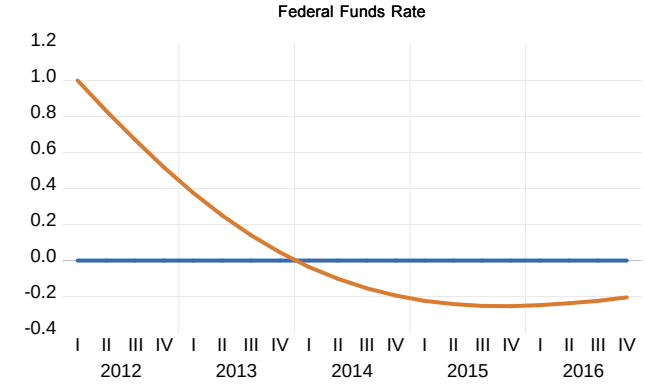
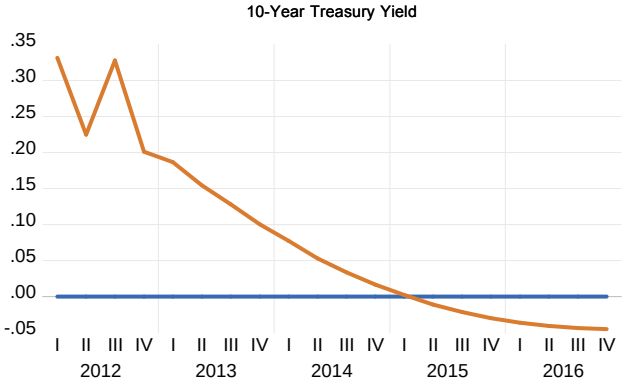
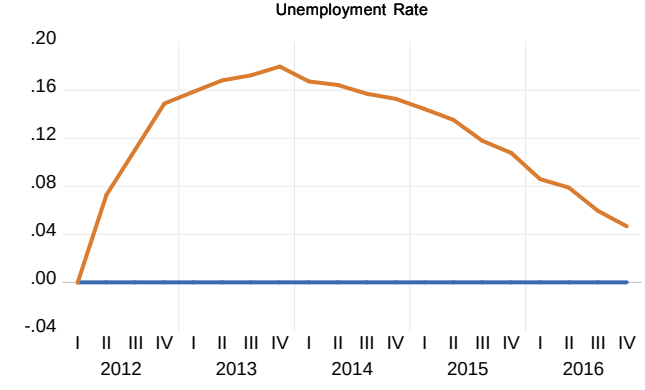
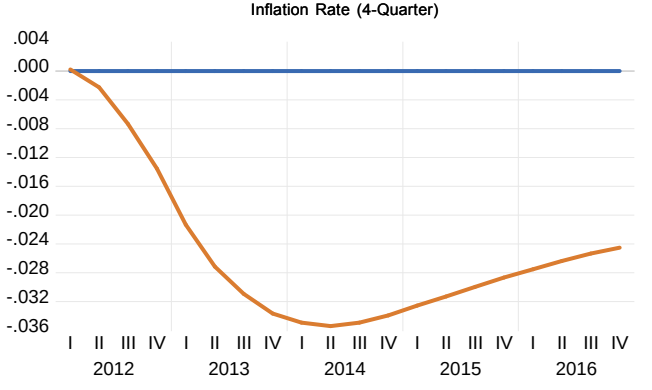
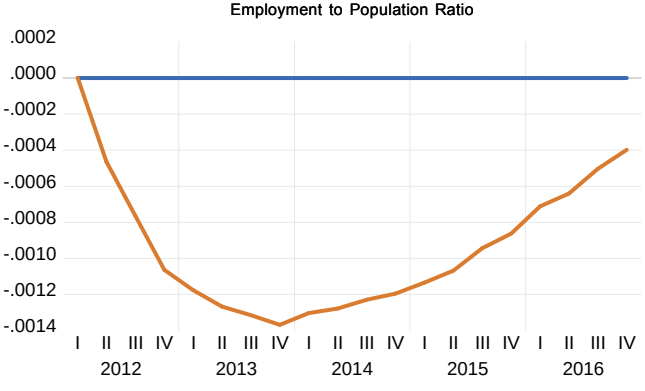
1. Macroeconomic Effects of Funds Rate Perturbation
(VAR Expectations)

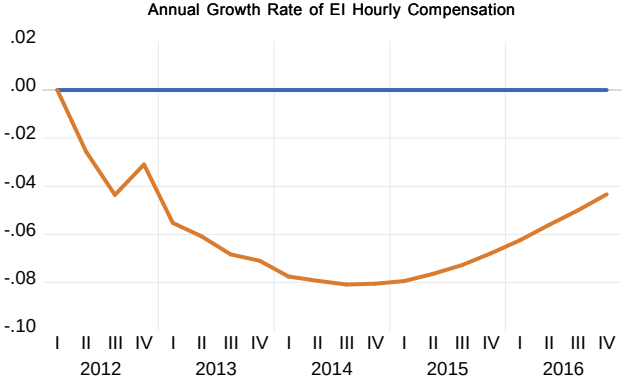




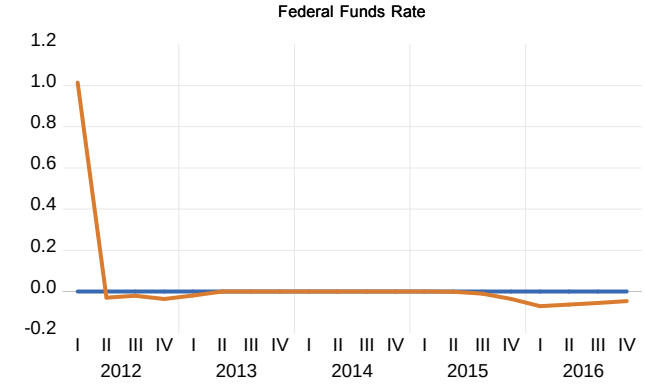


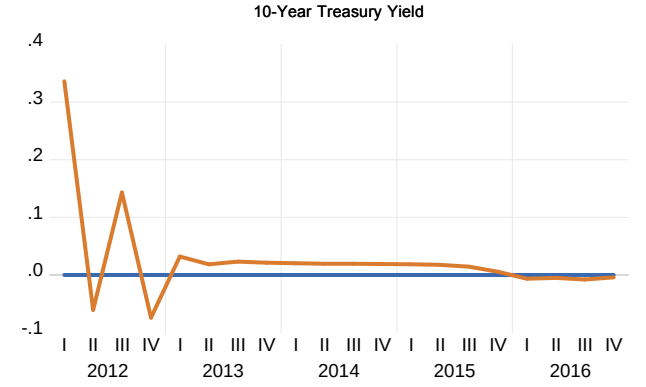


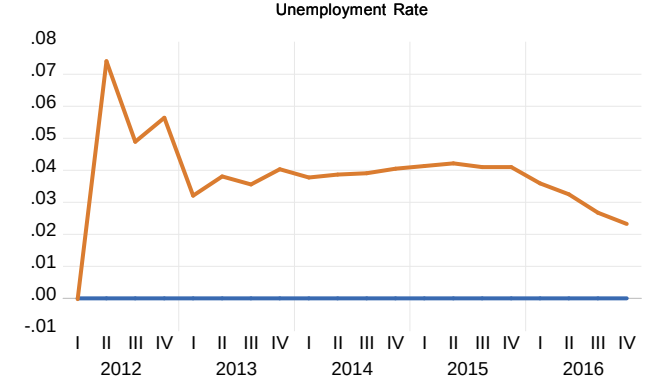


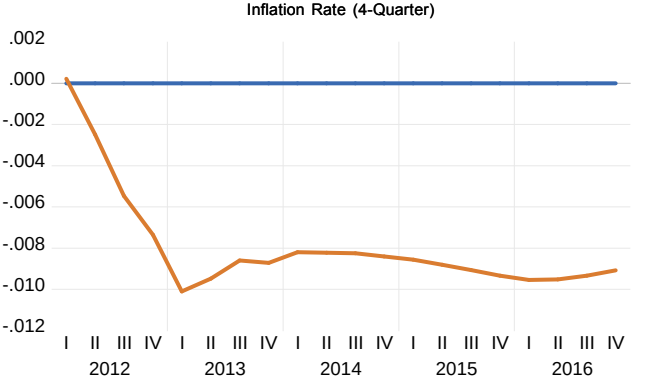


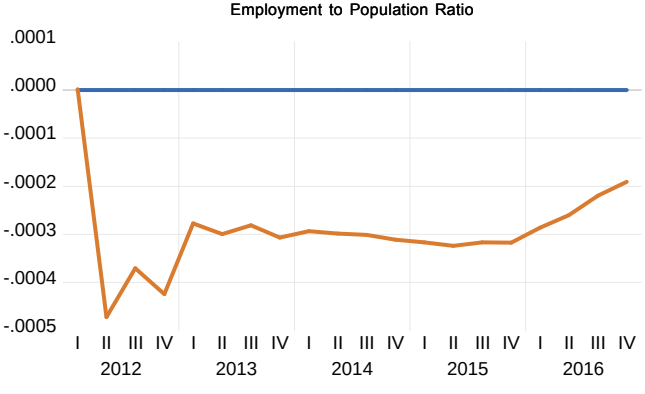
2. Macroeconomic Effects of Funds Rate Perturbation (VAR Expectations)

