Online Appendix for "Oil Prices and State Unemployment Rates"

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Abstract

This paper studies the effect of oil price shocks on U.S. state-level unemployment rates. First, using a test of symmetry I evaluate whether the relationship between oil prices and state unemployment rates is symmetric. I find no evidence against the null of symmetry after accounting for data mining. Second, I use a symmetric structural VAR model to analyze the effect of oil supply shocks, aggregate demand shocks and oil-specific demand shocks on state unemployment. I find that an adverse supply shock triggers increases in unemployment whereas a positive aggregate demand shock reduces the unemployment rate across most U.S. states. I also show that oil-specific demand shocks have little effect on state unemployment. Finally, I dig into the historical contribution of the various oil shocks to the changes in state unemployment rates during the shale boom period. I find that aggregate demand shocks contributed the most into the change of unemployment.

Keywords: oil supply shocks, oil demand shocks, state unemployment.

JEL Classification: E24, E32, Q43.

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Table A.1: Test of symmetry for the response of unemployment rates to positive and negative oil price shocks with restrictions on the lag coeffi cients of the first equation.

	1 s.d.			2 s.d.		
State	x_t^1	x_t^{12}	x_t^{36}	x_t^1	x_t^{12}	x_t^{36}
National	0.31	0.79	0.97	0.04	**0.00**	*0.10*
Alabama	0.76	0.97	1.00	0.37	*0.09*	0.62
Alaska	0.55	0.92	1.00	0.13	*0.08*	0.74
Arizona	0.90	0.94	1.00	0.73	0.12	0.71
Arkansas	0.59	0.80	0.99	0.43	**0.01**	0.13
California	0.75	0.92	1.00	0.36	**0.00**	0.33
Colorado	0.96	0.98	0.99	0.91	0.31	0.78
Connecticut	0.52	0.90	0.95	0.08	**0.01**	0.44
Delaware	0.01	0.72	0.90	**0.00**	**0.00**	*0.07*
Florida	0.57	0.84	0.99	**0.04**	**0.01**	0.62
Georgia	0.66	0.96	1.00	*0.08*	0.14	0.71
Hawaii	0.71	0.84	0.98	0.37	**0.05**	0.54
Idaho	0.09	0.72	0.99	**0.00**	**0.00**	0.23
Illinois	0.22	0.72	0.99	0.12	**0.00**	0.34
Indiana	0.54	0.77	1.00	*0.06*	**0.00**	0.31
Iowa	0.25	0.82	1.00	**0.02**	**0.00**	0.63
Kansas	0.84	0.97	0.99	0.44	0.42	0.69
Kentucky	0.76	0.78	0.94	0.45	**0.00**	0.15
Louisiana	0.43	0.61	0.88	0.11	**0.00**	0.16
Maine	0.21	0.68	1.00	**0.00**	**0.02**	0.51
Maryland	0.74	0.97	0.98	0.37	**0.01**	0.17
Massachusetts	0.40	0.72	0.99	**0.00**	**0.03**	0.45
Michigan	0.61	0.77	1.00	**0.03**	**0.00**	*0.08*
Minnesota	0.57	0.93	0.99	0.20	**0.02**	0.64
Mississippi	**0.02**	0.72	0.73	**0.00**	**0.00**	**0.02**
Missouri	0.34	0.88	0.98	0.14	**0.05**	0.17
Montana	0.96	0.99	1.00	0.72	0.16	0.84
Nebraska	0.37	0.70	0.96	0.35	**0.00**	0.32
Nevada	0.77	0.97	1.00	0.71	**0.03**	0.29
New Hampshire	0.27	0.87	1.00	**0.03**	**0.01**	0.19
New Jersey	0.12	0.79	0.99	**0.00**	**0.00**	0.30
New Mexico	0.92	0.86	1.00	0.51	**0.00**	0.55
New York	0.57	0.98	0.99	0.25	0.69	0.73
North Carolina	0.71	0.73	0.99	0.23	**0.00**	0.22
North Dakota	0.79	0.98	0.99	0.44	0.27	0.32
Ohio	0.13	0.73	1.00	**0.01**	**0.00**	0.21
Oklahoma	0.97	0.97	0.92	0.92	**0.02**	0.56
Oregon	0.26	0.72	0.98	**0.01**	**0.00**	**0.05**
Pennsylvania	0.92	0.82	1.00	0.86	**0.01**	0.79
Rhode Island	0.48	0.93	0.99	**0.05**	**0.02**	0.70
South Carolina	0.33	0.86	0.93	0.14	**0.01**	**0.04**
South Dakota	0.83	0.91	0.99	0.46	**0.02**	0.31
Tennessee	0.29	0.88	1.00	0.18	**0.02**	0.45
Texas	0.15	0.79	0.99	**0.00**	**0.01**	0.80
Utah	0.13	0.68	0.97	**0.00**	**0.00**	0.20
Vermont	0.26	0.87	0.96	**0.00**	**0.00**	**0.02**
Virginia	0.48	0.78	1.00	*0.07*	**0.00**	0.59
Washington	0.26	0.87	0.98	*0.08*	**0.00**	0.36
West Virginia	*0.09*	0.94	1.00	**0.00**	**0.04**	0.66
Wisconsin	0.69	0.89	0.95	0.46	**0.03**	0.11
Wyoming	0.43	0.72	0.97	0.19	**0.02**	0.69

