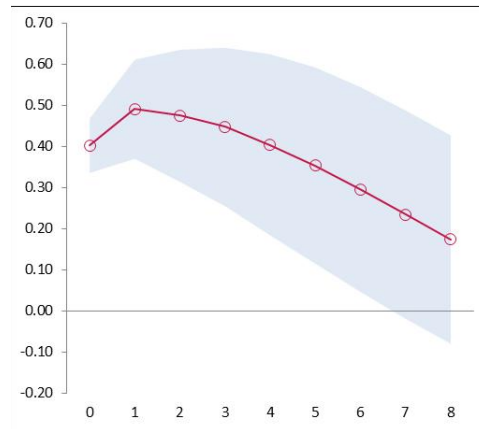
Response: Core Inflation



Response: Unemployment



Response: Federal Funds Rate



Zero Lower Bound (2008:Q4 – 2015:Q2)

VAR Output

	Coefficient	Std. Error	z	P > z	[95% Confidence Interval]	
<i>Interest Rate Expectations</i>						
Interest Rate Expectations						
L1.	0.920	0.189	4.88	0.000	0.551	1.290
L2.	-0.081	0.210	-0.39	0.699	-0.492	0.330
Core Inflation						
L1.	-0.118	0.325	-0.36	0.716	-0.756	0.520
L2.	0.143	0.339	0.42	0.674	-0.522	0.808
Unemployment						
L1.	0.116	0.113	1.02	0.307	-0.106	0.338
L2.	-0.155	0.121	-1.28	0.199	-0.391	0.082
Federal Funds Rate						
L1.	-0.450	0.379	-1.19	0.234	-1.192	0.292
L2.	-0.261	0.341	-0.77	0.443	-0.930	0.407
_Constant	0.498	0.369	1.35	0.177	-0.225	1.222
<i>Core Inflation</i>						
Interest Rate Expectations						
L1.	-0.040	0.113	-0.35	0.725	-0.262	0.182
L2.	-0.052	0.126	-0.42	0.677	-0.299	0.194
Core Inflation						
L1.	0.213	0.195	1.09	0.276	-0.170	0.596
L2.	0.027	0.204	0.13	0.895	-0.372	0.426
Unemployment						
L1.	-0.039	0.068	-0.57	0.567	-0.172	0.094
L2.	0.025	0.072	0.34	0.731	-0.117	0.167
Federal Funds Rate						
L1.	-0.215	0.227	-0.94	0.345	-0.660	0.231
L2.	0.170	0.205	0.83	0.407	-0.231	0.571
_Constant	0.474	0.222	2.14	0.032	0.040	0.908
<i>Unemployment</i>						
Interest Rate Expectations						
L1.	0.023	0.134	0.17	0.864	-0.240	0.286
L2.	-0.052	0.149	-0.35	0.725	-0.345	0.240
Core Inflation						
L1.	0.069	0.232	0.30	0.764	-0.384	0.523
L2.	-0.381	0.241	-1.58	0.115	-0.854	0.092
Unemployment						
L1.	1.437	0.081	17.83	0.000	1.279	1.595
L2.	-0.438	0.086	-5.10	0.000	-0.606	-0.270
Federal Funds Rate						
L1.	-0.505	0.269	-1.88	0.061	-1.033	0.022
L2.	0.847	0.243	3.49	0.000	0.372	1.323
_Constant	-0.006	0.263	-0.02	0.982	-0.520	0.509
<i>Federal Funds Rate</i>						
Interest Rate Expectations						
L1.	-0.018	0.020	-0.90	0.366	-0.057	0.021
L2.	0.042	0.022	1.90	0.057	-0.001	0.085
Core Inflation						
L1.	-0.100	0.034	-2.93	0.003	-0.167	-0.033
L2.	0.005	0.036	0.14	0.888	-0.065	0.075
Unemployment						
L1.	0.025	0.012	2.09	0.036	0.002	0.048
L2.	-0.026	0.013	-2.02	0.043	-0.050	-0.001
Federal Funds Rate						
L1.	0.308	0.040	7.76	0.000	0.230	0.385
L2.	-0.104	0.036	-2.91	0.004	-0.174	-0.034
_Constant	0.136	0.039	3.53	0.000	0.061	0.212

Forecast Error Variance

Decomposition (Tables)

Variance Decomposition: Core Inflation

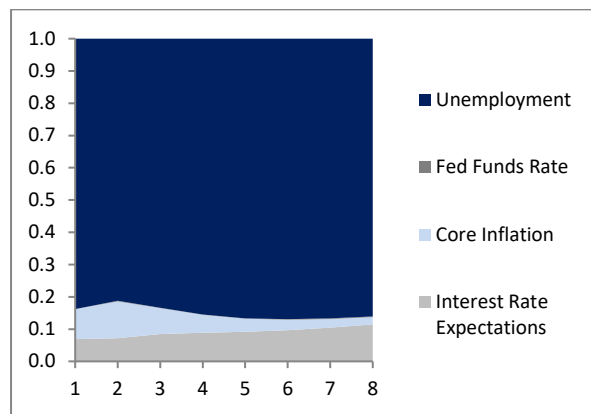
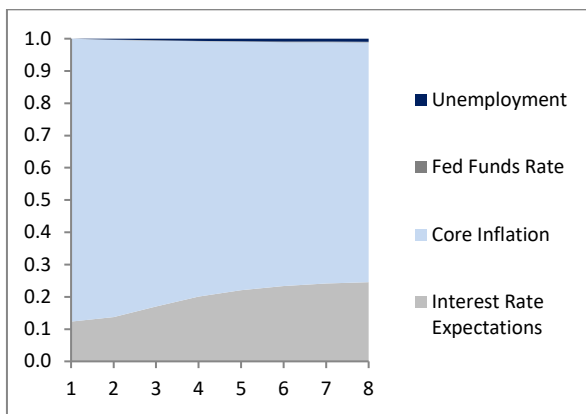
Step	Core Inflation	Fed Funds Rate	Unemployment	Interest Rate Expectations
1	87.7%	0.0%	0.0%	12.3%
2	85.8%	0.1%	0.3%	13.7%
3	82.4%	0.1%	0.5%	17.0%
4	79.2%	0.1%	0.6%	20.0%
5	77.0%	0.2%	0.8%	22.1%
6	75.6%	0.2%	0.9%	23.4%
7	74.8%	0.2%	0.9%	24.1%
8	74.3%	0.2%	1.0%	24.5%

Variance Decomposition: Unemployment

Step	Core Inflation	Fed Funds Rate	Unemployment	Interest Rate Expectations
1	9.3%	0.0%	83.8%	6.9%
2	11.4%	0.1%	81.2%	7.2%
3	8.1%	0.1%	83.4%	8.4%
4	5.6%	0.1%	85.5%	8.8%
5	4.1%	0.2%	86.6%	9.1%
6	3.2%	0.2%	86.9%	9.7%
7	2.6%	0.2%	86.6%	10.5%
8	2.2%	0.2%	86.0%	11.5%

Forecast Error Variance Decomposition (Graphs)

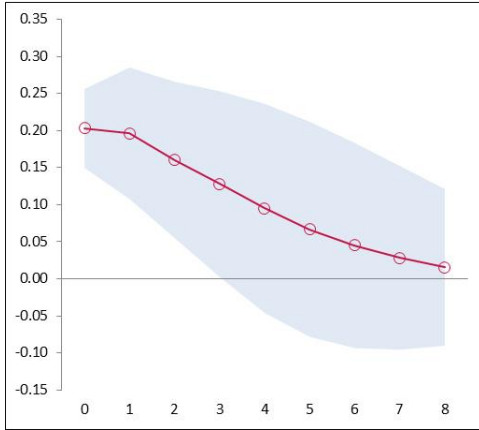
Core Inflation (Left) | Unemployment (Right)



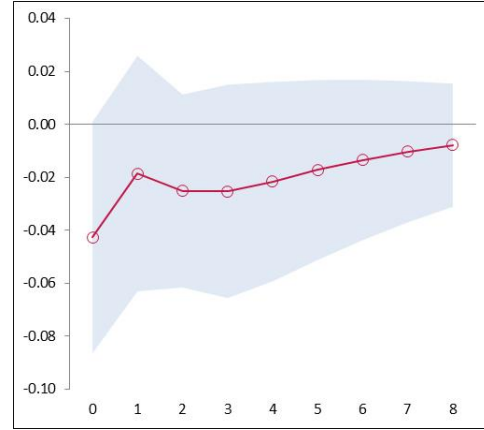
Impulse-Response Functions

Shock: Interest Rate Expectations

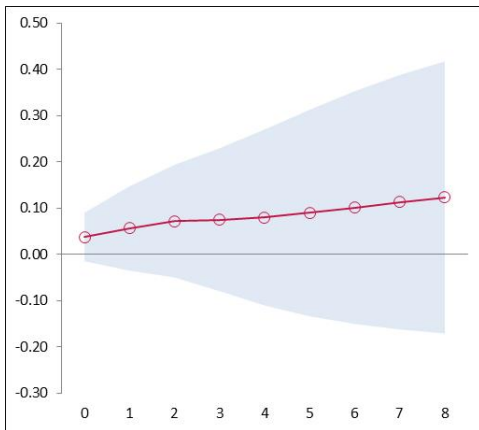
Response: Interest Rate Expectations



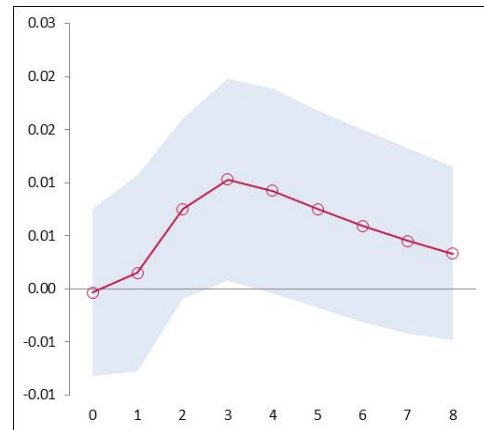
Response: Core Inflation



Response: Unemployment



Response: Federal Funds Rate

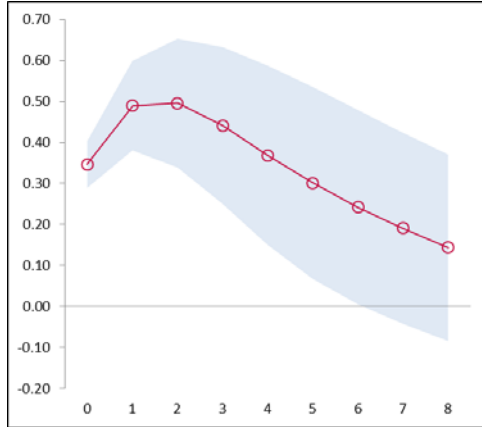


Model 2

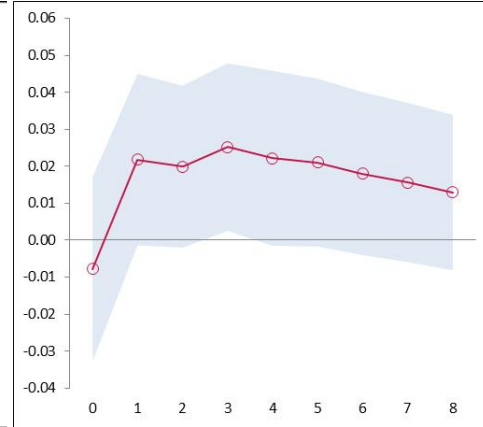
Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

Shock: Interest Rate Expectations

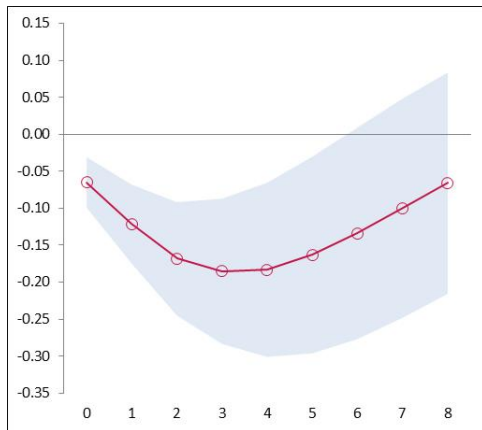
Response: Interest Rate Expectations



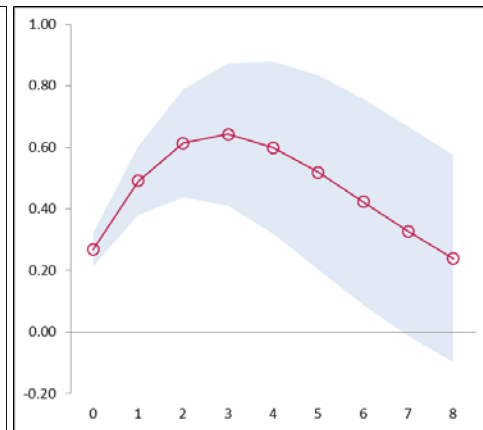
Response: Core Inflation



Response: Unemployment



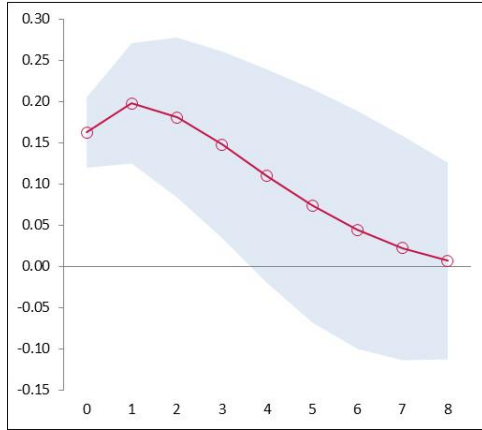
Response: Federal Funds Rate



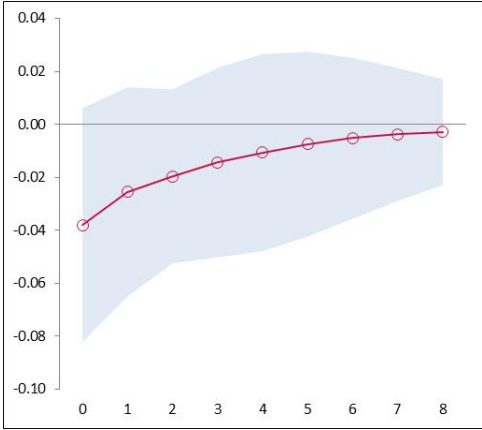
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Interest Rate Expectations