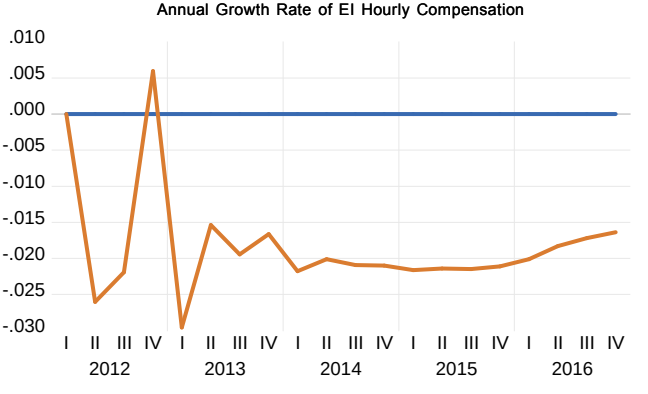




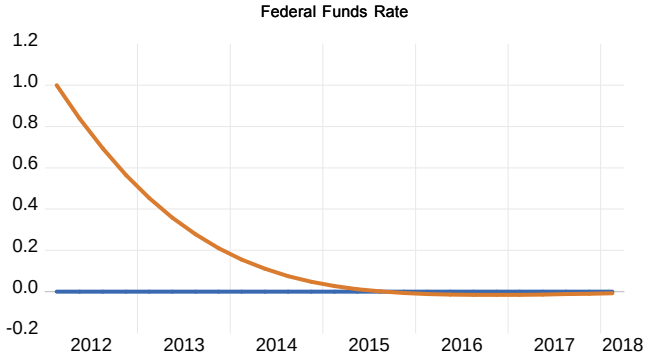


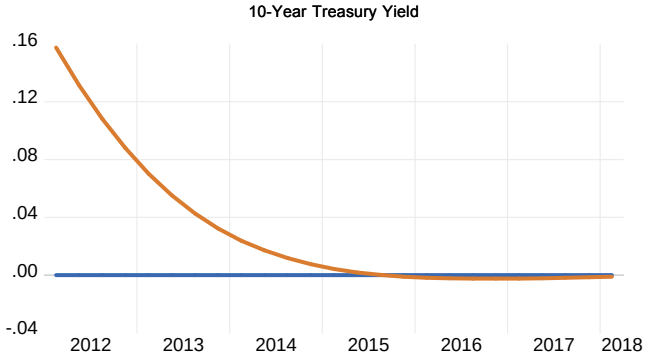


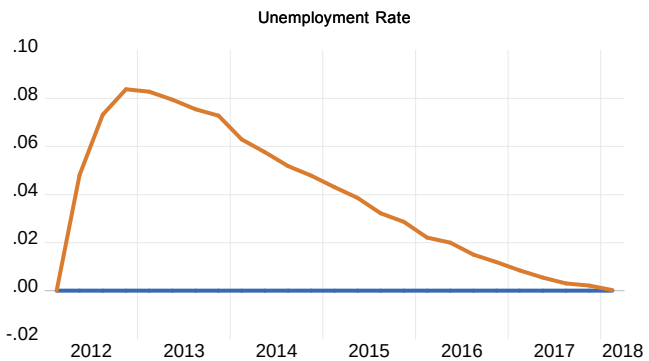


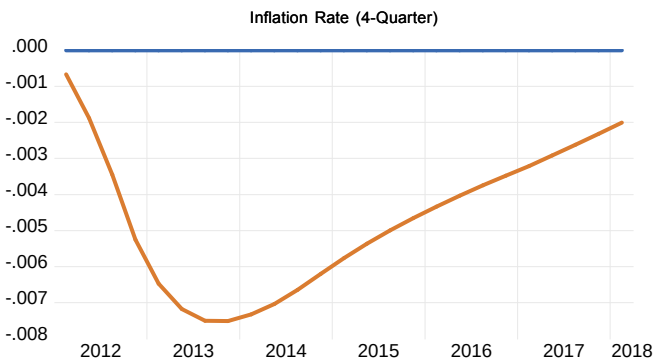


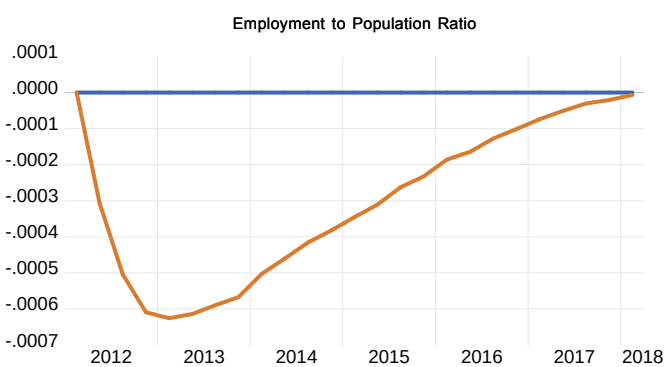
3. Macroeconomic Effects of Funds Rate Shock

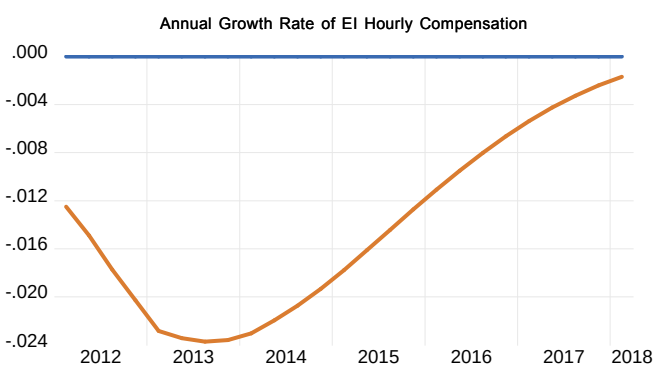








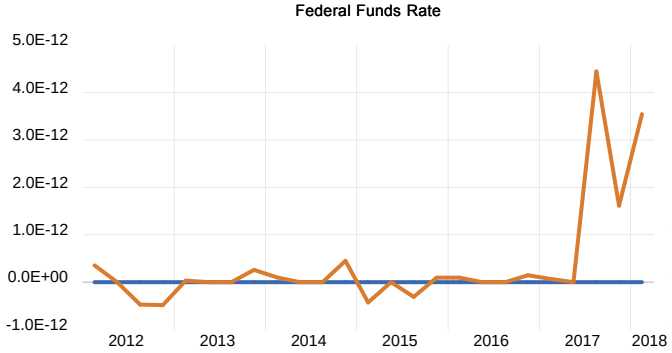


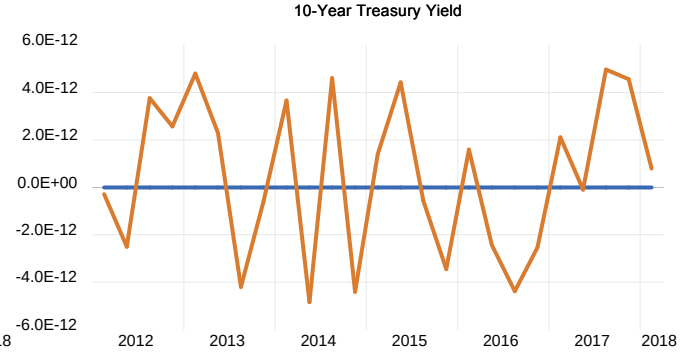


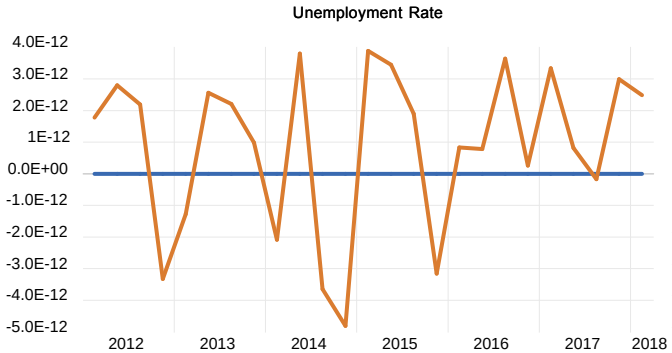
iter	converge stat	SSR stat	step length	step iters	Newton MCE deriv's?
0	0.367737	1.756082			
1	0.136811	0.571843	1.000000	1	
2	0.061447	0.093404	1.000000	1	
3	0.100691	0.165098	1.000000	1	
4	0.081485	0.136067	1.000000	1	
5	0.011192	0.002334	1.000000	1	
6	0.005199	0.000353	1.000000	1	
7	0.002092	6.26E-05	1.000000	1	
8	0.000402	2.22E-06	1.000000	1	
9	5.75E-05	5.10E-08	1.000000	1	
10	9.49E-06	1.39E-09	1.000000	1	

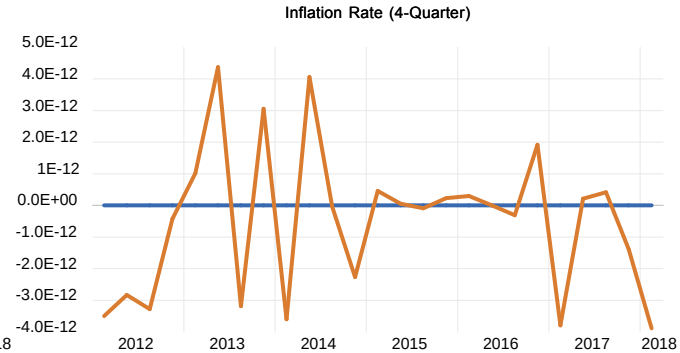
Simulation start = 2012Q1
Simulation end = 2018Q4
MCE method = "qnewton"
-- Initial Jacobian approximation = "bd"
---- QNewton iteration switch = 600
Linesearch method = lmr
-- Linesearch trigger = 0.9
-- Maximum linesearch iterations = 10
Convergence criteria = 1e-05
Maximum number of MCE iterations = 200
MCE instrument perturbation factor = 0.001
Intermediate output level factor = 1
MCE instrument variables = ZDIVGR_A ZGAP05_A ZGAP10_A ZGAP30_A ZPI10_A ZPI10F_A ZPIB5_A ZPIC30_A ZPIC58_A ZPICXFE_A ZPIECI_A ZRFF10_A ZRFF30_A ZRFF5_A
MCE error variables = EZDIVGR EZGAP05 EZGAP10 EZGAP30 EZPI10 EZPI10F EZPIB5 EZPIC30 EZPIC58 EZPICXFE EZPIECI EZRFF10 EZRFF30 EZRFF5
There are 392 instrument and 392 error observations
At iteration 11, convergence

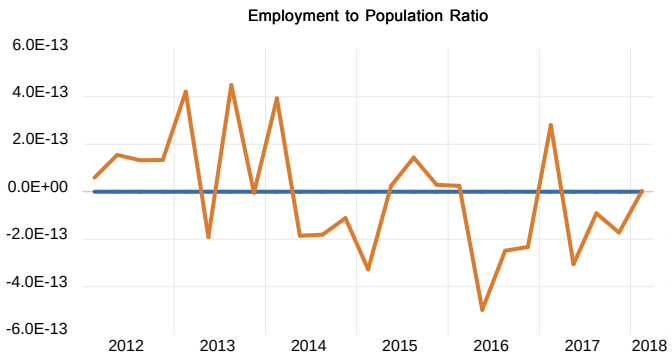
4. Macroeconomic Effects of Funds Rate Shock

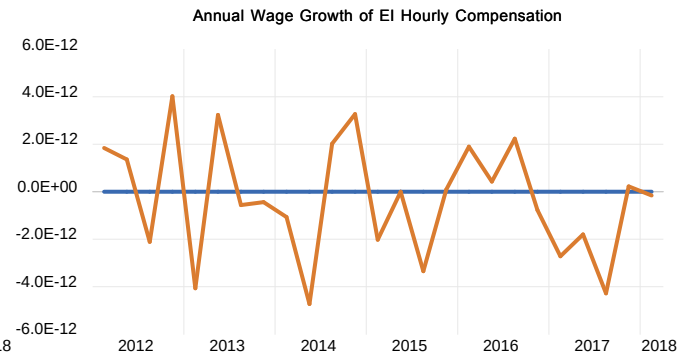








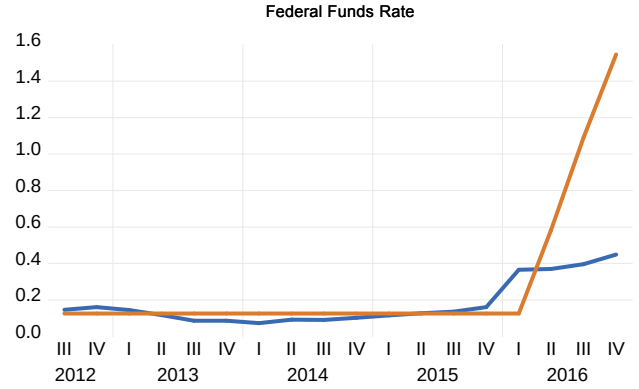


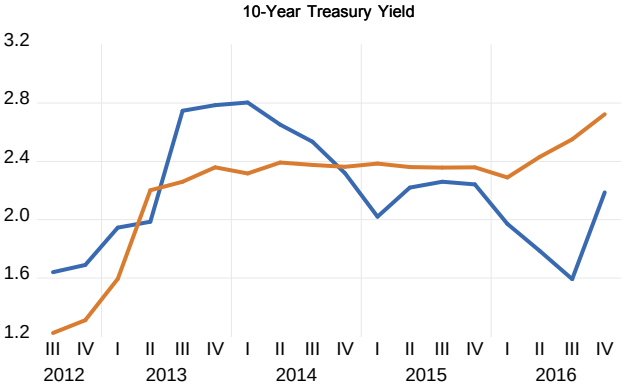


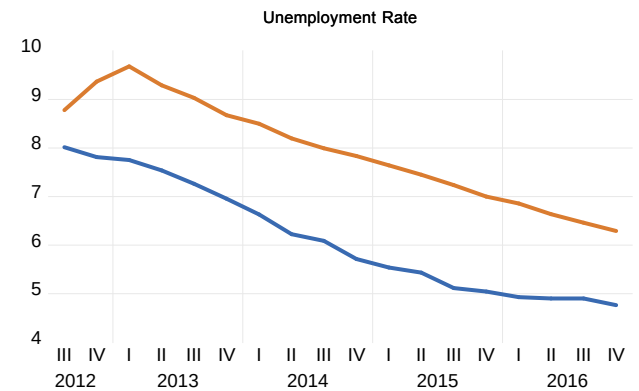
iter	converge stat	SSR stat	step length	step iters	Newton MCE deriv's?
0	9.22E-12	2.99E-21			