Notes: Computations are based on 10,000 simulations of model (4). p-values are based on the χ^2_{H+1}. Bold and italics refer to significance at the 5% and 10% significance level, respectively. Significance based on data mining robust critical values at the 5% and 10% level is denoted by ** and * respectively.

Figure A.1: Real oil price and nonlinear transformations:

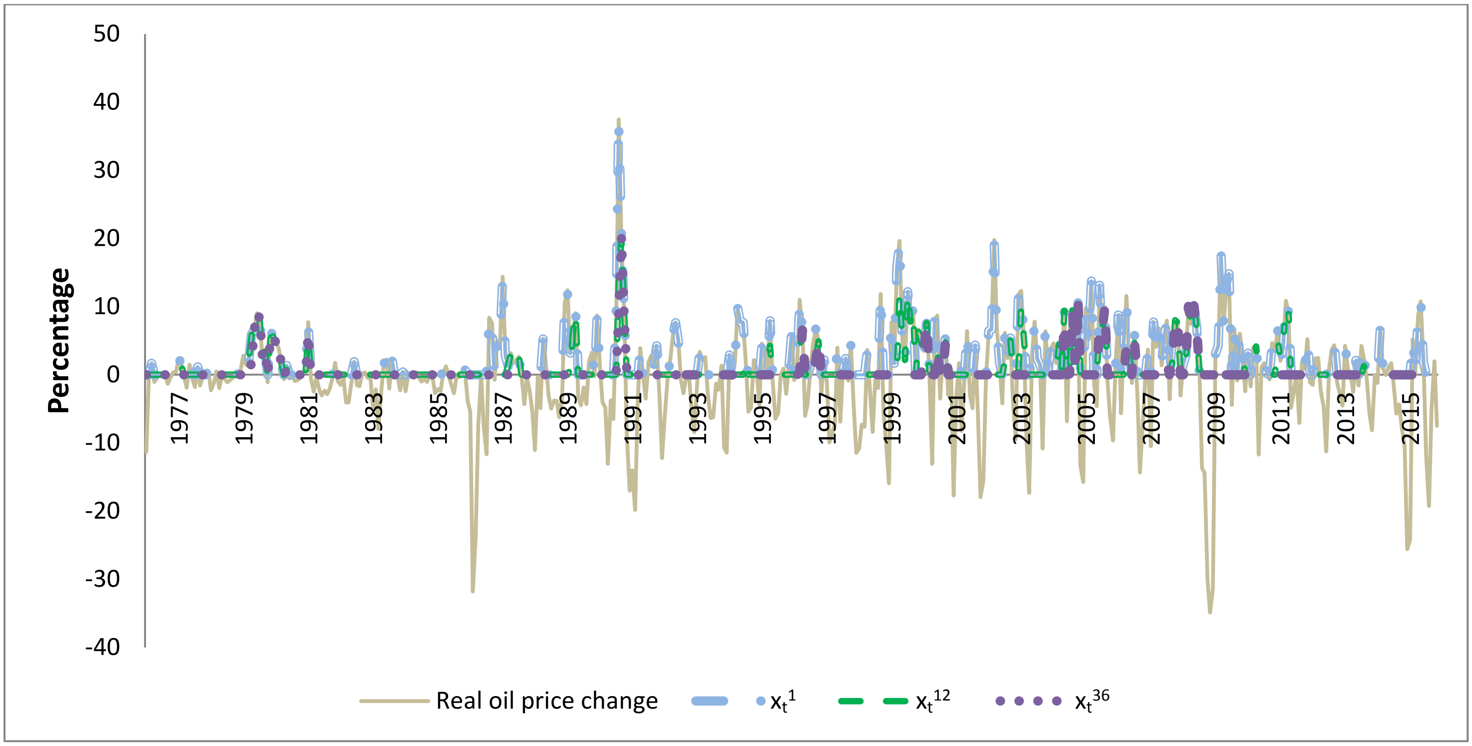
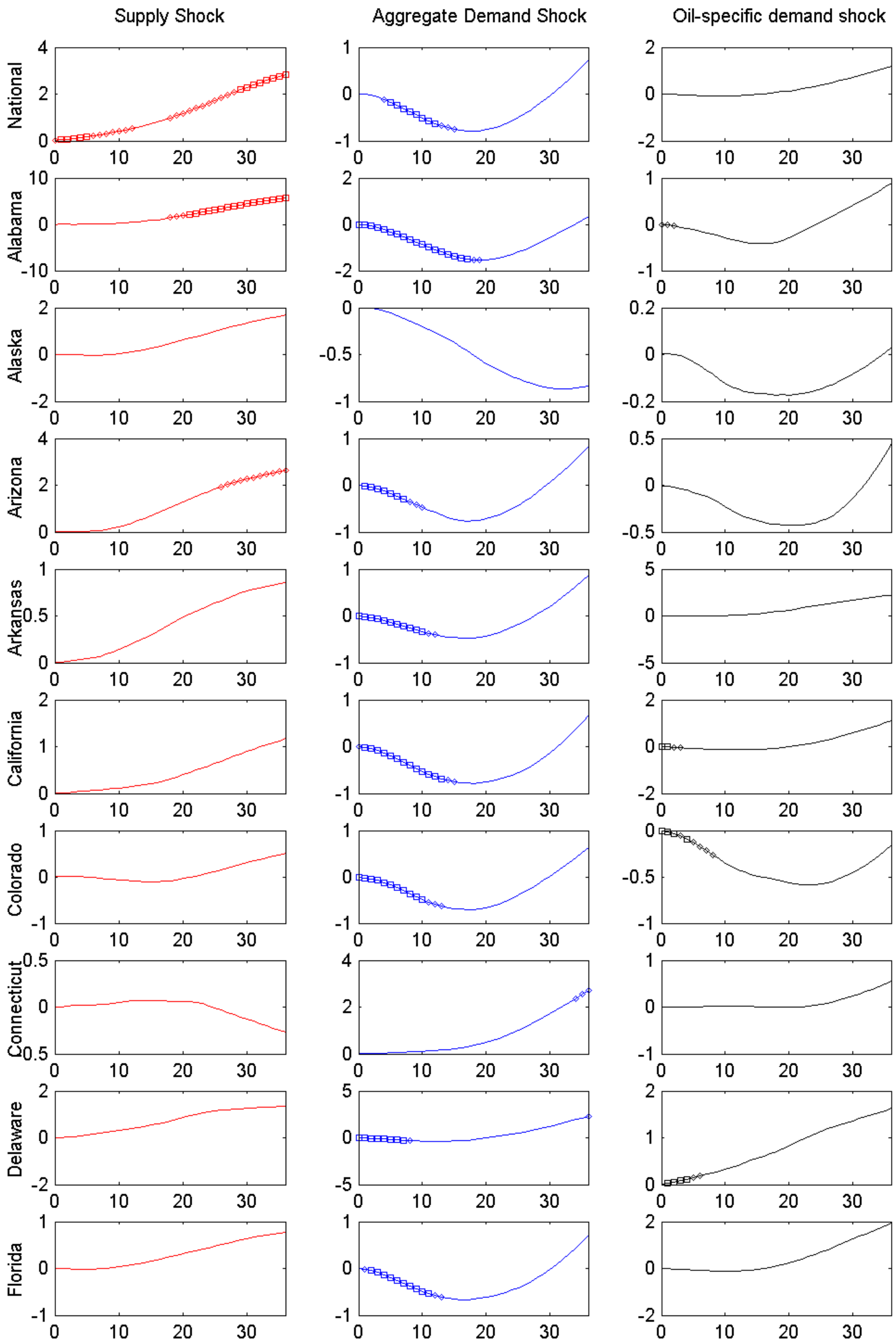
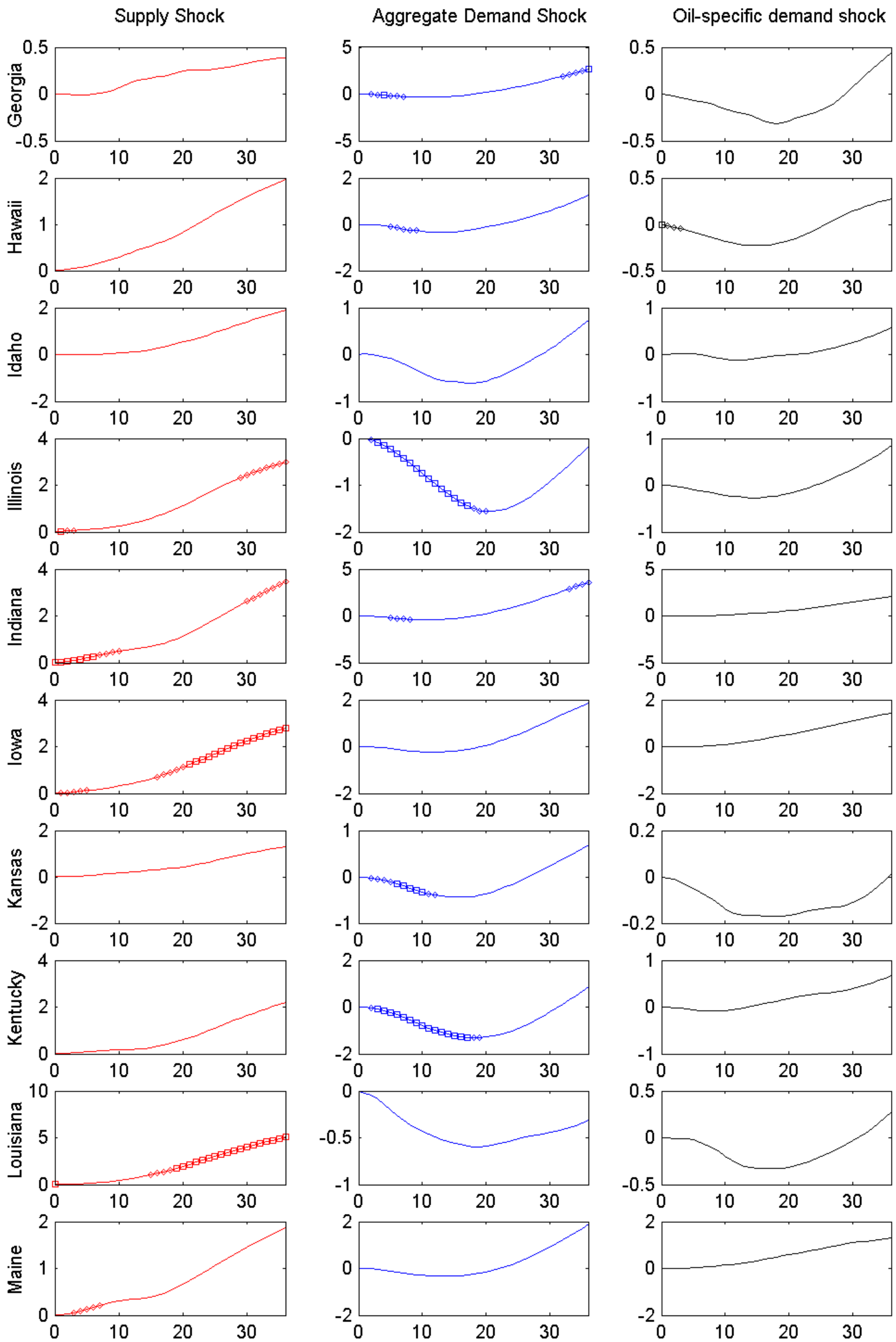