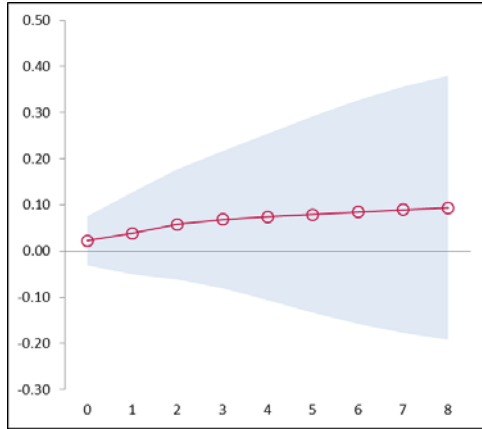
Response: Interest Rate Expectations



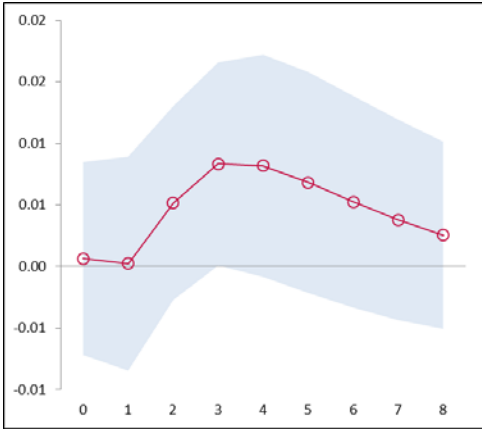
Response: Core Inflation



Response: Unemployment



Response: Federal Funds Rate

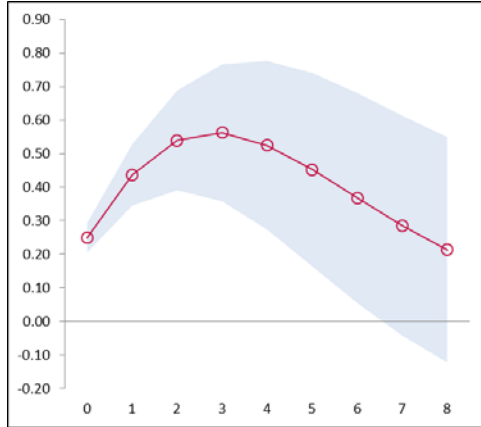


Model 3

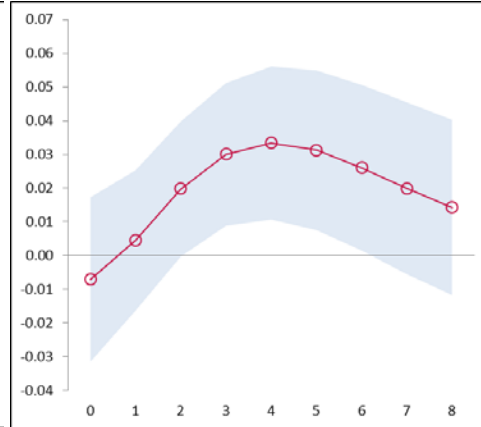
Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

Shock: Interest Rate Expectations

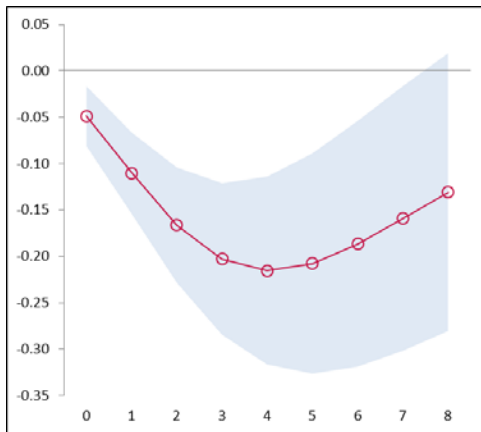
Response: Interest Rate Expectations



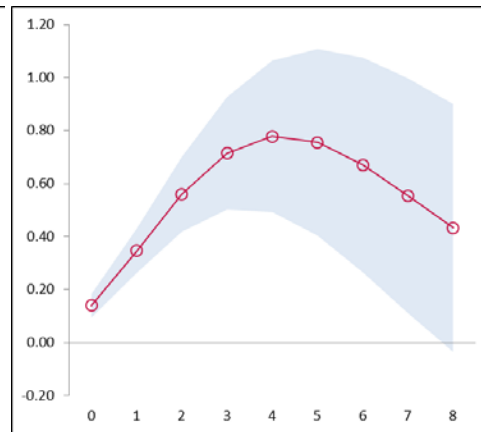
Response: Core Inflation



Response: Unemployment



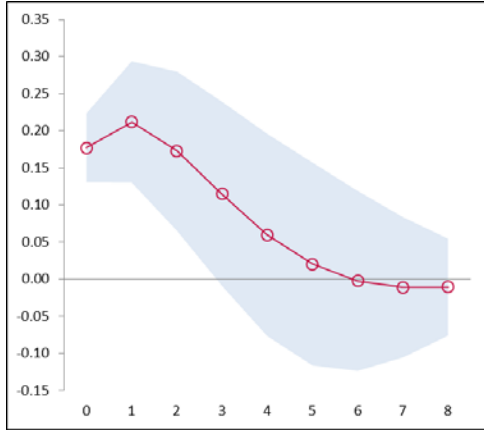
Response: Federal Funds Rate



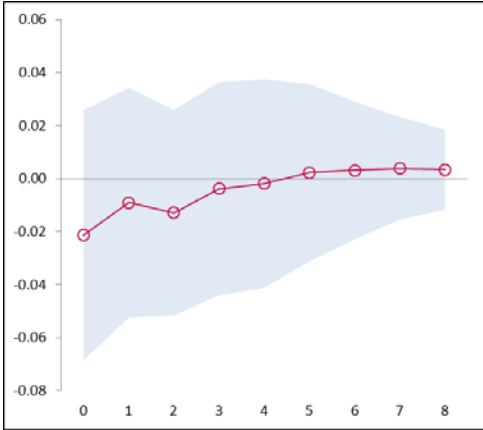
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Interest Rate Expectations

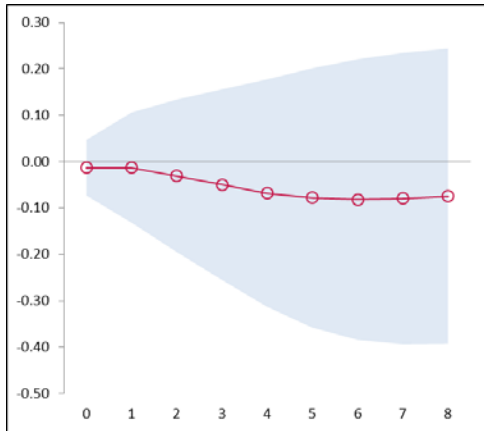
Response: Interest Rate Expectations



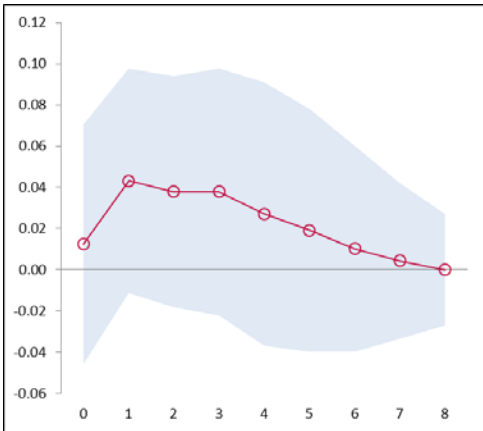
Response: Core Inflation



Response: Unemployment



Response: Federal Funds Rate

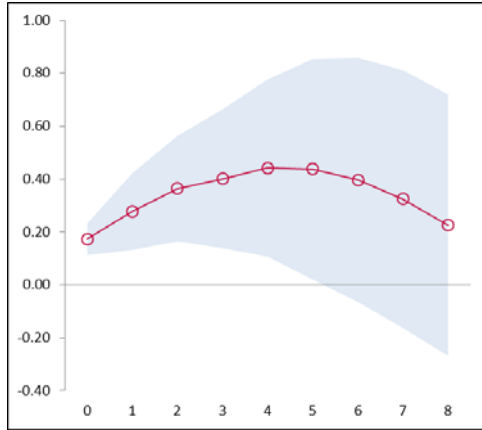


Model 4

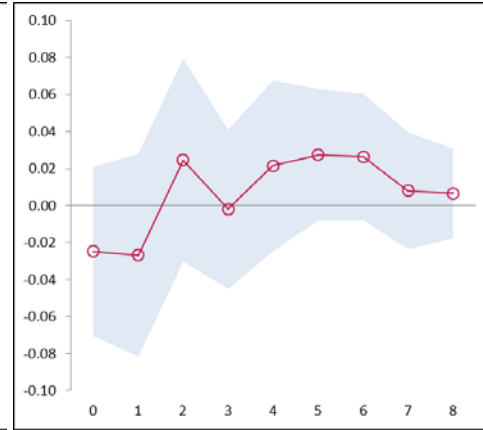
Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

Shock: Interest Rate Expectations

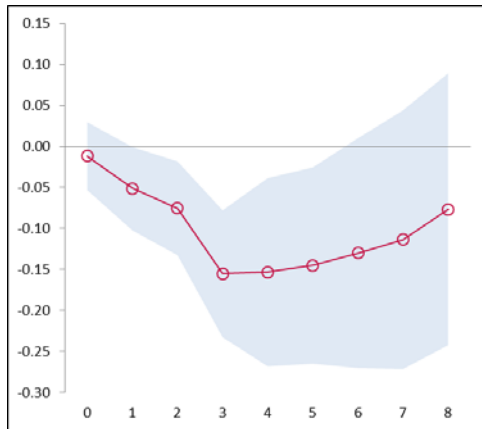
Response: Interest Rate Expectations



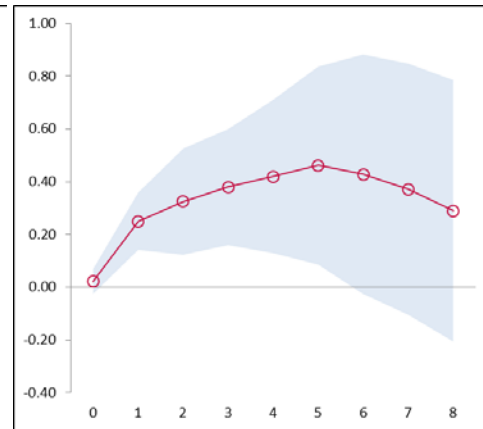
Response: Core Inflation



Response: Unemployment



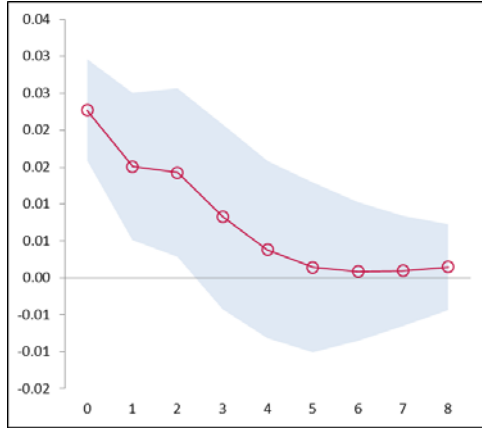
Response: Federal Funds Rate



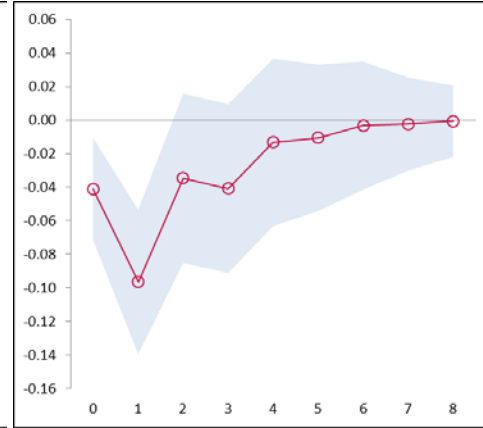
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Interest Rate Expectations