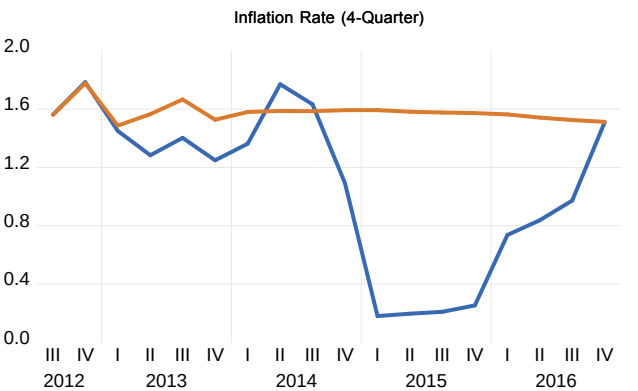
Simulation start = 2012Q1
Simulation end = 2018Q4
MCE method = "qnewton"
-- Initial Jacobian approximation = "bd"
---- QNewton iteration switch = 600
Linesearch method = lmr
-- Linesearch trigger = 0.9
-- Maximum linesearch iterations = 10
Convergence criteria = 1e-05
Maximum number of MCE iterations = 200
MCE instrument perturbation factor = 0.001
Intermediate output level factor = 1
MCE instrument variables = ZDIVGR_A ZGAP05_A ZGAP10_A ZGAP30_A ZPI10_A ZPI10F_A ZPIB5_A ZPIC30_A ZPIC58_A ZPICXFE_A ZPIECI_A ZRFF10_A ZRFF30_A ZRFF5_A
MCE error variables = EZDIVGR EZGAP05 EZGAP10 EZGAP30 EZPI10 EZPI10F EZPIB5 EZPIC30 EZPIC58 EZPICXFE EZPIECI EZRFF10 EZRFF30 EZRFF5
There are 392 instrument and 392 error observations
At iteration 1, convergence

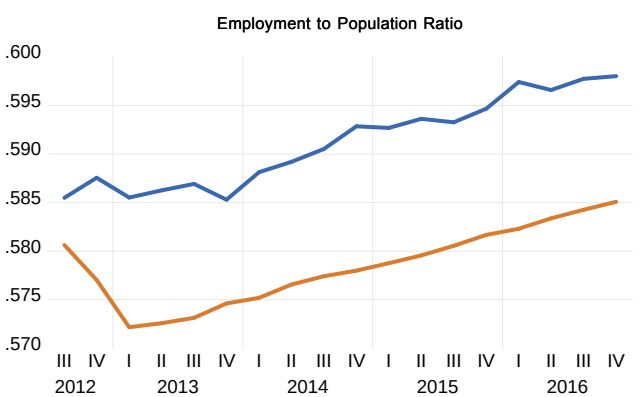
5. Macroeconomic Effects of Negative AD Shock
(VAR Expectations; Policy = rfftay)
(ZLB and Thresholds Imposed)

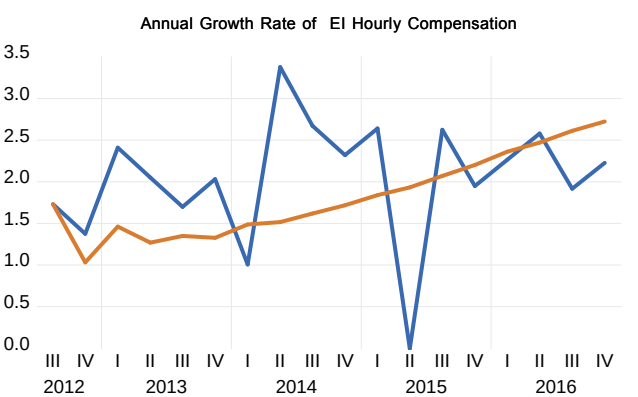










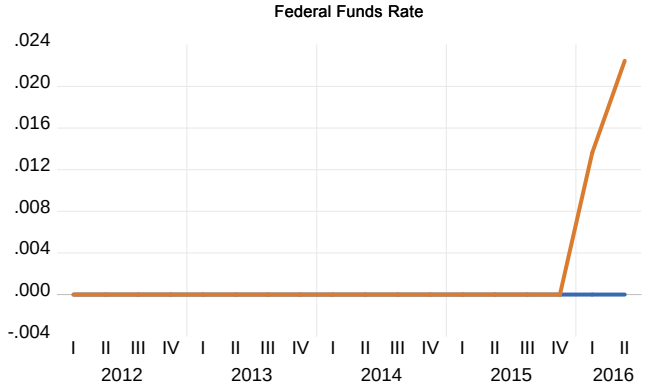


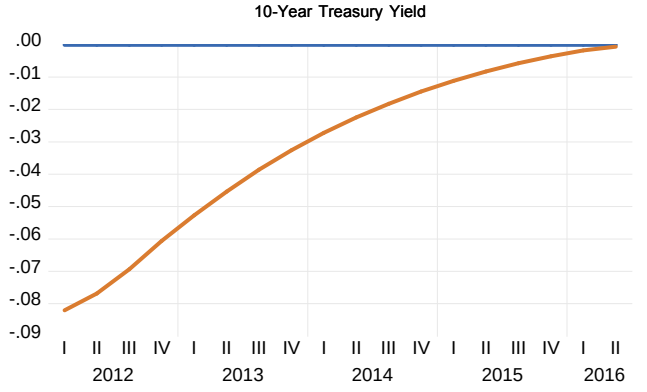
Blue: Actual; Red: Simulated

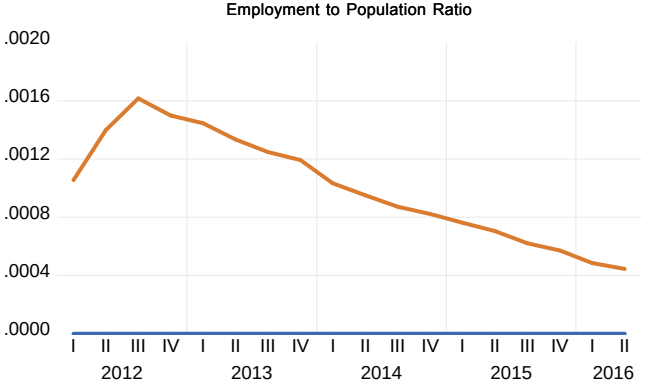
iter	converge stat	SSR stat	step length	step iters	Newton MCE deriv's?
0	0.481575	1.016649			
1	0.094388	0.299025	1.000000	1	
2	0.192817	0.622127	1.000000	1	
3	0.050130	0.049115	1.000000	1	
4	0.008192	0.000888	1.000000	1	
5	0.005914	0.000633	1.000000	1	
6	0.000964	1.85E-05	1.000000	1	
7	0.000146	8.99E-07	1.000000	1	
8	7.23E-05	1.60E-07	1.000000	1	
9	9.81E-06	2.94E-09	1.000000	1	

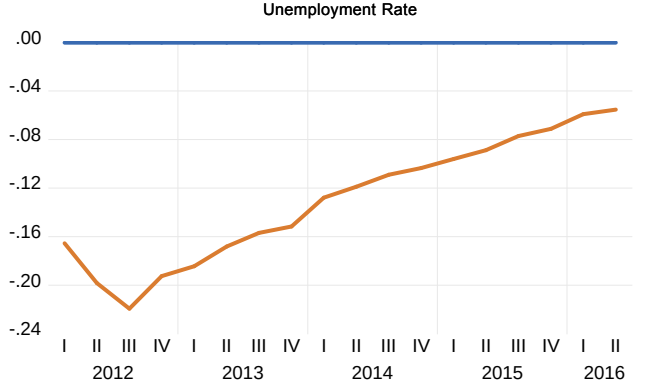
Simulation start = 2012Q1
Simulation end = 2016Q4
MCE method = "qnewton"
-- Initial Jacobian approximation = "bd"
---- QNewton iteration switch = 600
Linesearch method = lmr
-- Linesearch trigger = 0.9
-- Maximum linesearch iterations = 10
Convergence criteria = 1e-05
Maximum number of MCE iterations = 200
MCE instrument perturbation factor = 0.001
Intermediate output level factor = 1
MCE instrument variables = ZDIVGR_A ZGAP05_A ZGAP10_A ZGAP30_A ZPI10_A ZPI10F_A ZPIB5_A ZPIC30_A ZPIC58_A ZPICXFE_A ZPIECI_A ZRFF10_A ZRFF30_A ZRFF5_A ZGAP3_A ZPIC43_A
MCE error variables = EZDIVGR EZGAP05 EZGAP10 EZGAP30 EZPI10 EZPI10F EZPIB5 EZPIC30 EZPIC58 EZPICXFE EZPIECI EZRFF10 EZRFF30 EZRFF5 EZGAP3 EZPIC43
There are 320 instrument and 320 error observations
At iteration 10, convergence

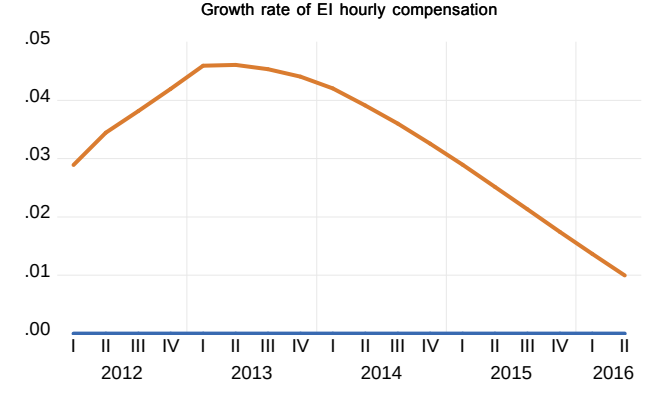
6. Macroeconomic Effects of a Shock to Consumption