Figure A.2a: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock



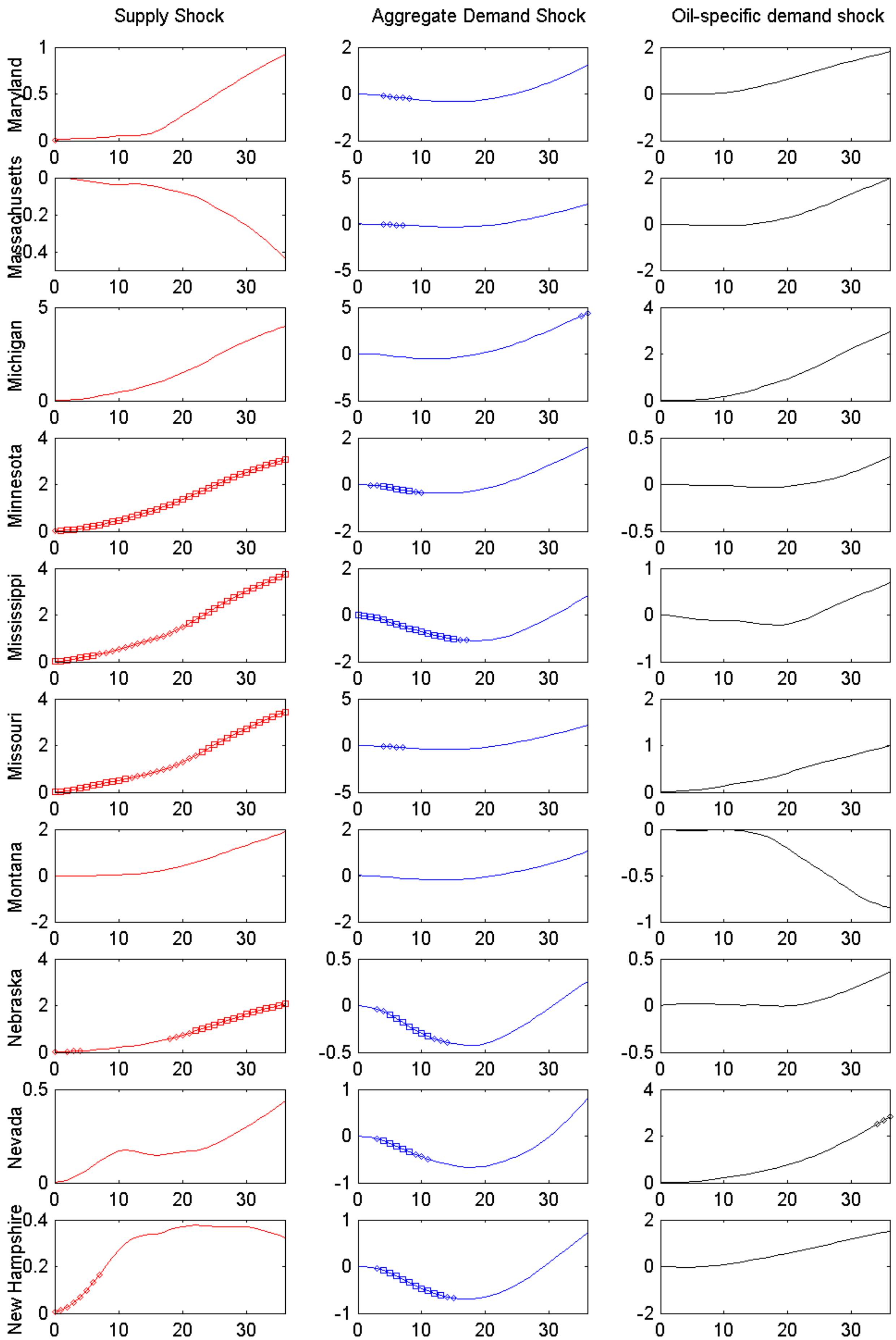
Notes: Squares and diamonds represent significance at the 5% and 10%, respectively.
Computations are based on 10,000 simulations.