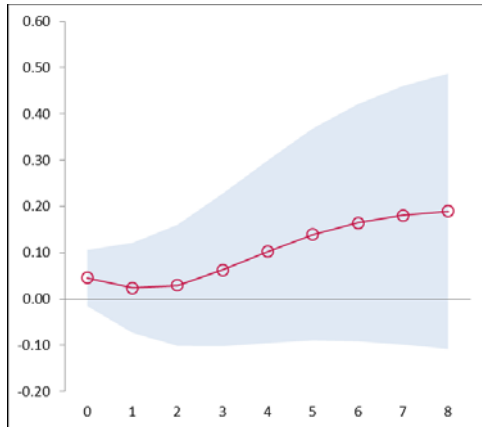
Response: Interest Rate Expectations



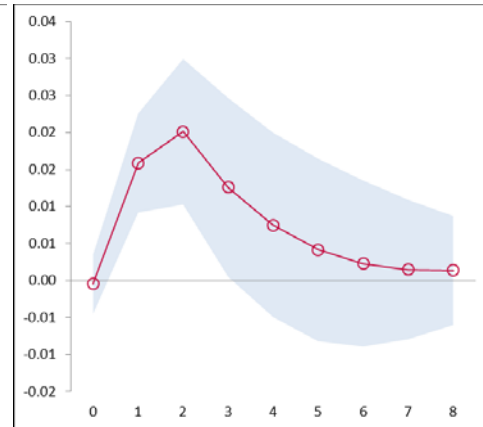
Response: Core Inflation



Response: Unemployment



Response: Federal Funds Rate

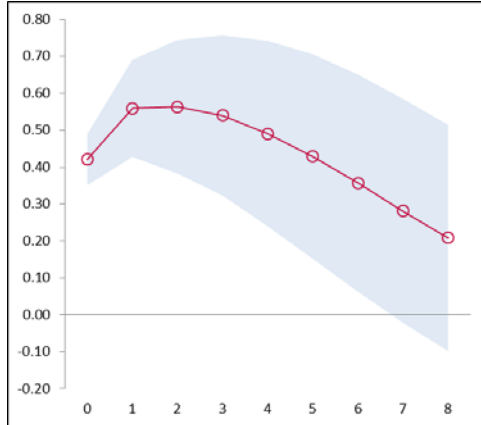


Model 5

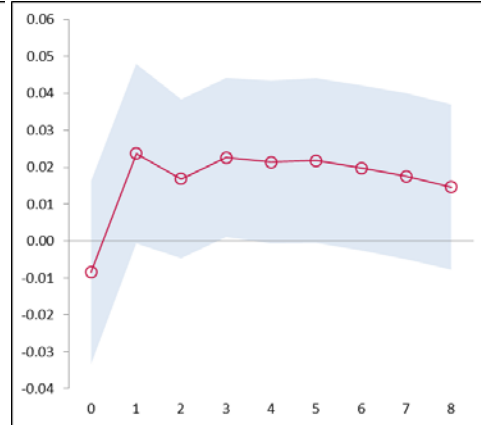
Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

Shock: Interest Rate Expectations

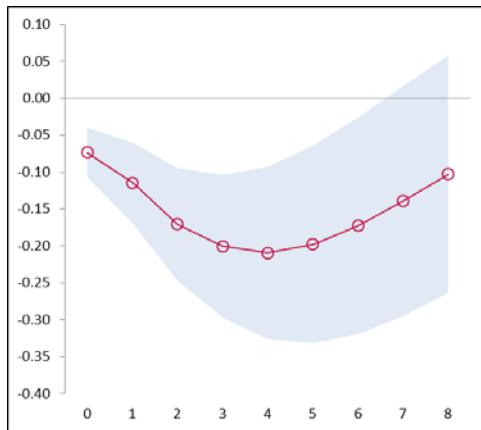
Response: Interest Rate Expectations



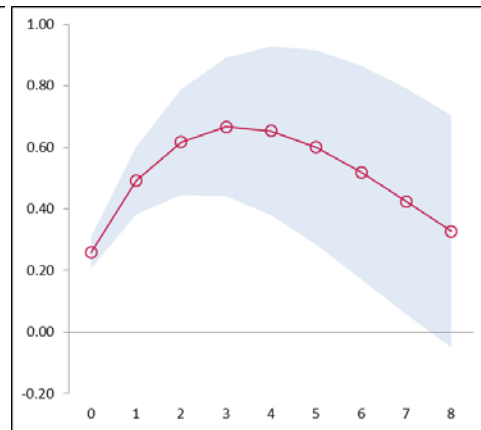
Response: Core Inflation



Response: Unemployment



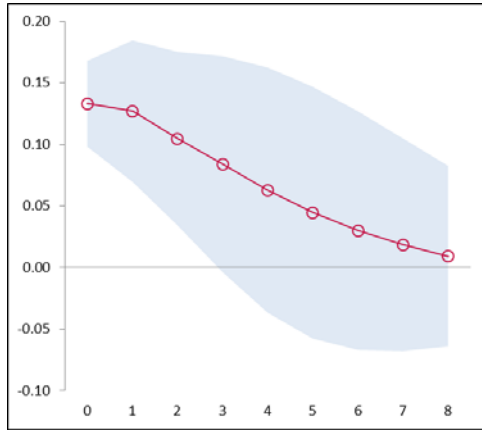
Response: Federal Funds Rate



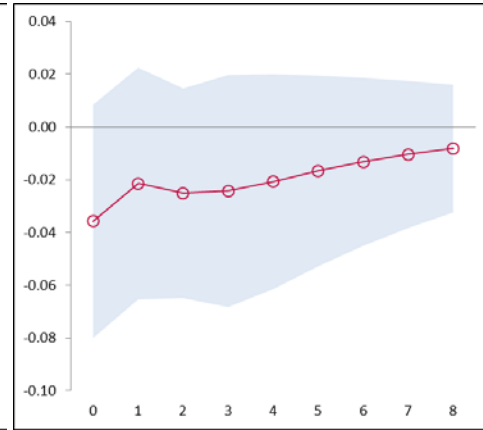
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Interest Rate Expectations

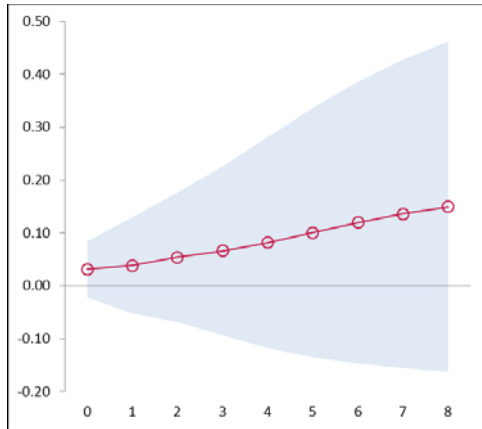
Response: Interest Rate Expectations



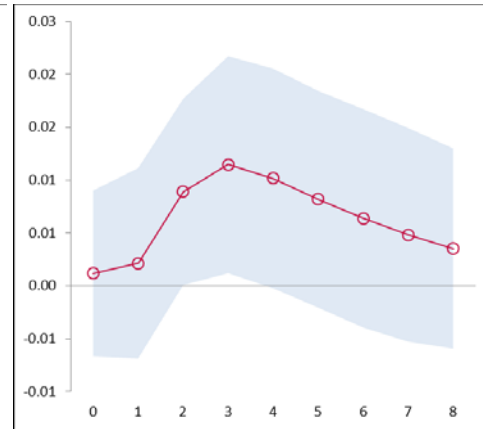
Response: Core Inflation



Response: Unemployment



Response: Federal Funds Rate

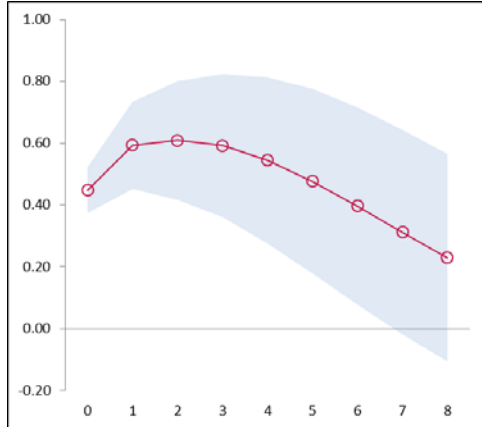


Model 6

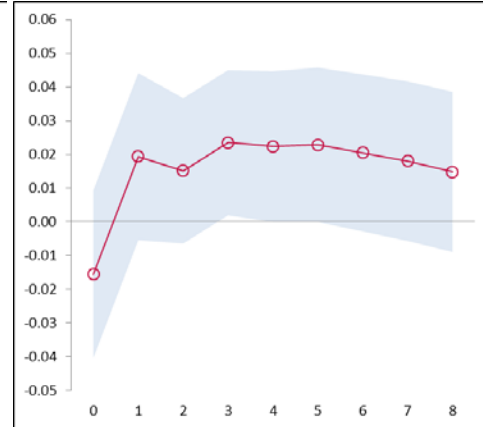
Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

Shock: Interest Rate Expectations

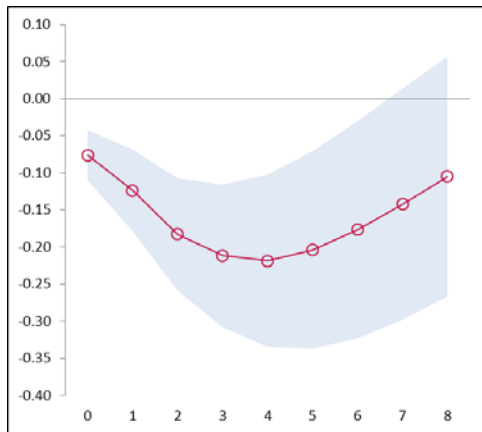
Response: Interest Rate Expectations



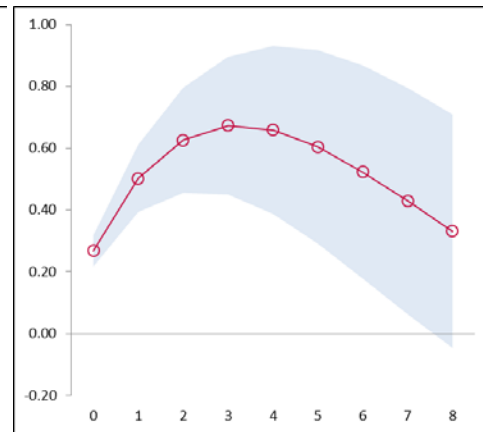
Response: Core Inflation



Response: Unemployment



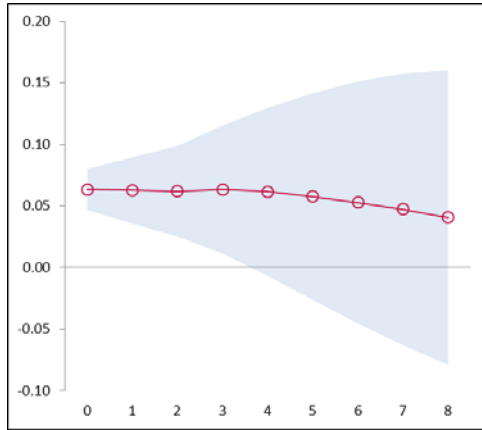
Response: Federal Funds Rate



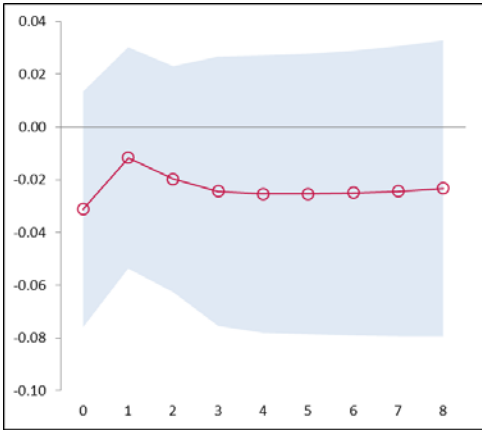
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Interest Rate Expectations