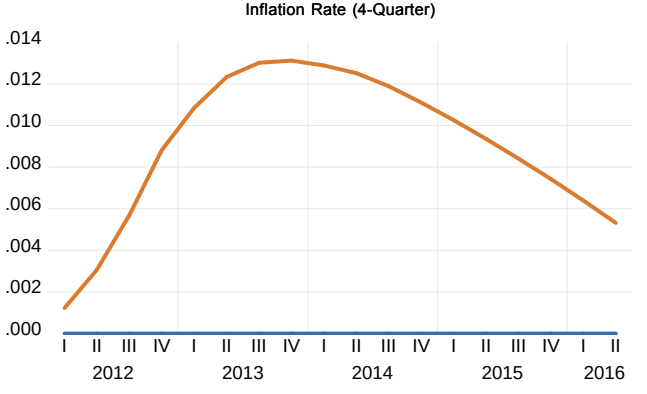




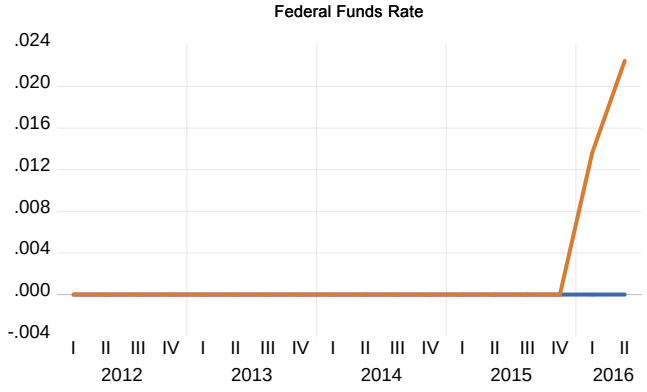


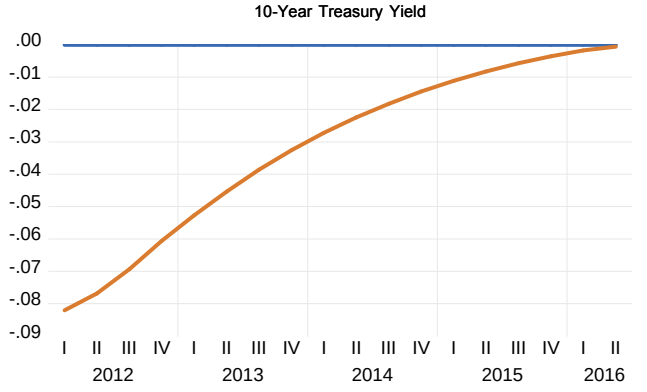


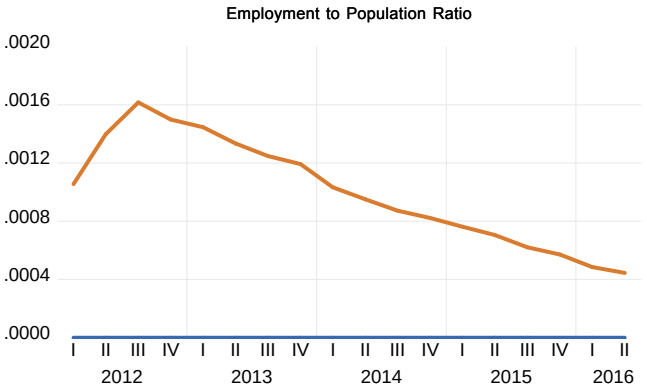


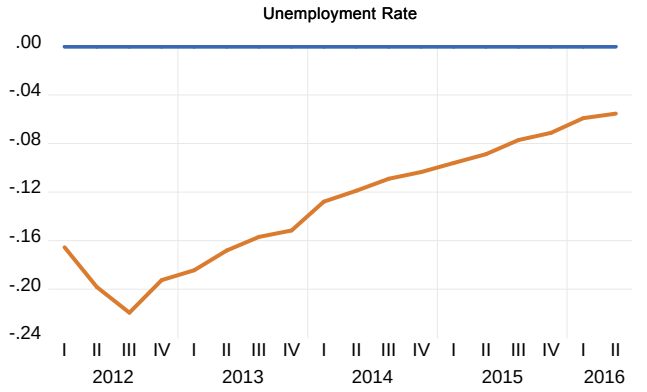


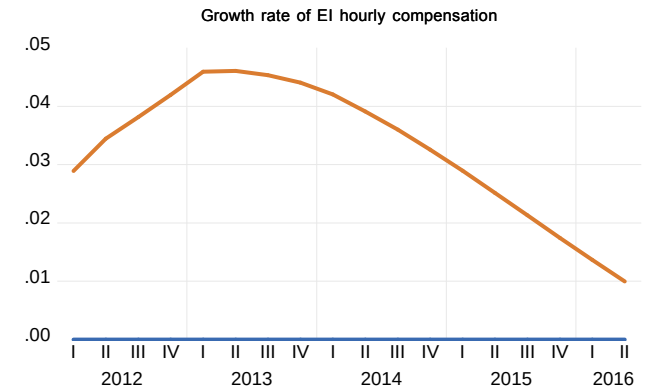
Macroeconomic Effects of a Shock to Consumption

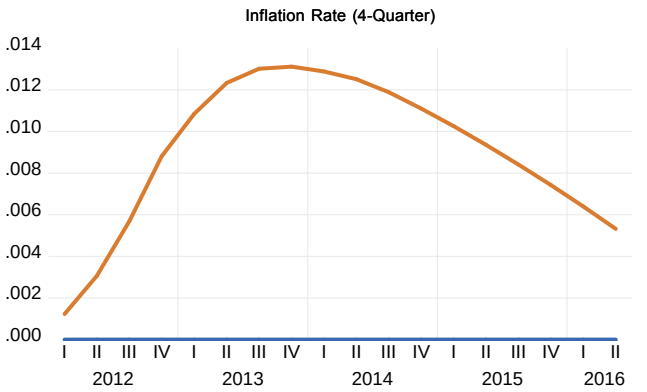






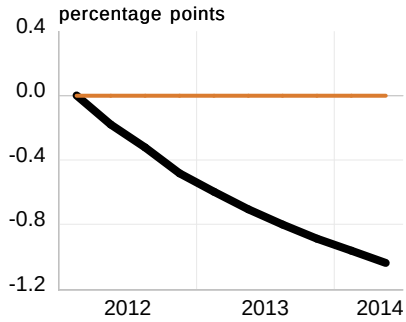




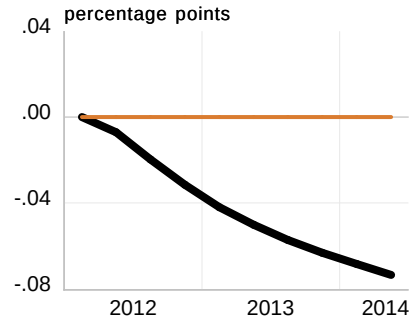


7. FRB/US Ping Simulations: VAR Expectations -- III

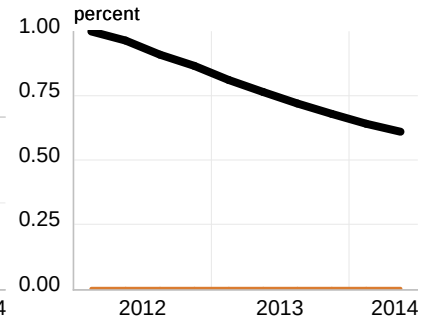
Response of Output Gap to Term Premium



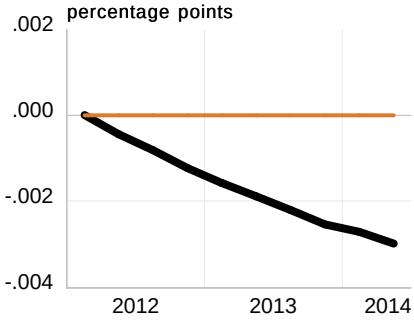
Response of Core Inflation to Term Premium



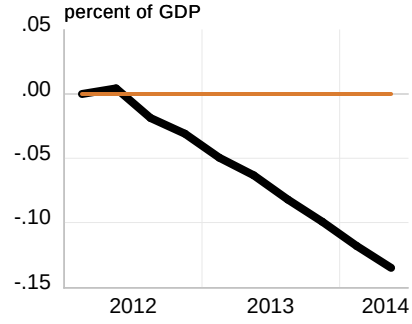
Response of Term Premium (10-year) to Term Premium



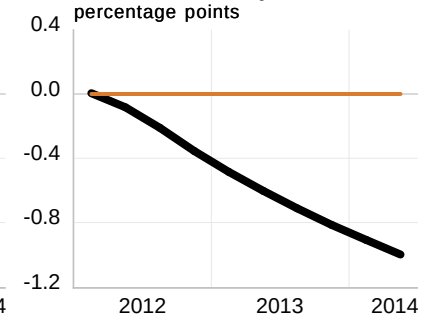
Response of Employment to Population Ratio to Federal Purch



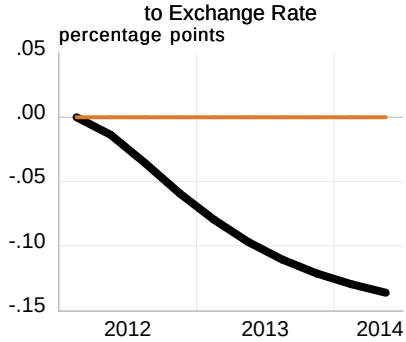
Response of Hourly EI Compensation Annual Growth Rate to Funds Rate



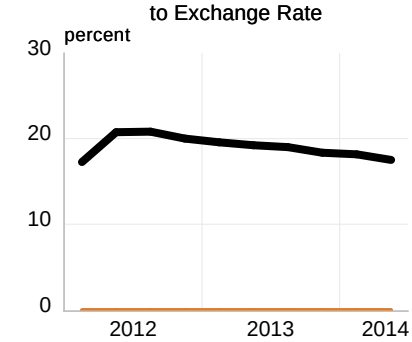
Response of Output Gap to Exchange Rate



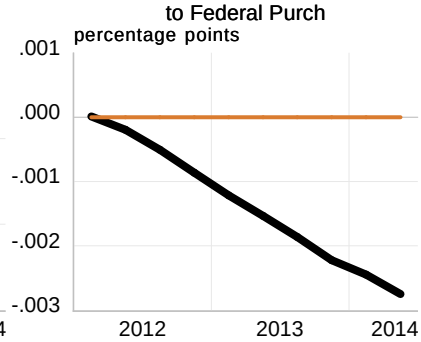
Response of Core Inflation to Exchange Rate



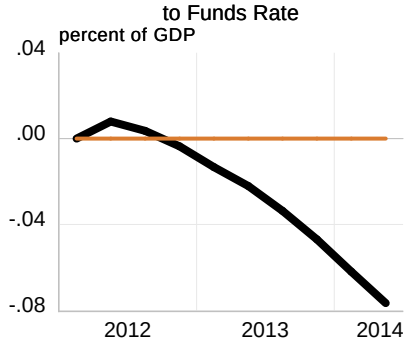
Response of Exchange Rate to Exchange Rate