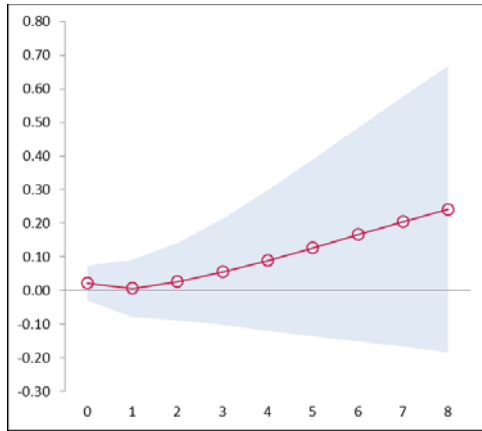
Response: Interest Rate Expectations



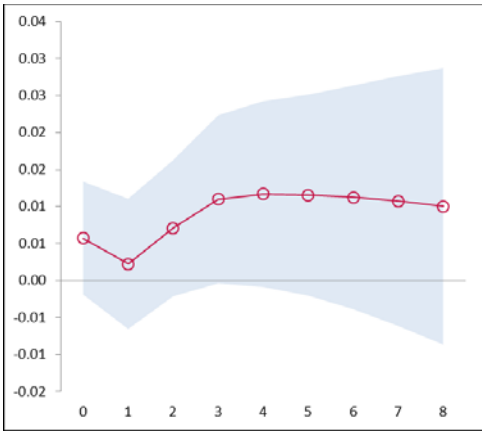
Response: Core Inflation



Response: Unemployment



Response: Federal Funds Rate

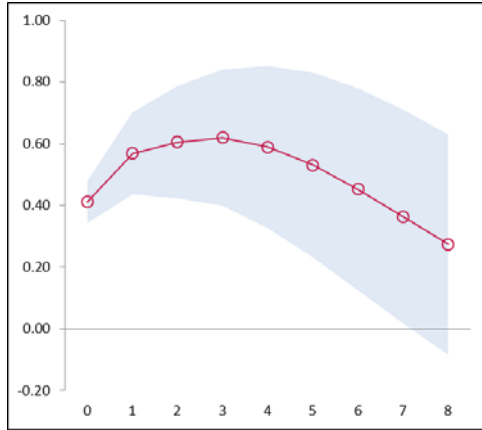


Model 7

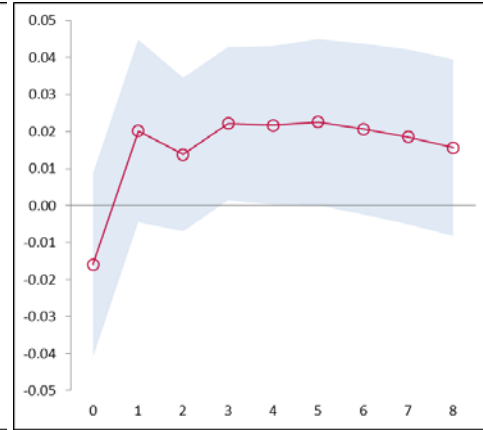
Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

Shock: Interest Rate Expectations

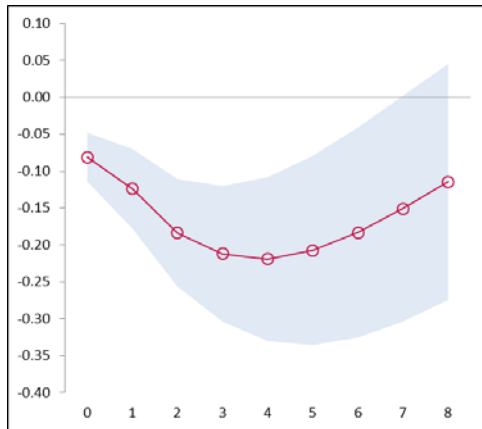
Response: Interest Rate Expectations



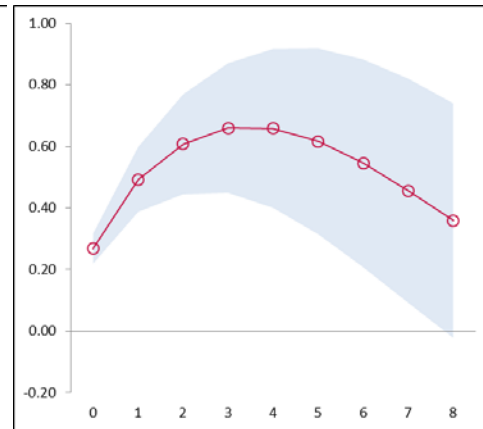
Response: Core Inflation



Response: Unemployment



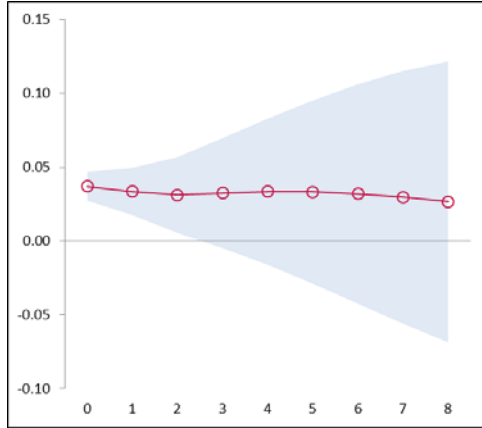
Response: Federal Funds Rate



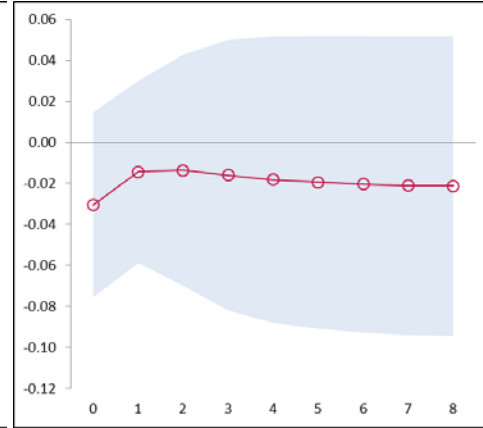
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Interest Rate Expectations

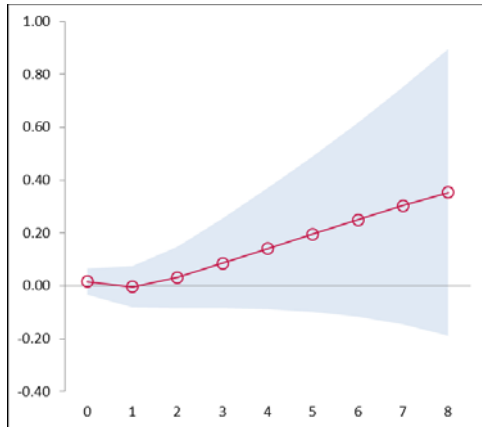
Response: Interest Rate Expectations



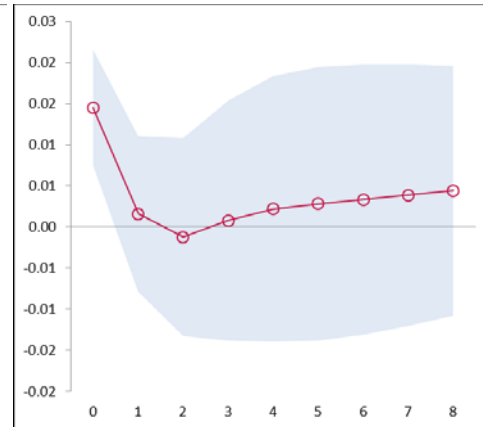
Response: Core Inflation



Response: Unemployment



Response: Federal Funds Rate

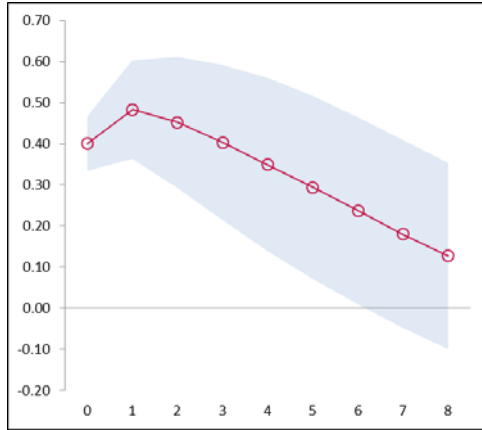


Model 8

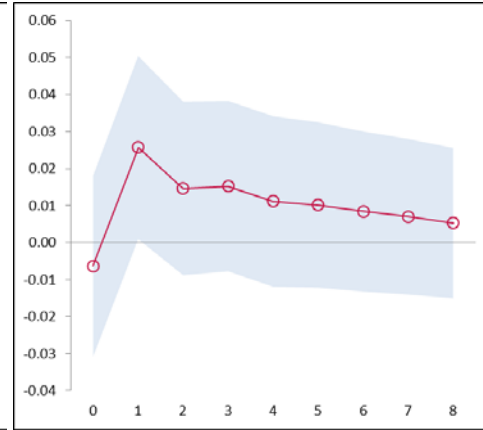
Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

Shock: Interest Rate Expectations

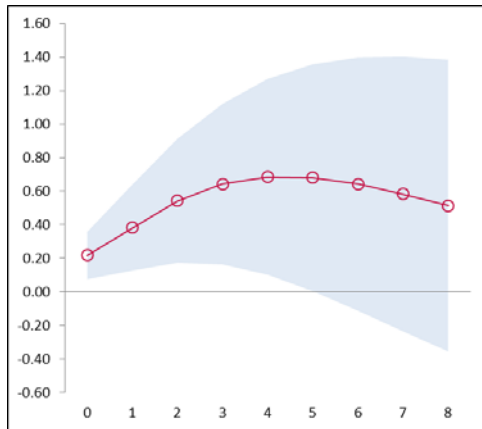
Response: Interest Rate Expectations



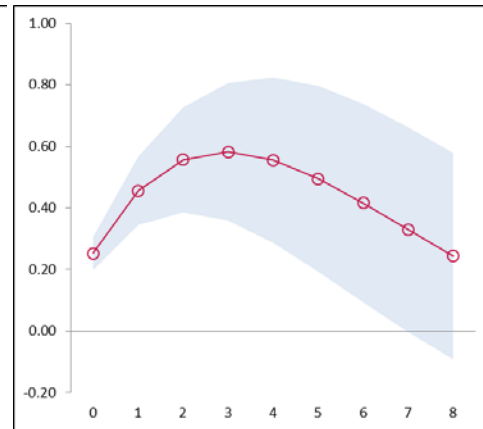
Response: Core Inflation



Response: Production



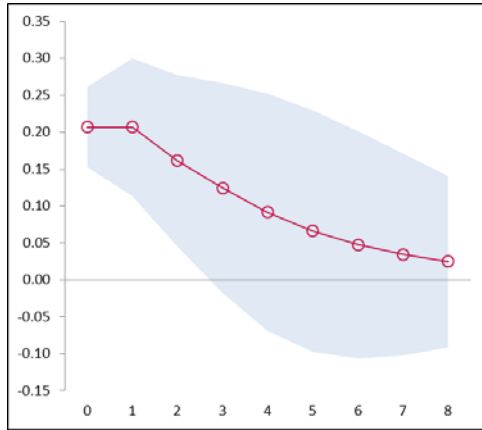
Response: Federal Funds Rate



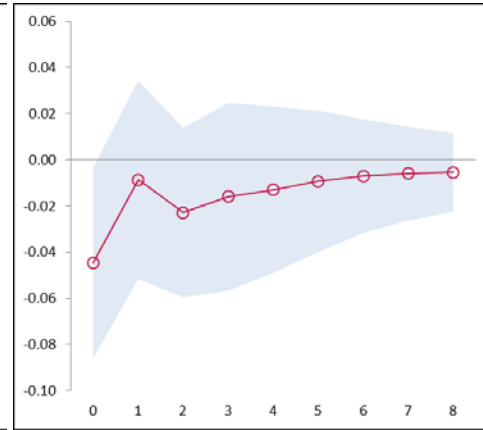
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Interest Rate Expectations

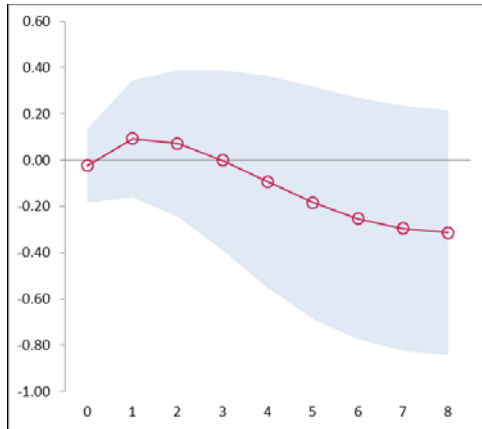
Response: Interest Rate Expectations



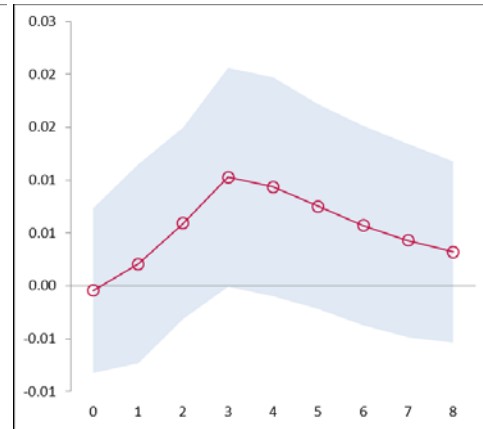
Response: Core Inflation



Response: Production



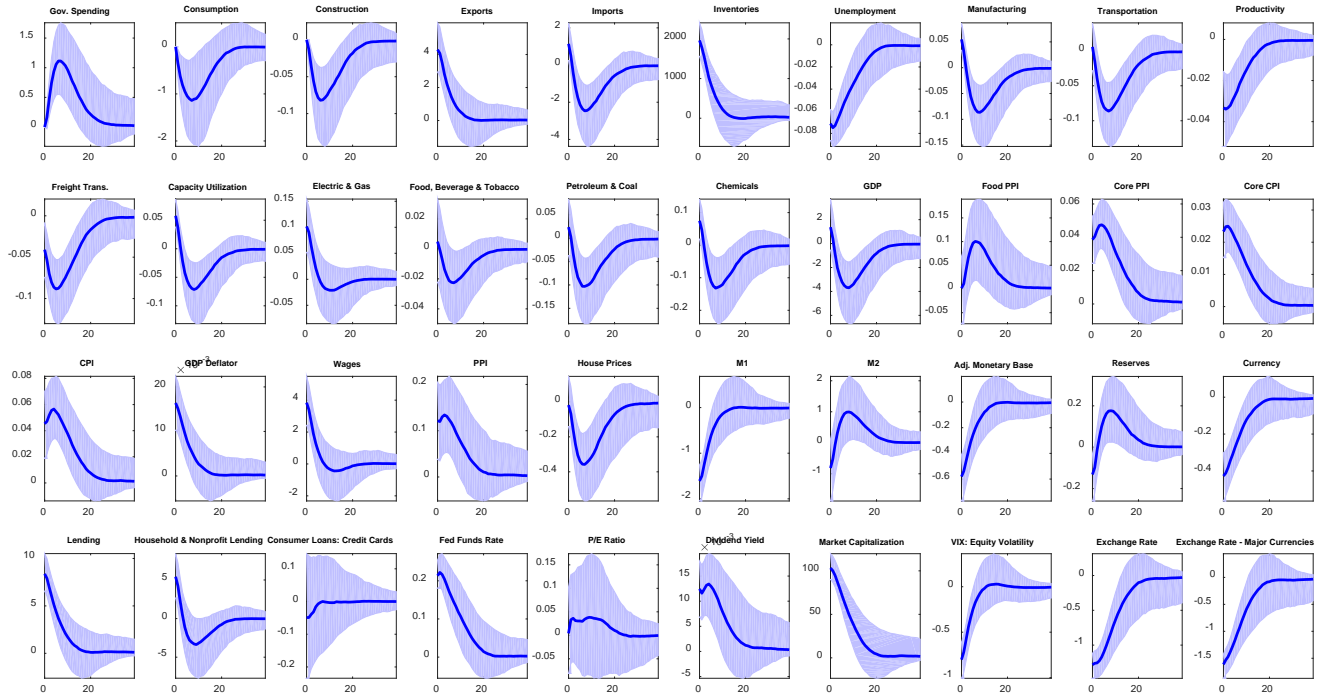
Response: Federal Funds Rate



Model 9

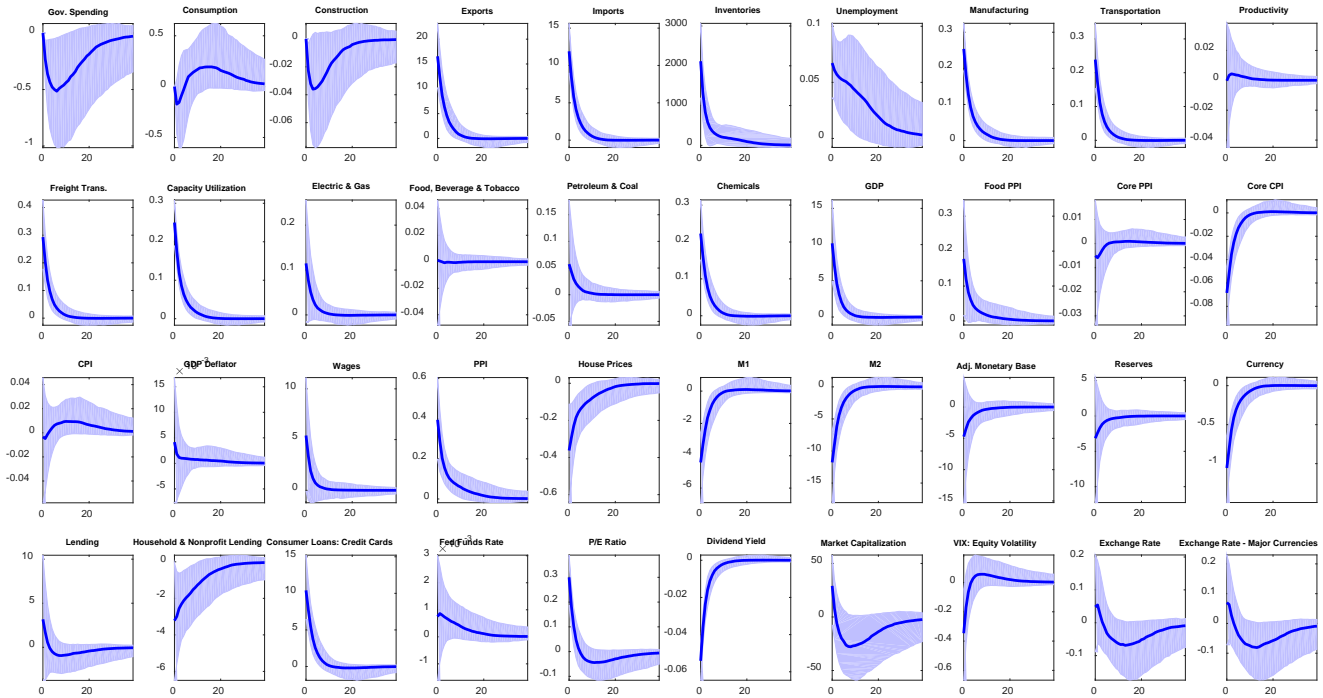
Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

Shock: Interest Rate Expectations



Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Interest Rate Expectations

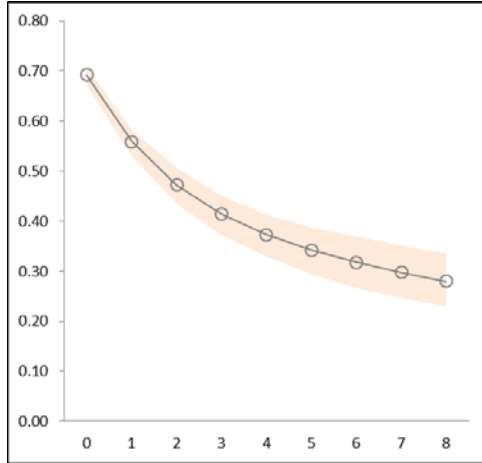


Model 10

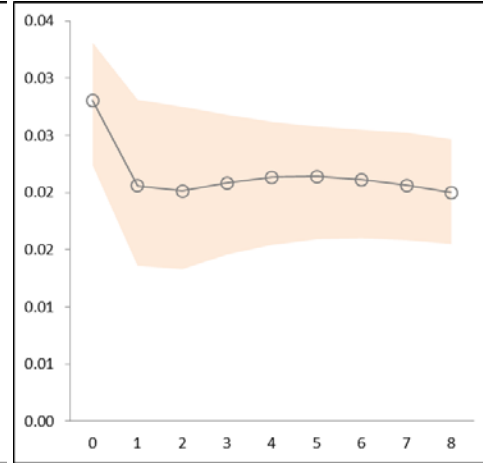
Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

Shock: Interest Rate Expectations

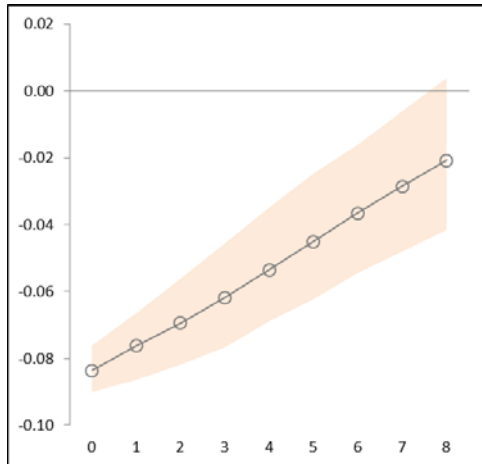
Response: Interest Rate Expectations



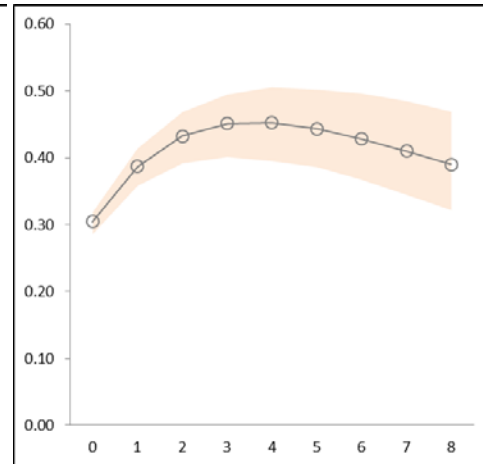
Response: Core Inflation



Response: Unemployment



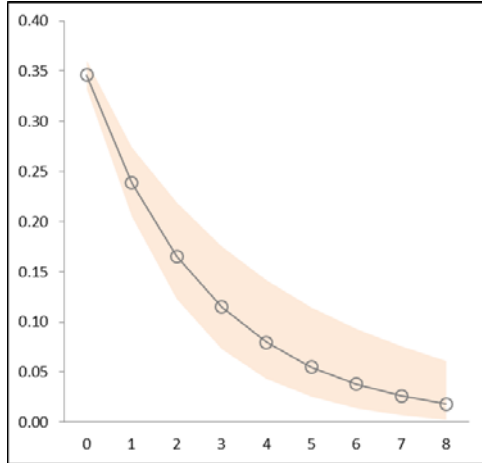
Response: Federal Funds Rate



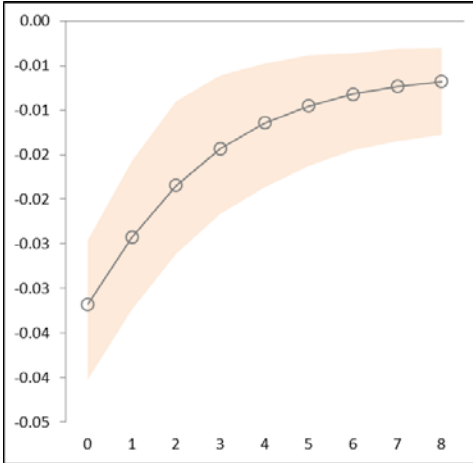
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Interest Rate Expectations

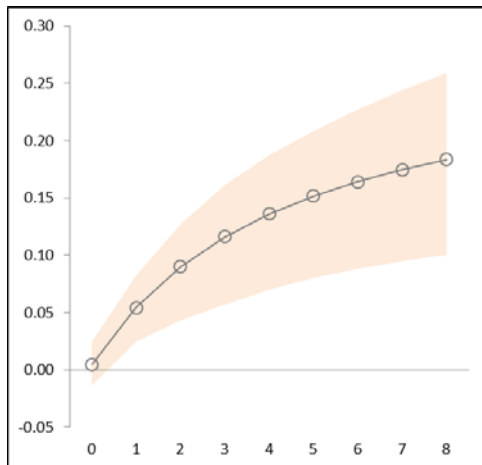
Response: Interest Rate Expectations



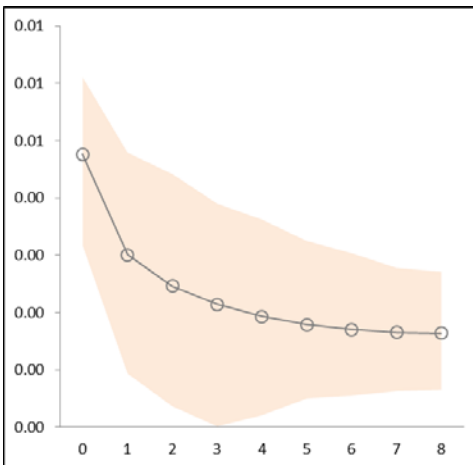
Response: Core Inflation



Response: Unemployment

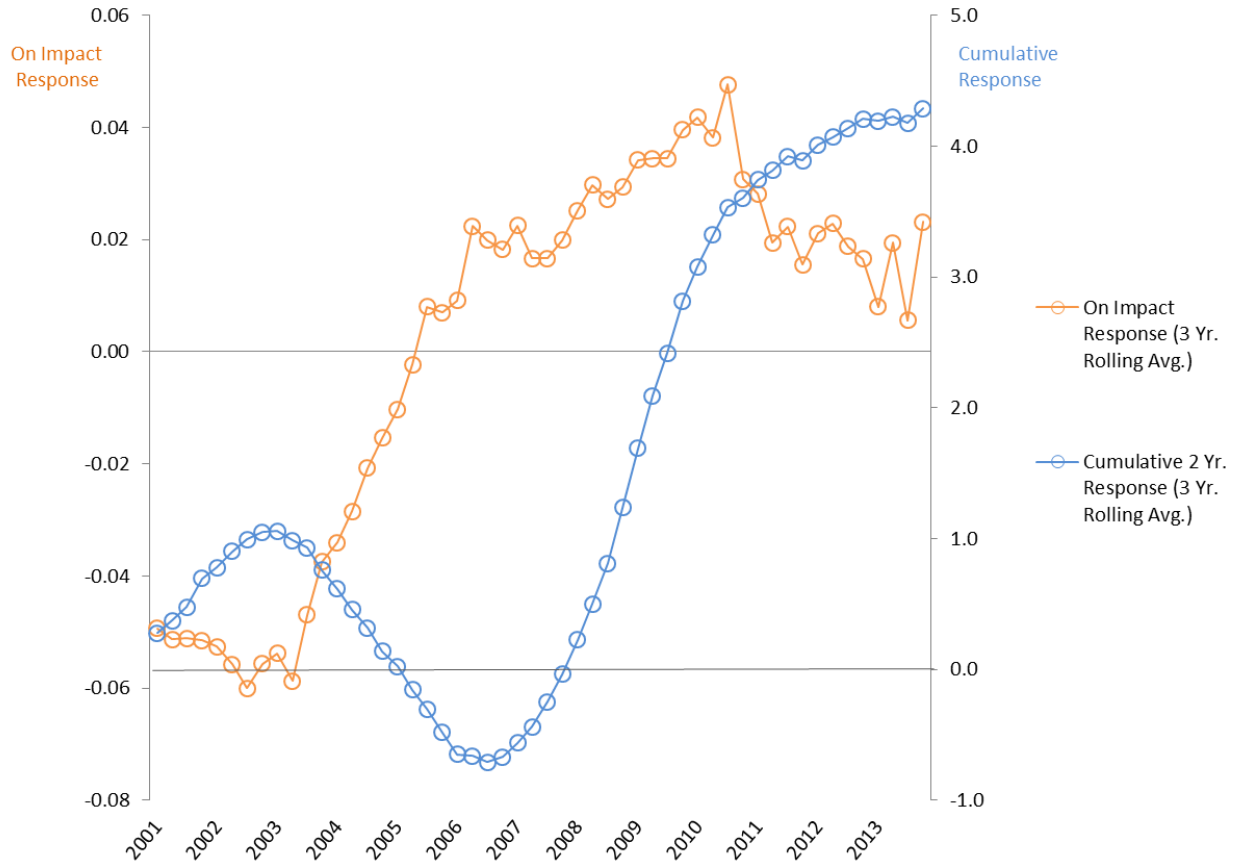


Response: Federal Funds Rate



Model 11

Time-Varying On-Impact & Cumulative Impulse-Response Functions (Shock: Interest Rate Expectations | Response: Unemployment Rate) – Cholesky Ordering