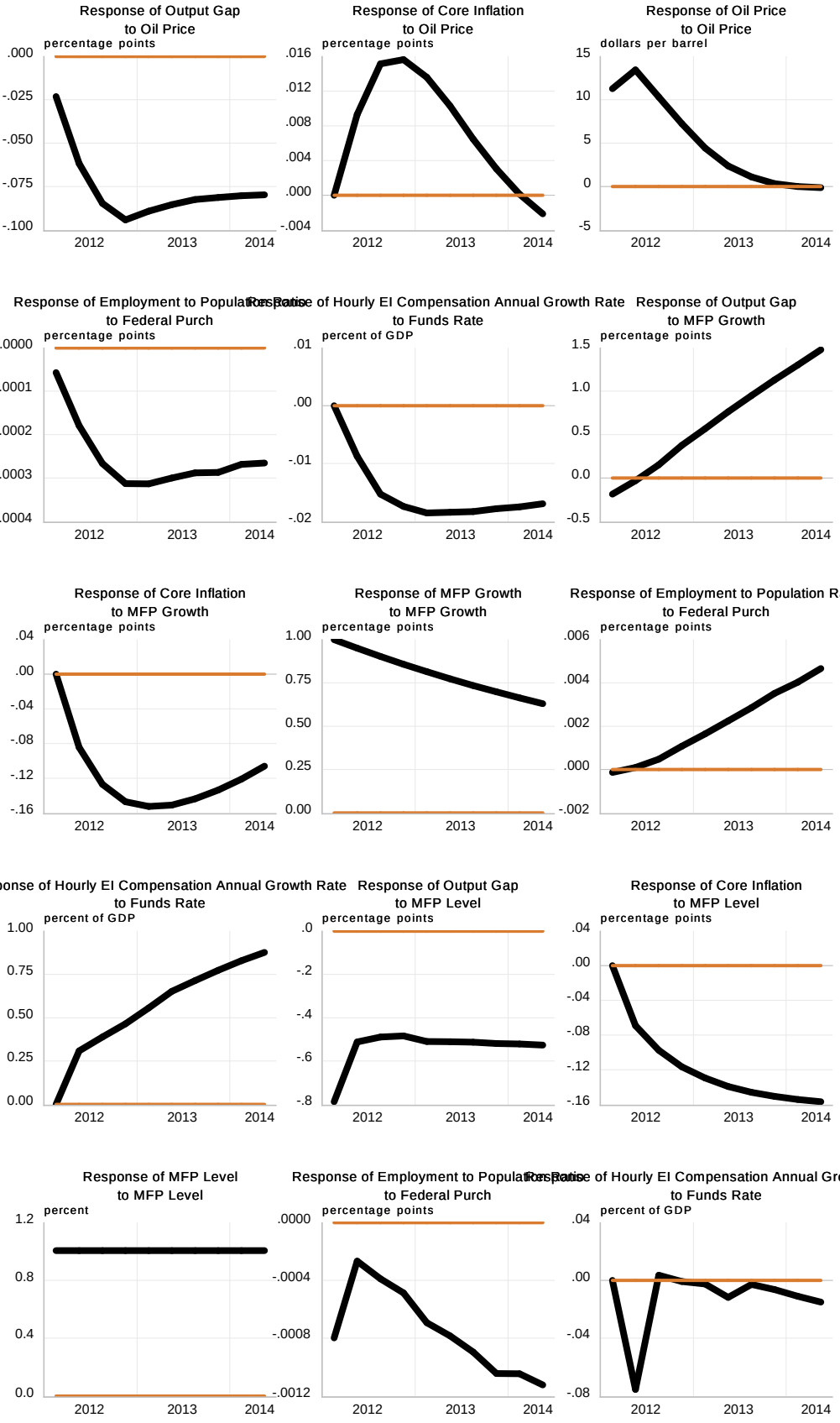
Response of Employment to Population Ratio to Federal Purch



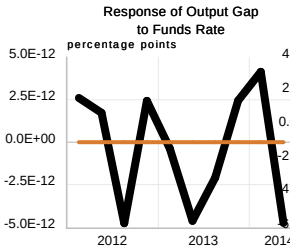
Response of Hourly EI Compensation Annual Growth Rate to Funds Rate

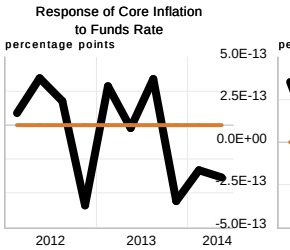


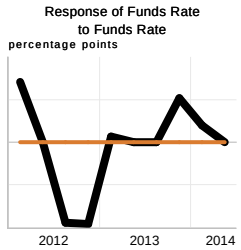
FRB/US Ping Simulations: VAR Expectations -- II

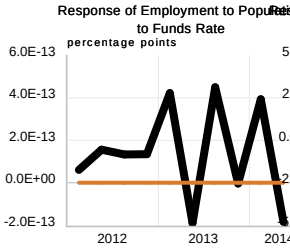


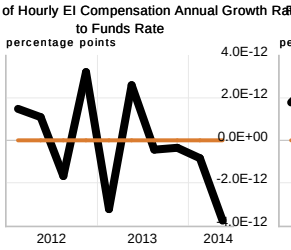
FRB/US Ping Simulations: VAR Expectations -- I

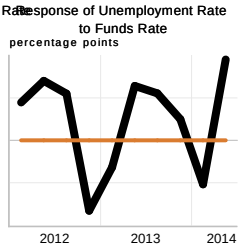


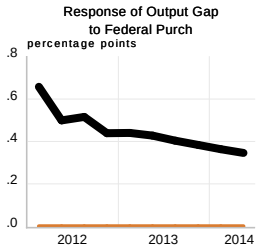


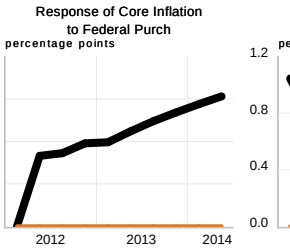


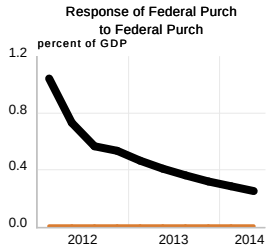


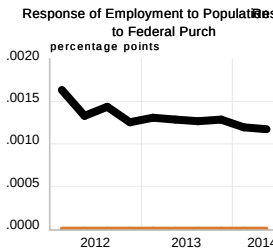


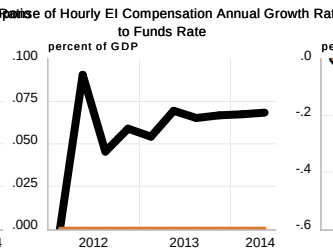


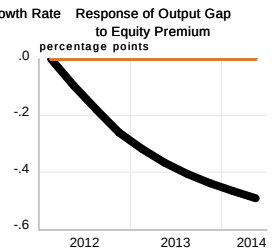


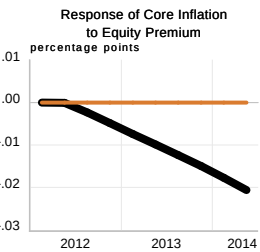


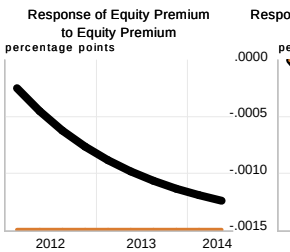


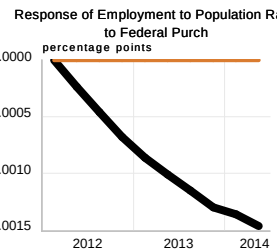


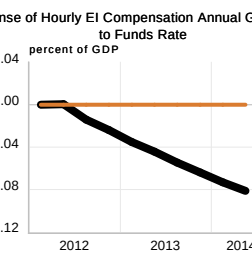








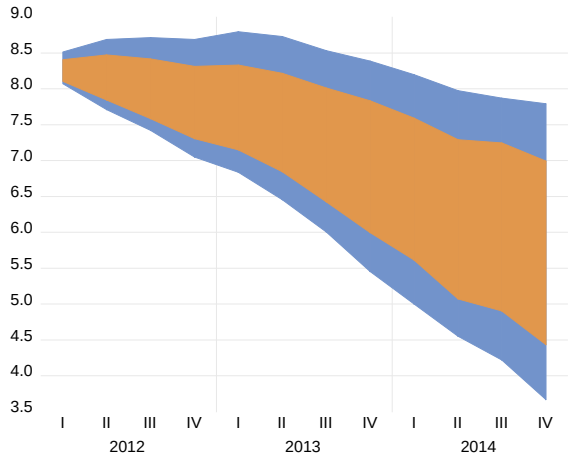




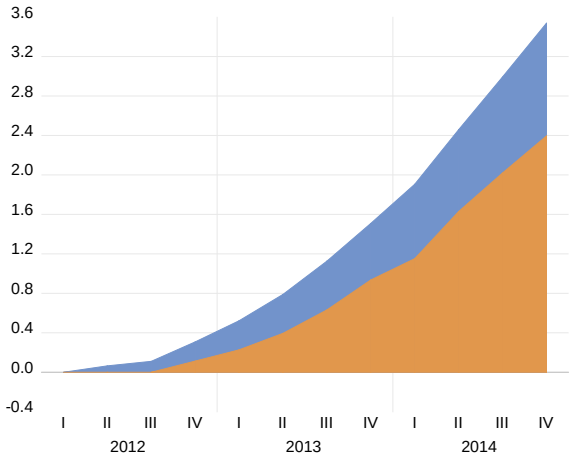
qtr	baseline	mean	median	stdev	90%-low	90%-hi	70%-low	70%-hi
RFF								
2012Q4	0.161	0.050	0.000	0.122	0.000	0.308	0.000	0.113
2013Q4	0.085	0.368	0.027	0.544	-0.000	1.508	0.000	0.936
2014Q4	0.102	1.060	0.635	1.209	-0.000	3.539	0.000	2.396
LUR								
2012Q4	7.812	7.805	7.765	0.510	7.050	8.690	7.305	8.316
2013Q4	6.956	6.905	6.871	0.912	5.454	8.389	5.995	7.834
2014Q4	5.718	5.712	5.706	1.253	3.669	7.792	4.436	6.994
PICXFE								
2012Q4	1.762	1.771	1.755	0.969	0.218	3.329	0.800	2.801
2013Q4	1.900	1.931	1.918	0.978	0.356	3.575	0.960	2.941
2014Q4	1.098	1.141	1.120	1.034	-0.553	2.820	0.111	2.232
PICNIA								
2012Q4	2.240	2.207	2.202	1.333	0.341	4.123	1.038	3.497
2013Q4	1.629	1.656	1.615	1.254	-0.288	3.770	0.485	2.934
2014Q4	-0.508	-0.451	-0.496	1.260	-2.493	1.685	-1.687	0.869
PICX4								
2012Q4	1.808	1.815	1.791	0.584	0.873	2.786	1.228	2.383
2013Q4	1.578	1.602	1.608	0.806	0.246	2.922	0.773	2.404
2014Q4	1.452	1.500	1.500	0.847	0.077	2.873	0.601	2.342
XGAP2								
2012Q4	-3.119	-3.073	-3.016	1.140	-5.077	-1.362	-4.209	-1.944
2013Q4	-1.949	-1.863	-1.806	2.180	-5.706	1.670	-4.112	0.427
2014Q4	-0.291	-0.368	-0.242	2.994	-5.144	4.506	-3.486	2.563
HGGDP								
2012Q4	0.455	0.461	0.638	2.709	-3.959	4.458	-2.138	3.088
2013Q4	3.180	3.118	3.107	2.956	-1.644	7.988	0.137	6.126
2014Q4	2.245	1.883	1.949	2.808	-2.806	6.253	-1.020	4.731
ANNGR								
2012Q4	1.469	1.508	1.609	1.245	-0.675	3.299	0.287	2.721
2013Q4	2.614	2.659	2.688	1.836	-0.533	5.563	0.902	4.444
2014Q4	2.877	2.705	2.696	1.866	-0.291	5.668	0.875	4.592
EPOP								
2012Q4	0.588	0.588	0.588	0.003	0.582	0.592	0.584	0.591
2013Q4	0.585	0.586	0.586	0.007	0.575	0.596	0.579	0.592
2014Q4	0.593	0.593	0.593	0.009	0.578	0.608	0.583	0.602
PIECI								
2012Q4	1.377	1.415	1.358	1.139	-0.228	3.168	0.443	2.449
2013Q4	2.032	2.065	2.078	1.198	0.156	3.915	0.892	3.203
2014Q4	2.321	2.331	2.263	1.314	0.355	4.377	1.040	3.604