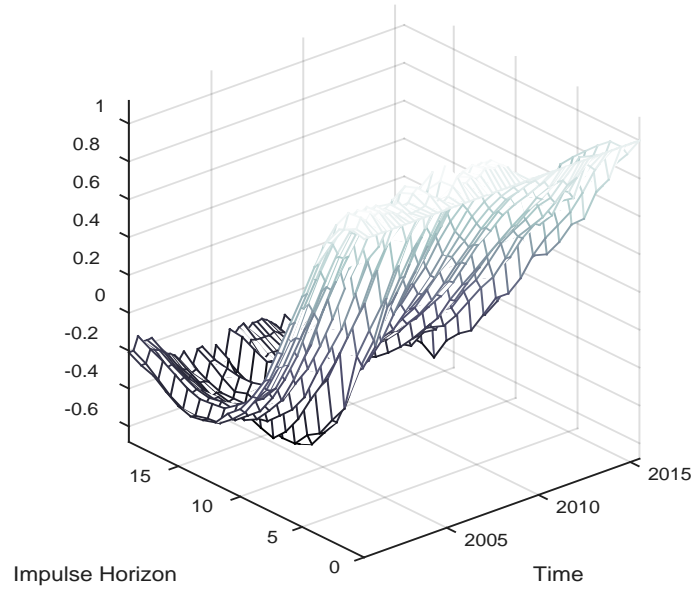


Impulse-Response Functions – Cholesky Ordering

Shock: Interest Rate Expectations

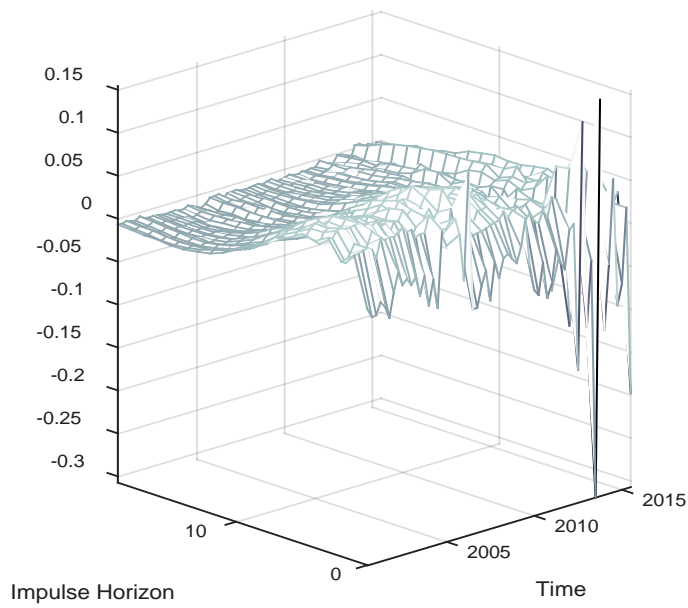
Response: Interest Rate Expectations

Interest Rate Expectations

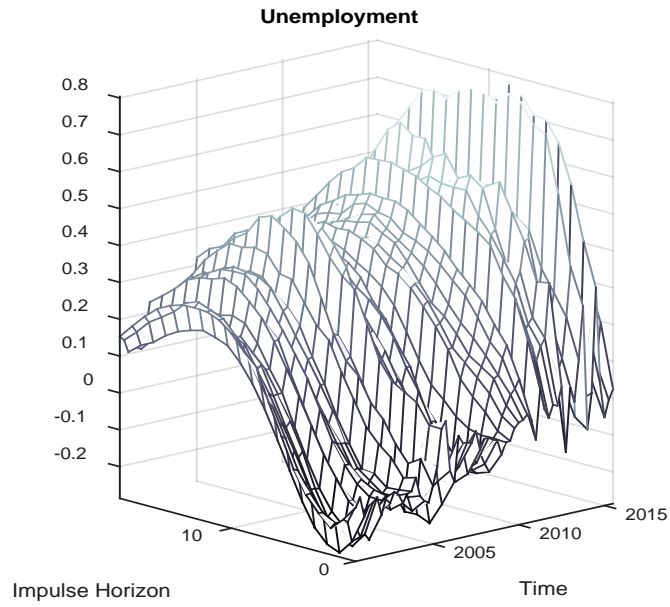


Response: Core Inflation

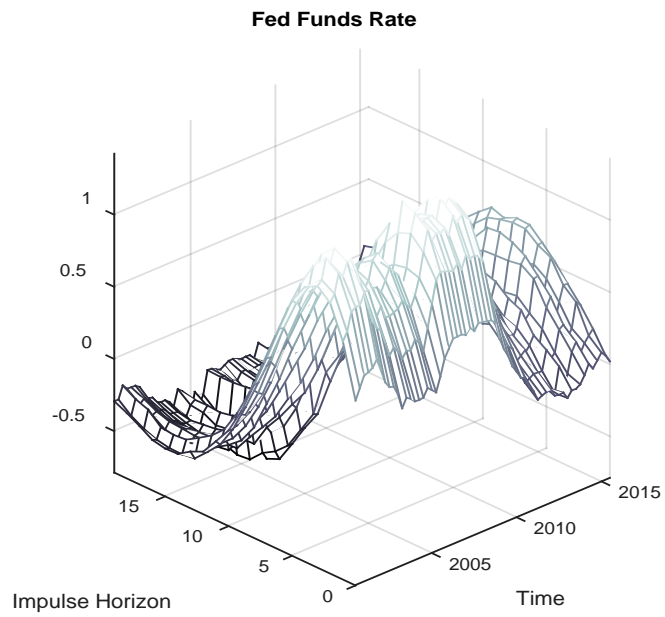
Core Inflation



Response: Unemployment



Response: Federal Funds Rate



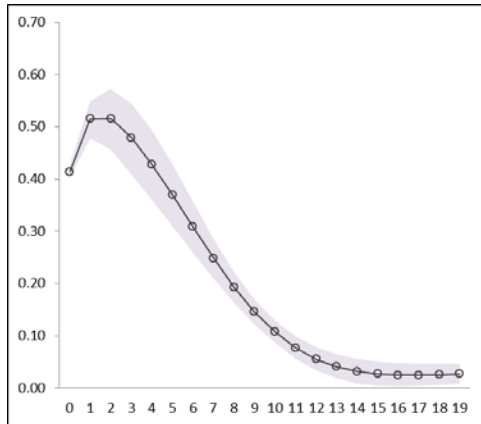
Model 12

Sign & Zero Restrictions VAR

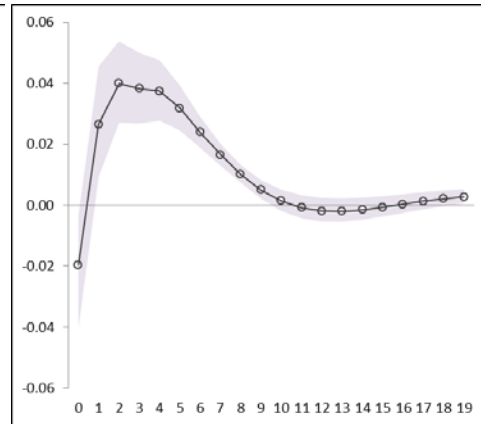
Pre-Zero Lower Bound (1990:Q1 – 2008:Q3)