8. Stochastic Simulations
(70 and 90 percent bands)

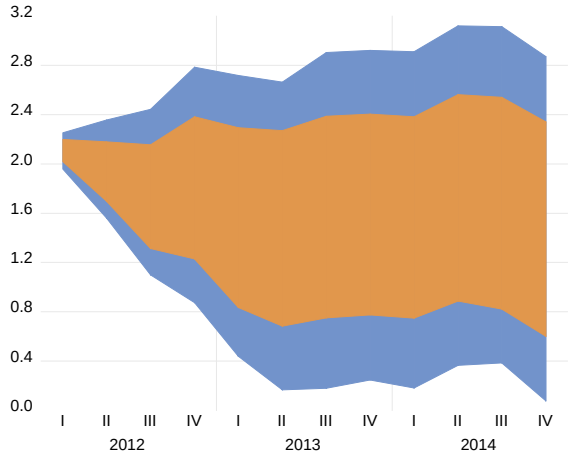
Unemployment Rate



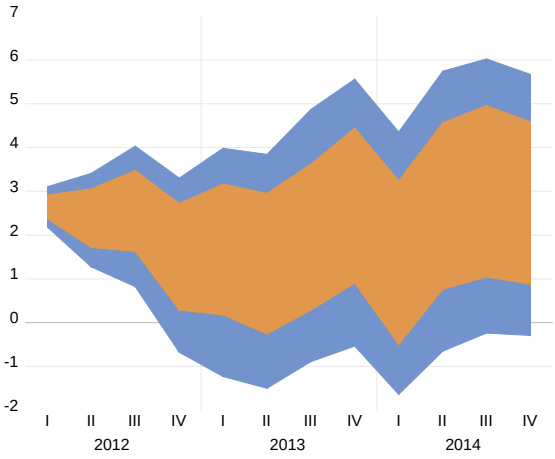
Federal Funds Rate



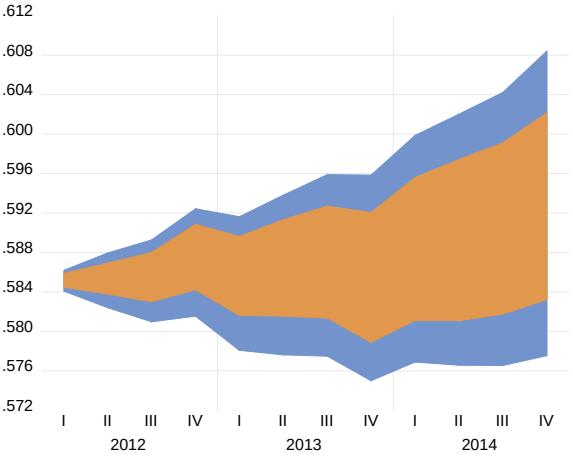
4-qtr Core Inflation Rate



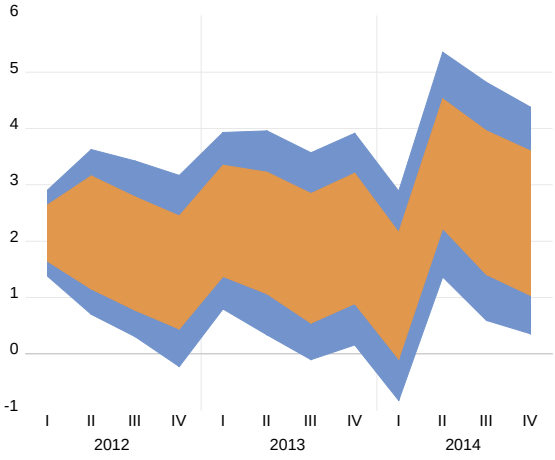
4-qtr Real GDP Growth Rate



4-qtr Employment to Population Ratio



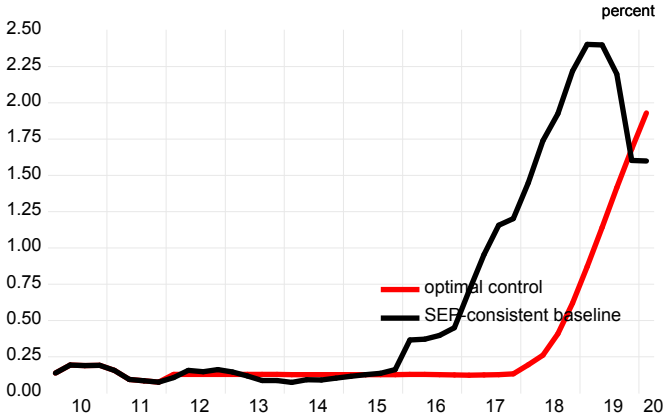
4-qtr Annual Growth Rate of EI Hourly Compensation



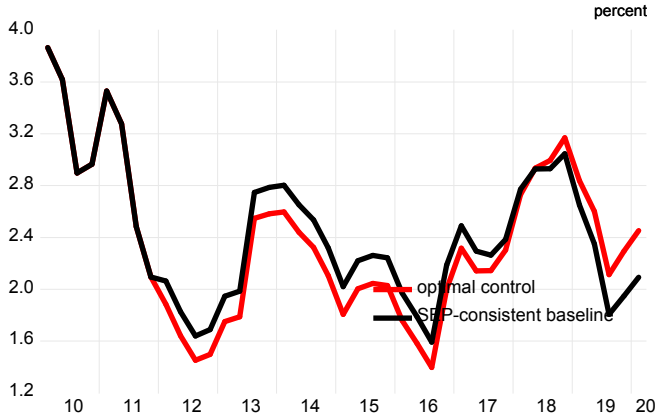
error	mean	std-dev
EBFI_ERR	-5.13E-19	0.016009
ECD_ERR	-3.98E-19	0.025866
ECH_ERR	6.82E-22	0.000197
ECO_ERR	-7.36E-20	0.003959
EGFE_ERR	-1.75E-19	0.018066
EGFL_ERR	2.29E-19	0.006980
EGSE_ERR	1.53E-19	0.015474
EGSL_ERR	-1.64E-20	0.002860
EH_ERR	-4.80E-19	0.032154
EMO_ERR	-2.40E-19	0.017333
EMP_ERR	-8.90E-18	0.183766
EX_ERR	-7.36E-20	0.021044
FPXRR_ERR	-2.62E-19	0.028381
FXGAP_ERR	-1.87E-17	0.896291
GTRD_ERR	8.73E-20	0.002744
HMFPT_ERR	2.08E-18	0.044014
HQLFPR_ERR	-5.11E-21	7.42E-05
HQLWW_ERR	8.84E-19	0.011931
KI_ERR	-2.18E-20	0.004946
LFPR_ERR	-7.02E-20	0.001199
LHP_ERR	4.36E-20	0.003216
LURNAT_ERR	1.85E-18	0.097896
LWW_ERR	-4.09E-21	0.001791
MFPT_ERR	-2.05E-21	0.000727
PBFIR_ERR	2.40E-19	0.005326
PCER_ERR	7.86E-19	0.024803
PCFR_ERR	-4.36E-20	0.006143
PEGFR_ERR	-1.36E-19	0.004462
PEGSR_ERR	2.18E-20	0.006567
PHOUSE_ERR	1.20E-19	0.006902
PHR_ERR	-6.55E-19	0.006728
PICXFE_ERR	-8.38E-18	0.765693
PIECI_ERR	2.92E-17	1.068906
PMO_ERR	5.46E-21	0.001810
POILR_ERR	-2.09E-18	0.114109
PXR_ERR	3.60E-19	0.006402
RBBBP_ERR	-3.05E-19	0.028139
RCAR_ERR	2.02E-17	0.322426
RCGAIN_ERR	2.78E-17	4.134953
REQP_ERR	1.03E-17	0.799839
RFYNIC_ERR	1.31E-17	0.281783
RFYNIL_ERR	6.46E-18	0.211663
RG10P_ERR	-3.67E-18	0.429419
RG30P_ERR	5.24E-18	0.399929
RG5P_ERR	-2.27E-18	0.493445
RGFINT_ERR	-1.53E-19	0.002335
RME_ERR	1.80E-17	0.290780
TRCI_ERR	-1.09E-20	0.014168
TRP_ERR	6.55E-20	0.005170
YNIDN_ERR	4.80E-19	0.043297
YNIRN_ERR	2.71E-20	0.002162