Shock: Expected Monetary Policy Contraction

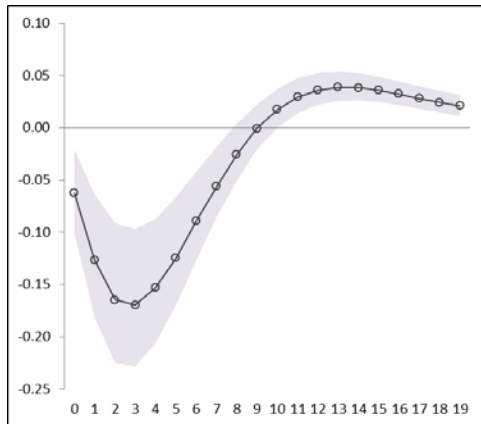
Response: Interest Rate Expectations



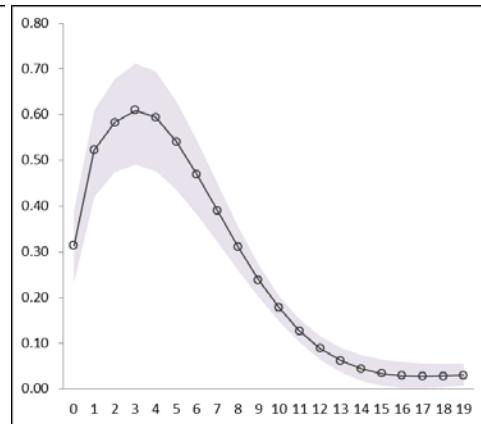
Response: Core Inflation



Response: Unemployment

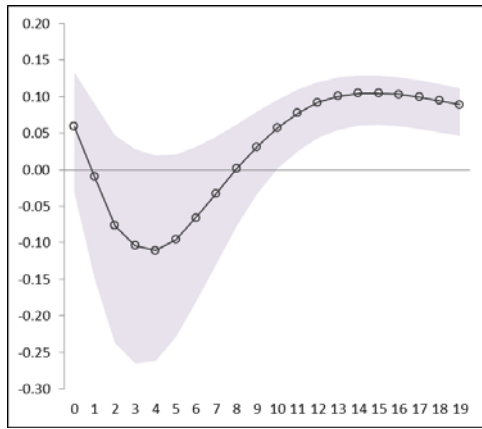


Response: Federal Funds Rate

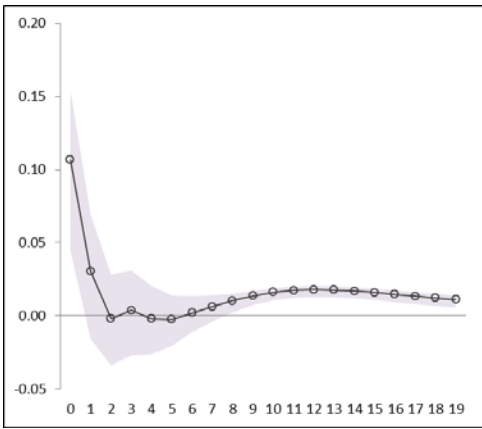


Shock: Aggregate Supply Contraction

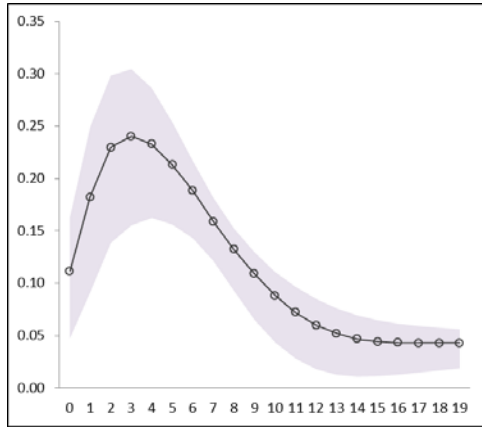
Response: Interest Rate Expectations



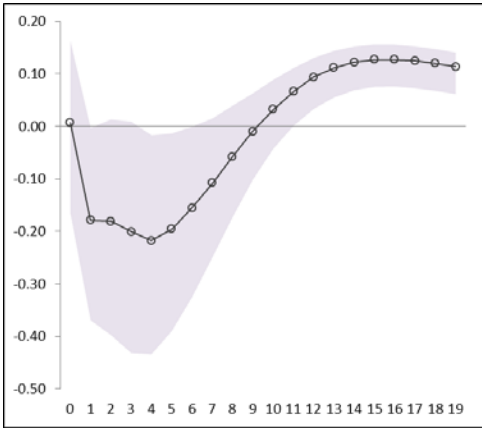
Response: Core Inflation



Response: Unemployment

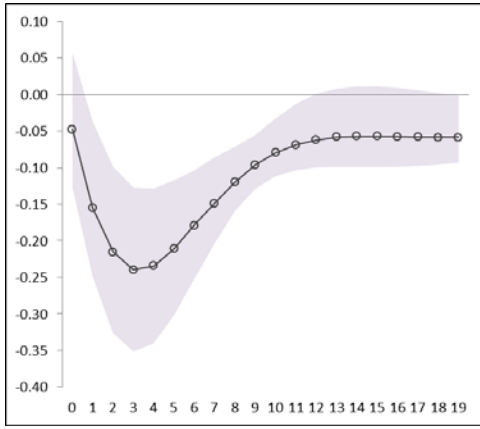


Response: Federal Funds Rate

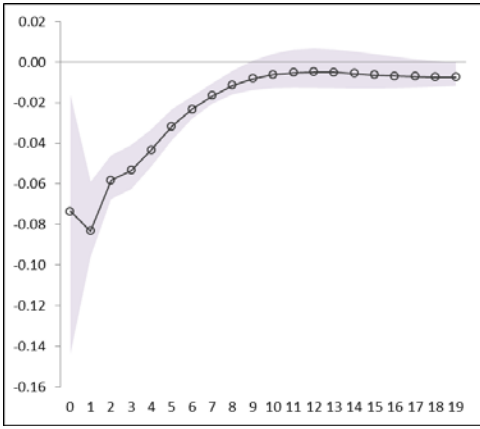


Shock: Aggregate Demand Contraction

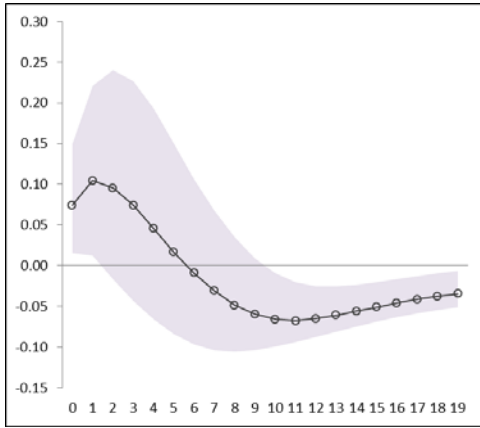
Response: Interest Rate Expectations



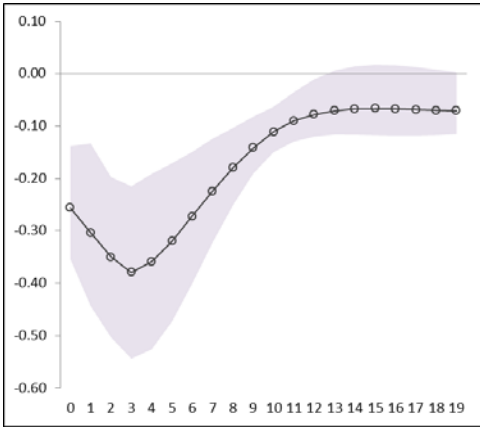
Response: Core Inflation



Response: Unemployment

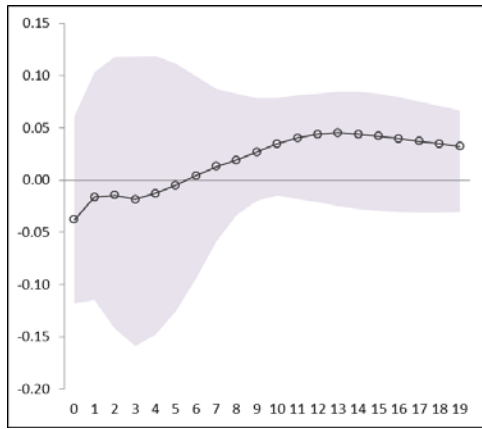


Response: Federal Funds Rate

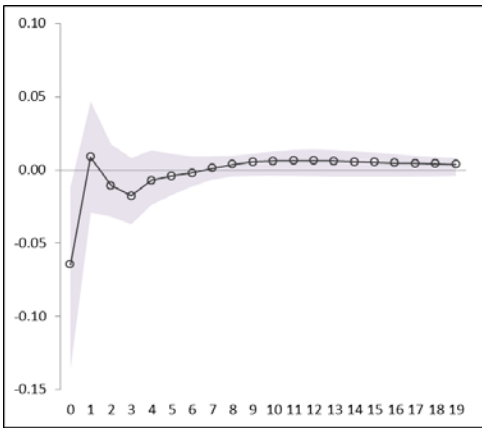


Shock: Monetary Policy Contraction

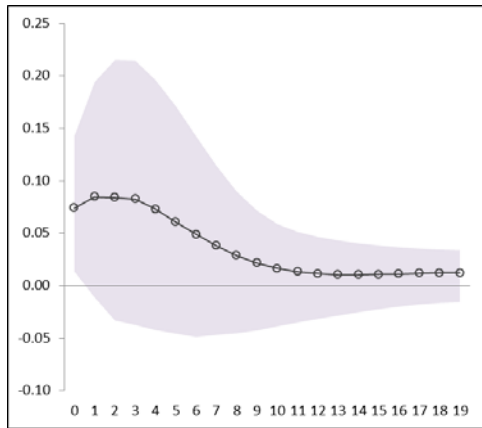
Response: Interest Rate Expectations



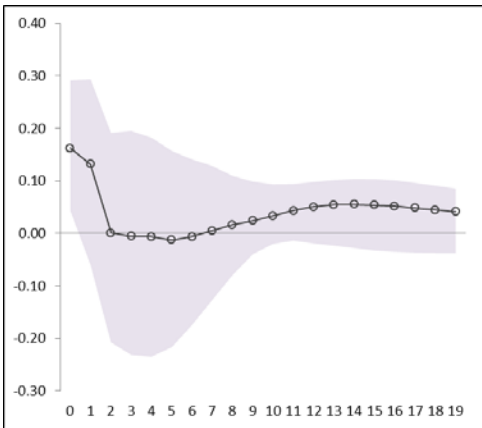
Response: Core Inflation



Response: Unemployment



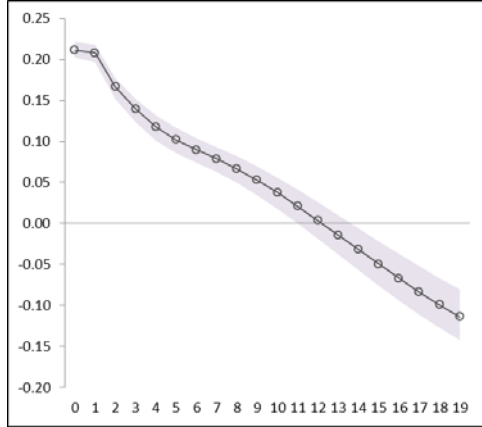
Response: Federal Funds Rate



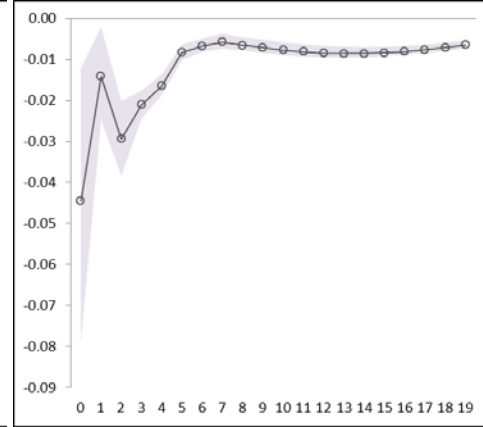
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Expected Monetary Policy Contraction