9. ZLB Imposed

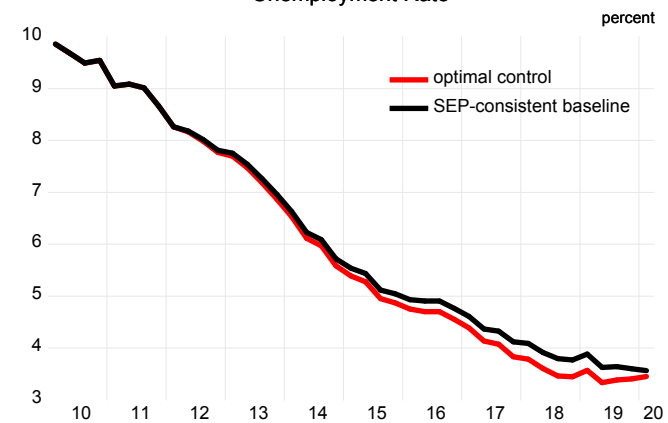
Federal Funds Rate



10-Year Treasury Yield

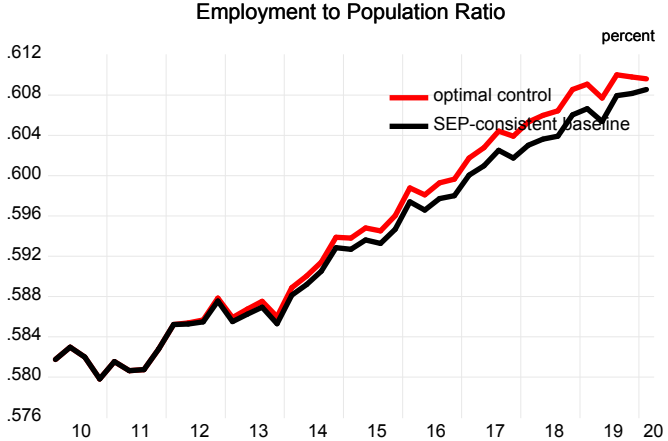


Unemployment Rate

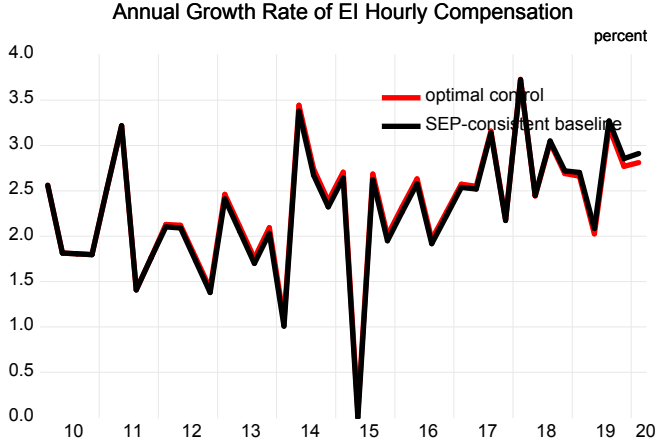


PCE Inflation Rate (4-Quarter)

Employment to Population Ratio



Annual Growth Rate of EI Hourly Compensation



iter	f(x)	step size	convergence statistic	linearity statistic
0	118.5264			
1	118.3343	0.250000	0.001621	-1.035195
2	118.2532	1.000000	0.000685	0.333356
3	118.2472	0.250000	5.04E-05	-1.496582
4	118.2472	0.031250	2.71E-07	-1.408235

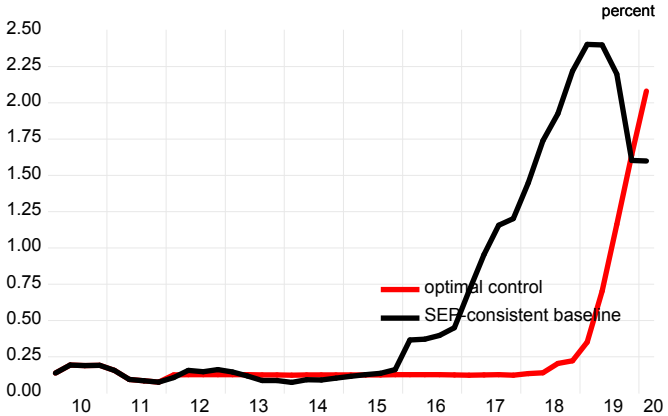
unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 8, convergence
unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 4, convergence

iter	f(x)	step size	convergence statistic	linearity statistic
0	124.9776			
1	123.0016	0.125000	0.015811	-1.008300
2	121.7573	0.500000	0.010116	-1.036963
3	119.6347	1.000000	0.017433	0.529866
4	118.8931	1.000000	0.006199	0.094747
5	118.8737	1.000000	0.000163	0.832745
6	118.8717	0.500000	1.69E-05	-1.567517
7	118.8680	1.000000	3.12E-05	-0.290151
8	118.8680	0.000977	3.95E-08	-1.246978

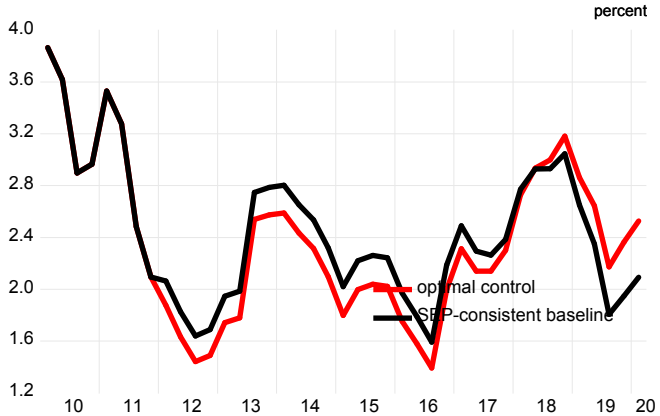
unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 8, convergence

10. ZLB Imposed

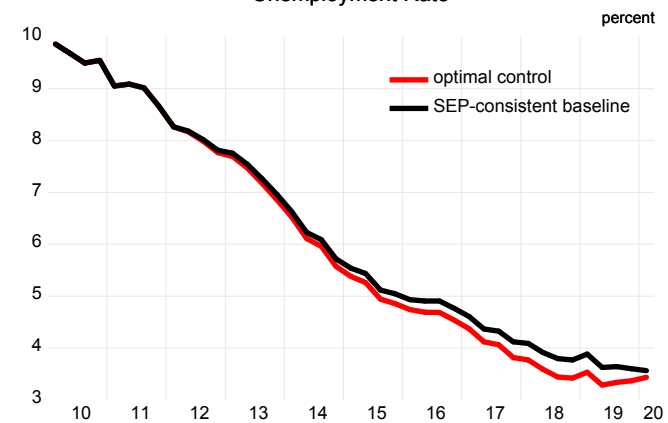
Federal Funds Rate



10-Year Treasury Yield

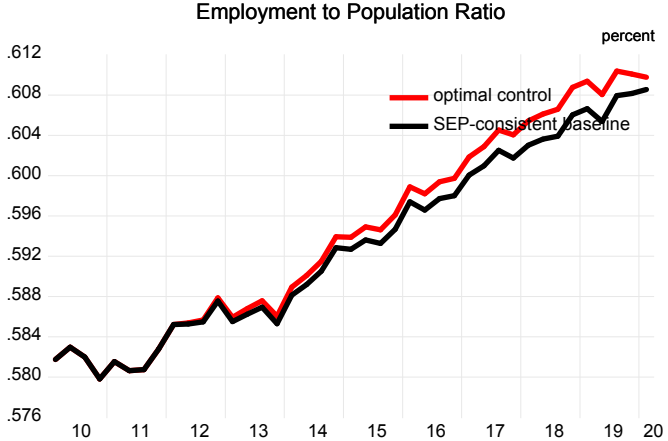


Unemployment Rate

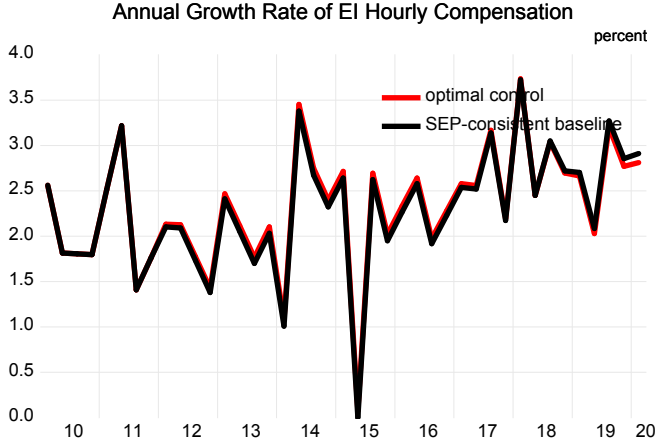


PCE Inflation Rate (4-Quarter)

Employment to Population Ratio



Annual Growth Rate of EI Hourly Compensation



iter	f(x)	step size	convergence statistic	linearity statistic
0	117.7981			
1	117.6819	0.250000	0.000987	-1.025616
2	117.4994	1.000000	0.001551	0.382128
3	117.4914	0.250000	6.79E-05	-1.485554
4	117.4912	0.250000	1.68E-06	-1.559233

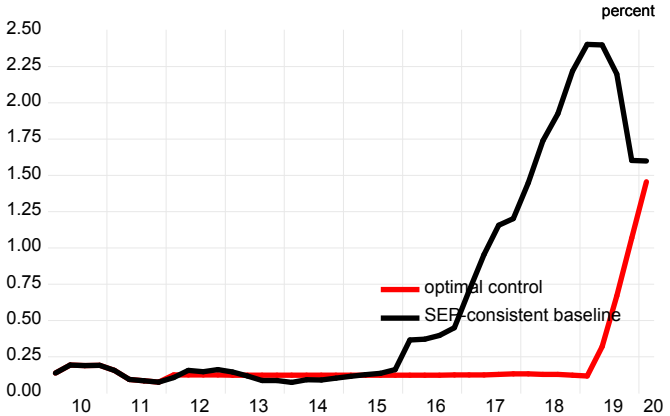
unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 10, convergence
unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 4, convergence

iter	f(x)	step size	convergence statistic	linearity statistic
0	124.3157			
1	123.5426	0.031250	0.006219	-1.001549
2	122.8082	0.125000	0.005945	-1.002745
3	121.7274	0.125000	0.008800	-1.004087
4	120.7775	0.125000	0.007804	-1.007549
5	119.7564	0.250000	0.008454	-1.010766
6	119.1582	0.250000	0.004996	-1.019163
7	118.6781	0.250000	0.004029	-1.052999
8	118.2407	0.500000	0.003685	-1.452117
9	118.1436	1.000000	0.000821	0.861382
10	118.1434	0.125000	2.15E-06	-1.474071

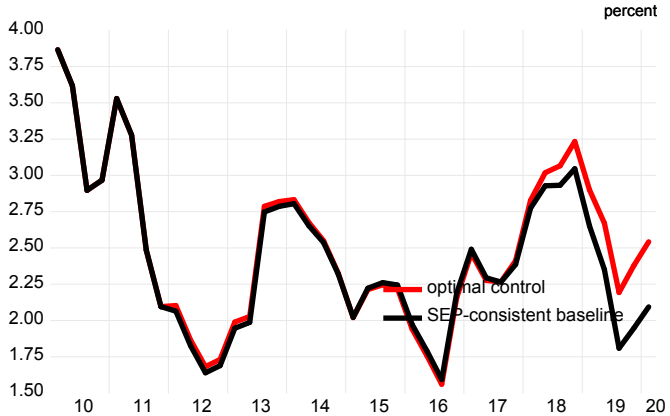
unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 10, convergence

11. ZLB Imposed

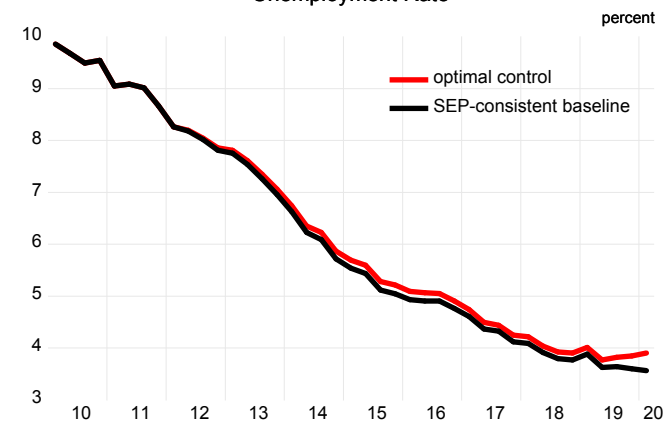
Federal Funds Rate



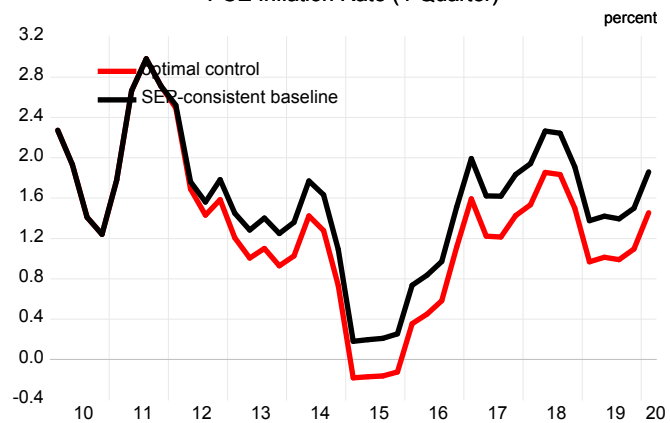
10-Year Treasury Yield



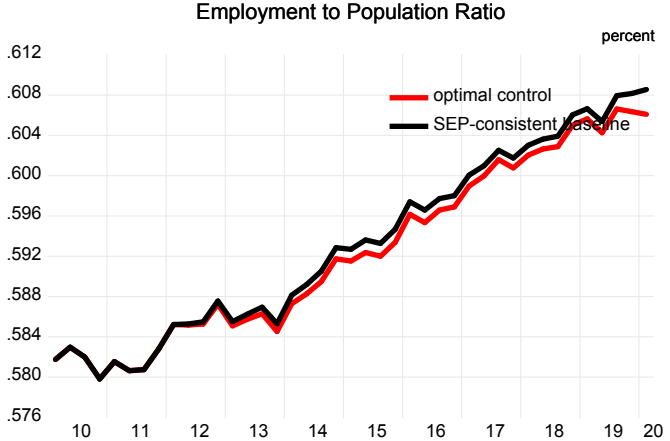
Unemployment Rate



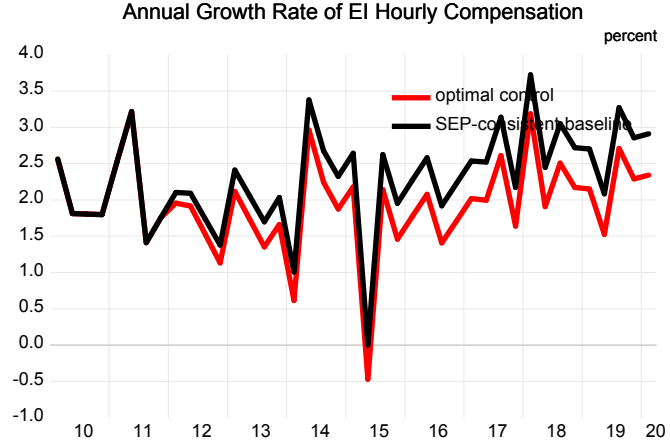
PCE Inflation Rate (4-Quarter)



Employment to Population Ratio



Annual Growth Rate of EI Hourly Compensation



iter	f(x)	step size	convergence statistic	linearity statistic
0	934.4774			
1	933.7835	1.000000	0.000743	1.974544
2	932.7351	1.000000	0.001123	0.092454
3	932.7348	0.125000	2.70E-07	-4.569062

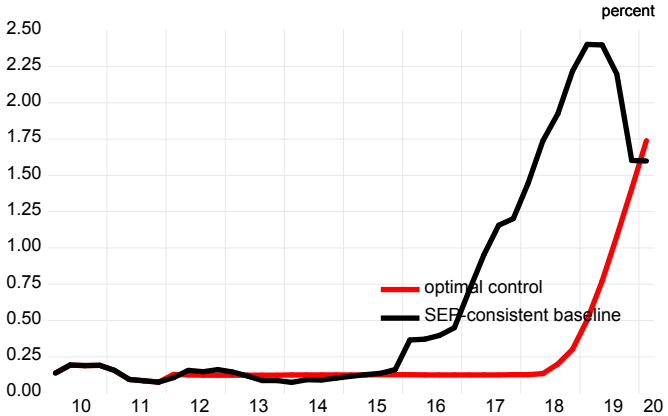
unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 8, convergence
unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 3, convergence

iter	f(x)	step size	convergence statistic	linearity statistic
0	1042.473			
1	1021.788	0.062500	0.019843	-1.019941
2	998.4456	0.250000	0.022844	-1.038588
3	958.7579	0.500000	0.039750	-1.196946
4	937.7767	1.000000	0.021884	0.448315
5	927.7464	1.000000	0.010696	0.012915
6	927.6708	1.000000	8.15E-05	0.275152
7	927.6486	0.500000	2.39E-05	-2.562257
8	927.6473	1.000000	1.41E-06	2.896163

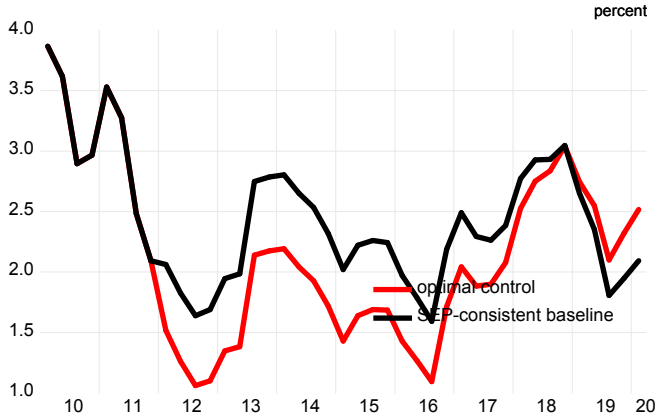
unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 8, convergence

12. ZLB Imposed

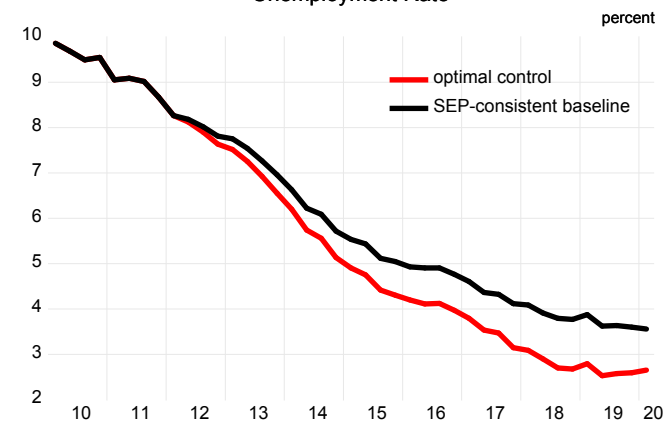
Federal Funds Rate



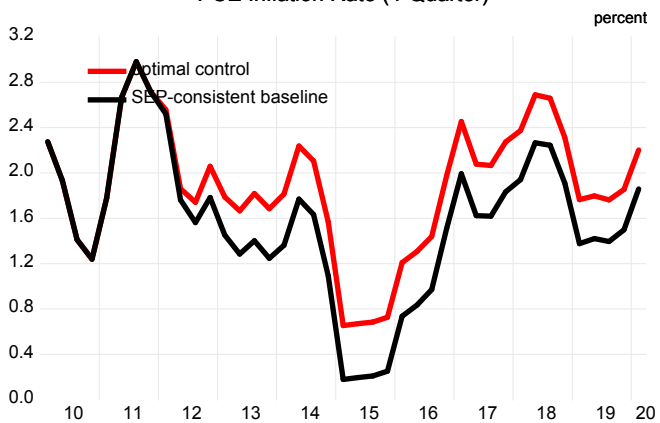
10-Year Treasury Yield



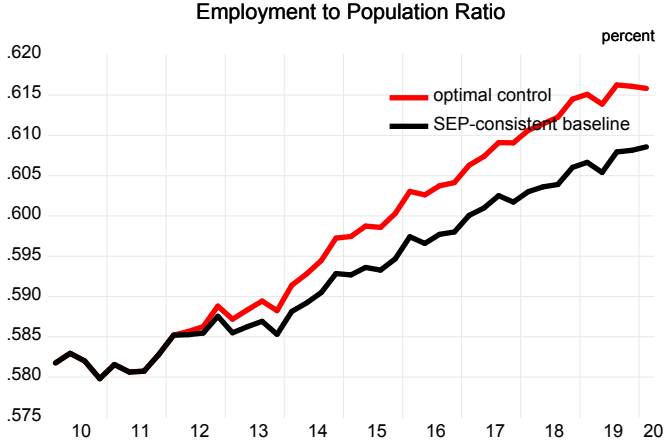
Unemployment Rate



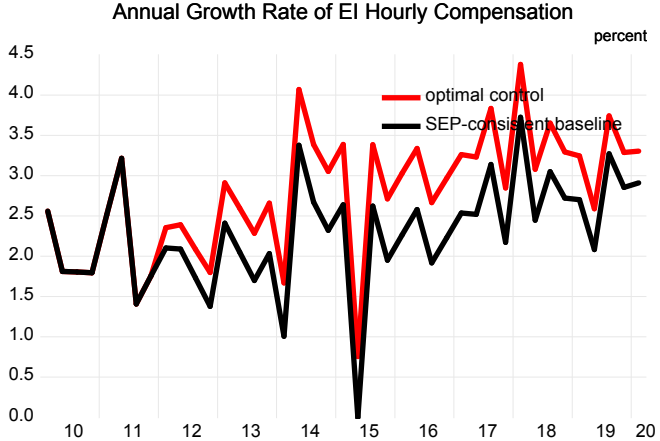
PCE Inflation Rate (4-Quarter)



Employment to Population Ratio



Annual Growth Rate of EI Hourly Compensation



iter	f(x)	step size	convergence statistic	linearity statistic
0	228.3889			
1	228.1364	0.250000	0.001105	-1.053206
2	228.1017	1.000000	0.000152	0.683590
3	228.0979	0.500000	1.66E-05	-1.628531
4	228.0943	1.000000	1.57E-05	-0.257544
5	228.0925	0.500000	8.07E-06	-7.204304

unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 8, convergence
unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 5, convergence

iter	f(x)	step size	convergence statistic	linearity statistic
0	302.4167			
1	296.5922	0.250000	0.019260	-1.040893
2	250.6745	0.500000	0.154817	-1.765494
3	230.6854	1.000000	0.079741	0.143527
4	228.8141	1.000000	0.008112	0.099021
5	228.8116	0.500000	1.12E-05	-11.73352
6	228.8076	0.500000	1.74E-05	-1.435856
7	228.7963	1.000000	4.94E-05	0.783045
8	228.7955	0.250000	3.25E-06	-1.457317

unconstrained optimization (EViews)
optimization type = committment
simulation period: 2012Q1 - 2027Q4
loss evalation period: 2012Q1 - 2031q4
instrument setting period: 2012Q1 - 2026q4
max number of optimization iterations = 15
max number of line search steps per iteration = 20
convergence criteria = 1e-05
output control parameter = 3
compute instrument derivs? = yes
instrument perturbation factor = 0.01
At iteration 8, convergence