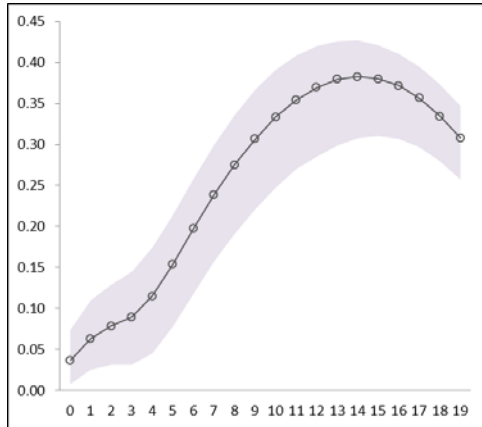
Response: Interest Rate Expectations



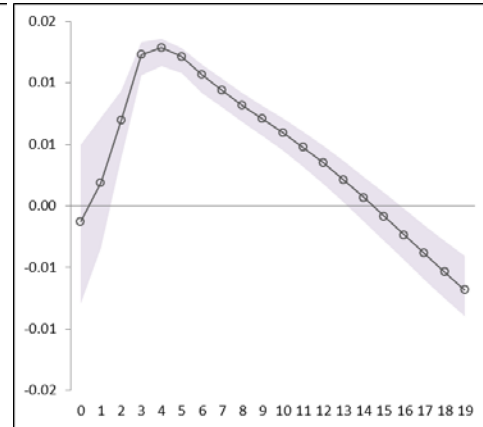
Response: Core Inflation



Response: Unemployment

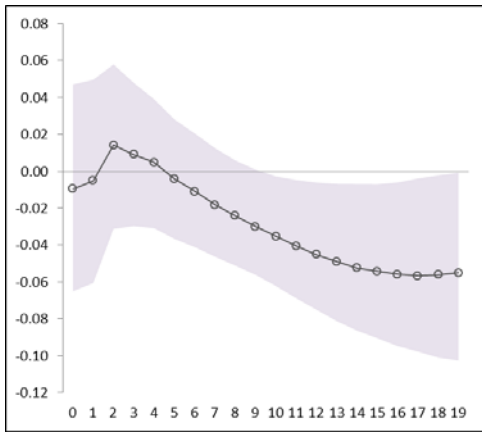


Response: Federal Funds Rate

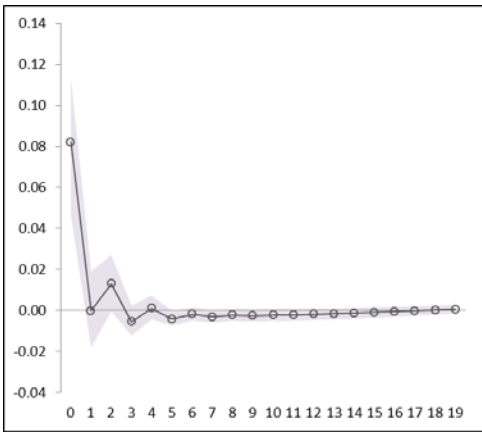


Shock: Aggregate Supply Contraction

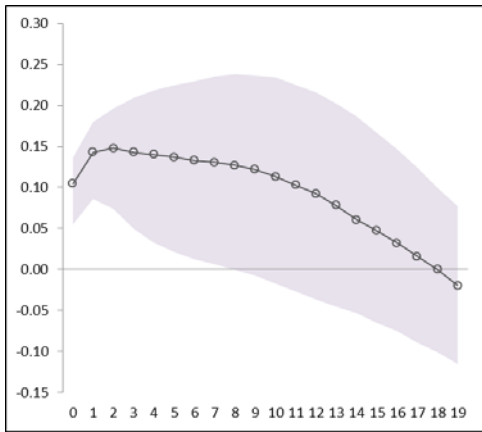
Response: Interest Rate Expectations



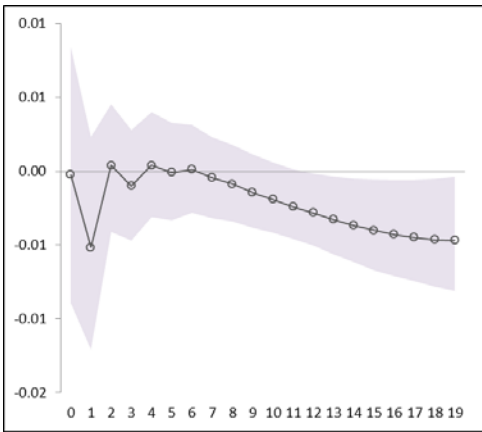
Response: Core Inflation



Response: Unemployment

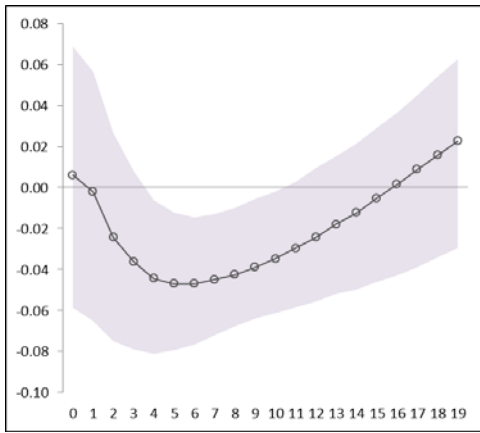


Response: Federal Funds Rate

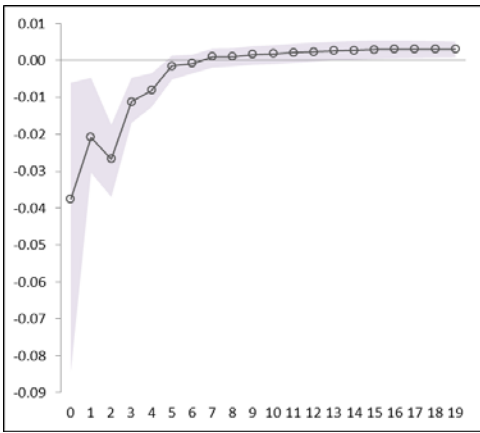


Shock: Aggregate Demand Contraction

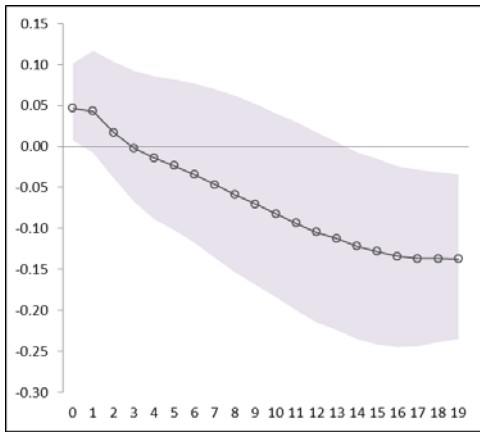
Response: Interest Rate Expectations



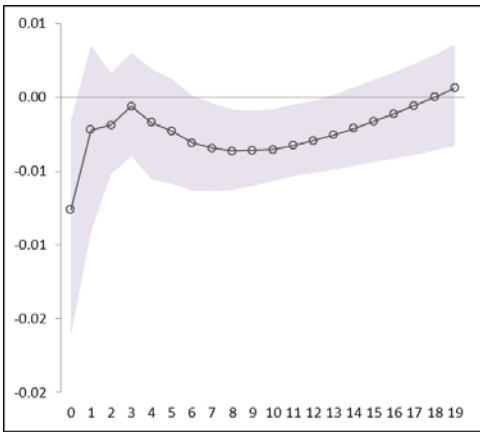
Response: Core Inflation



Response: Unemployment

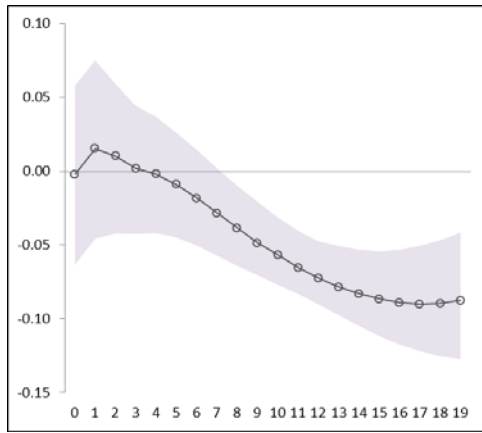


Response: Federal Funds Rate

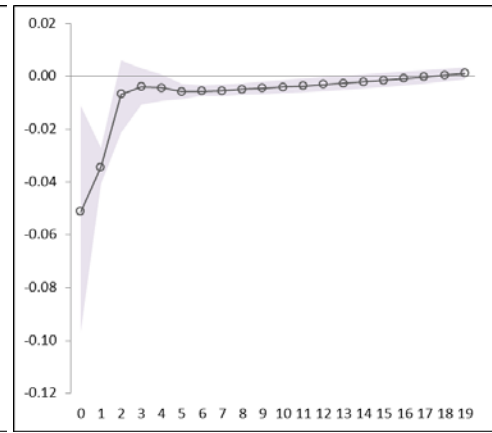


Shock: Monetary Policy Contraction

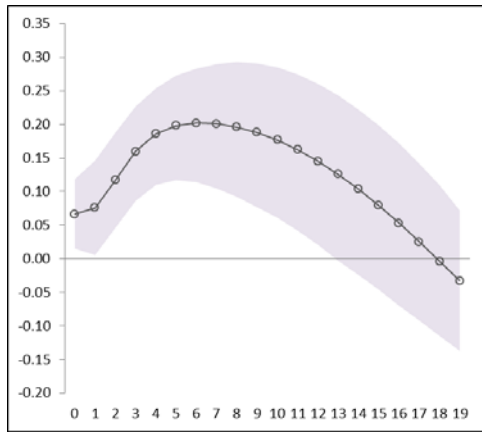
Response: Interest Rate Expectations



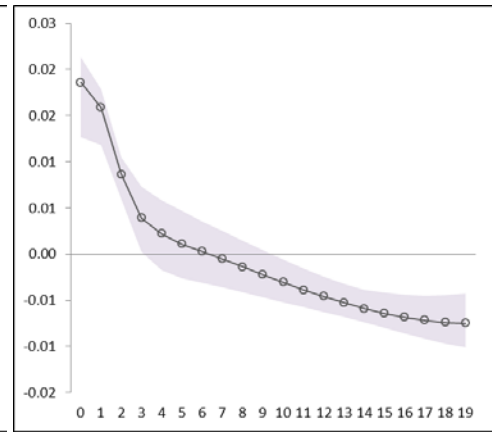
Response: Core Inflation



Response: Unemployment



Response: Federal Funds Rate

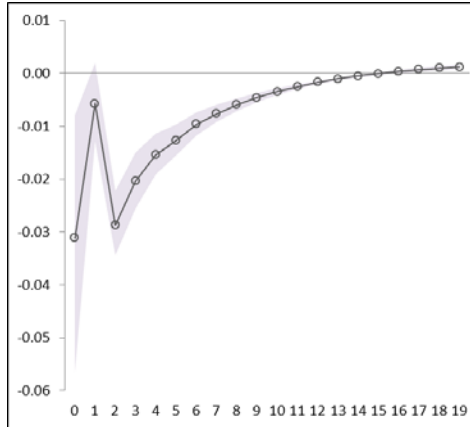


Model 13

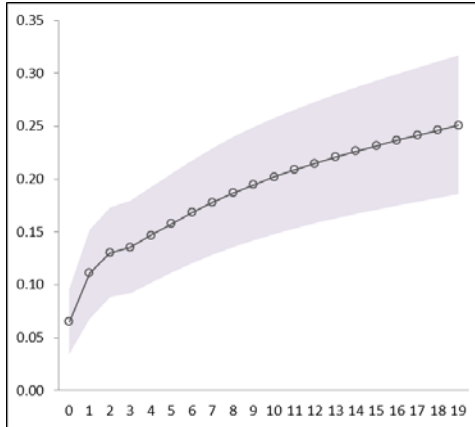
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Expected Monetary Policy Contraction (Price-Based)

Response: Core Inflation

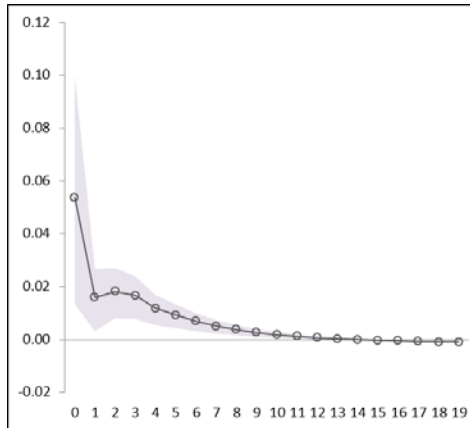


Response: Unemployment

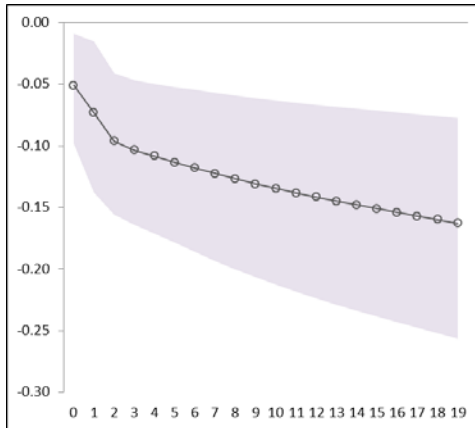


Shock: Monetary Policy Expansion (Quantity-Based)

Response: Core Inflation



Response: Unemployment

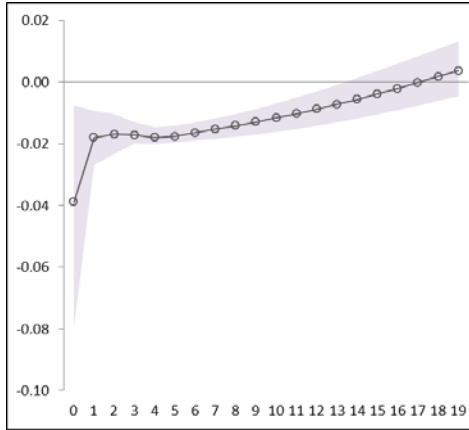


Model 14

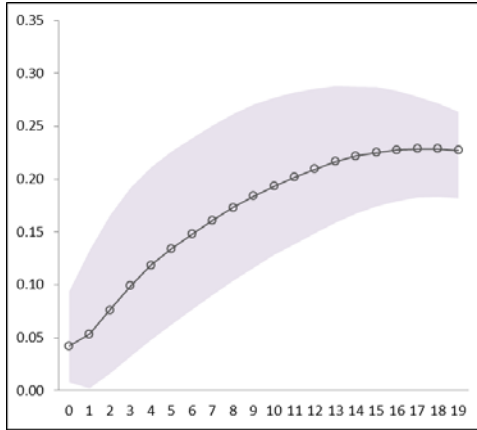
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Expected Monetary Policy Contraction

Response: Core Inflation

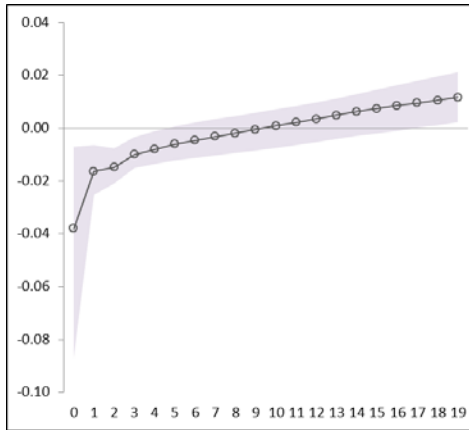


Response: Unemployment

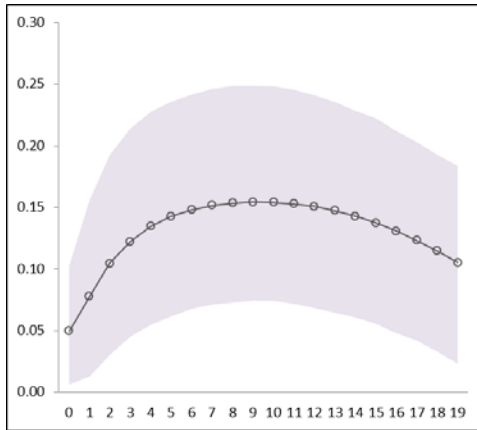


Shock: Monetary Policy Contraction

Response: Core Inflation



Response: Unemployment

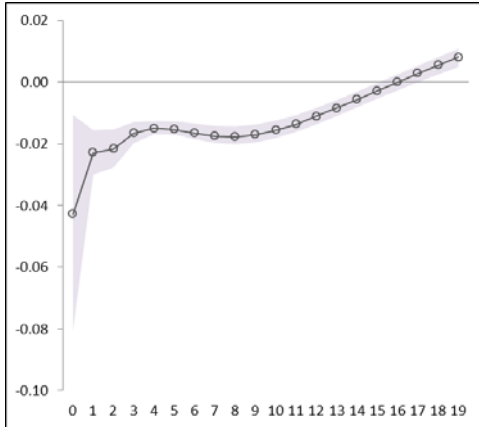


Model 15

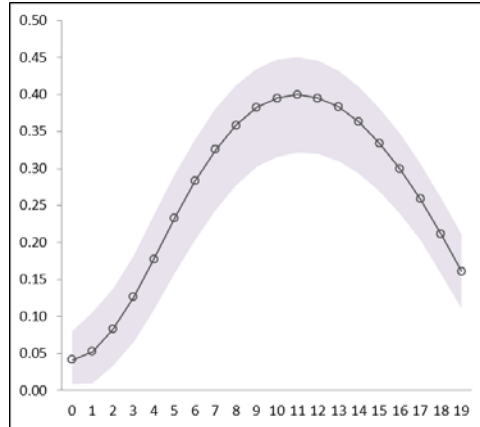
Zero Lower Bound (2008:Q4 – 2015:Q2)

Shock: Expected Monetary Policy Contraction

Response: Core Inflation

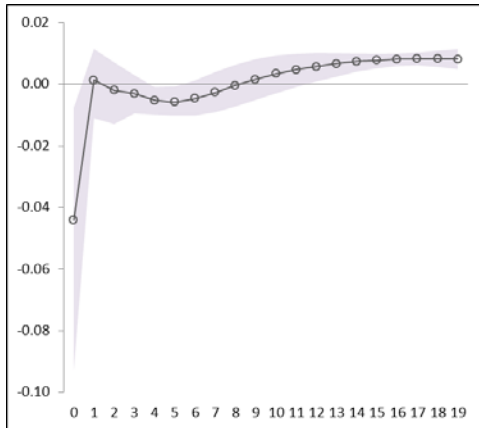


Response: Unemployment



Shock: Monetary Policy Contraction

Response: Core Inflation



Response: Unemployment