Figure A.2b: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock



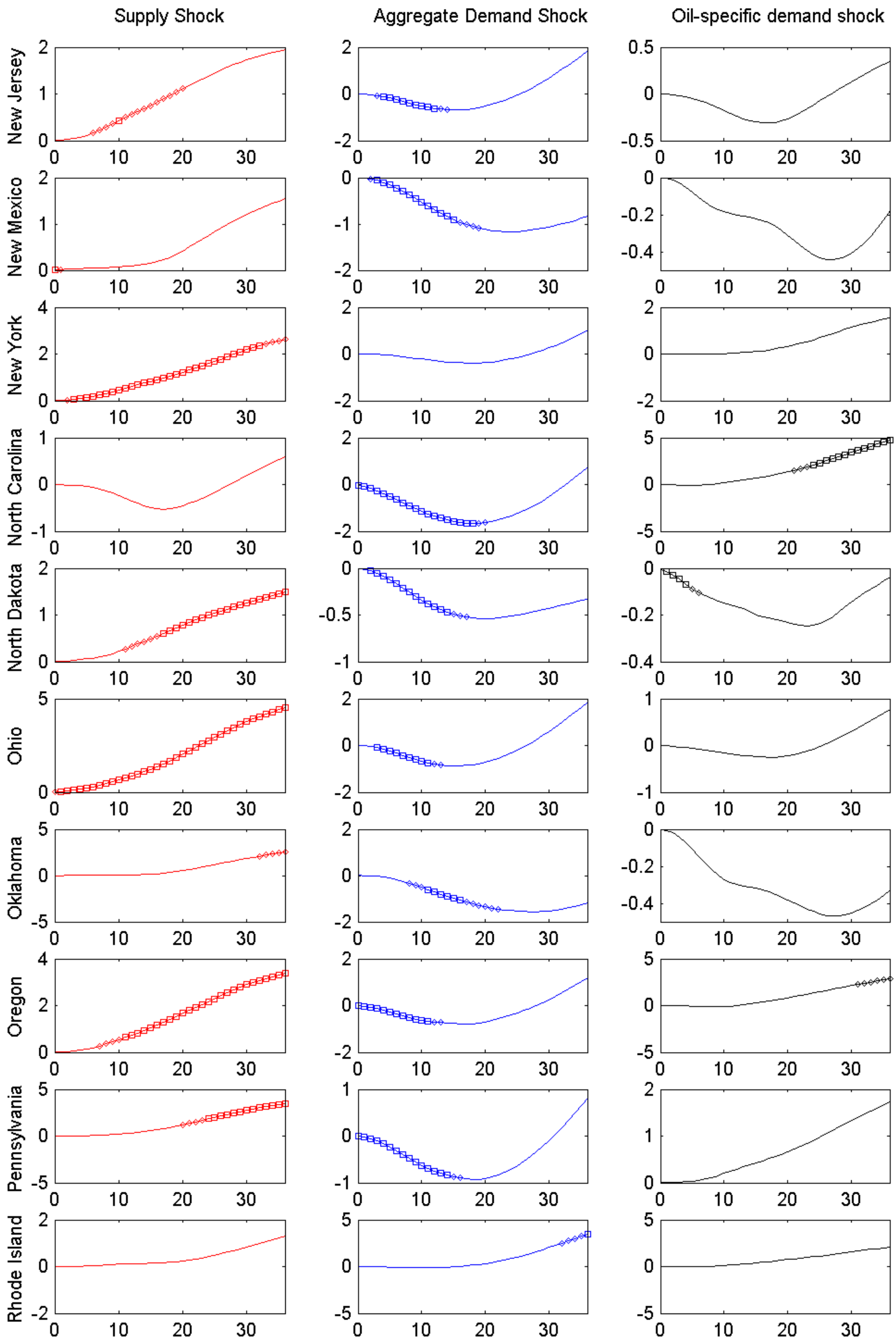
Notes: Squares and diamonds represent significance at the 5% and 10%, respectively. Computations are based on 10,000 simulations.

Figure A.2c: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock



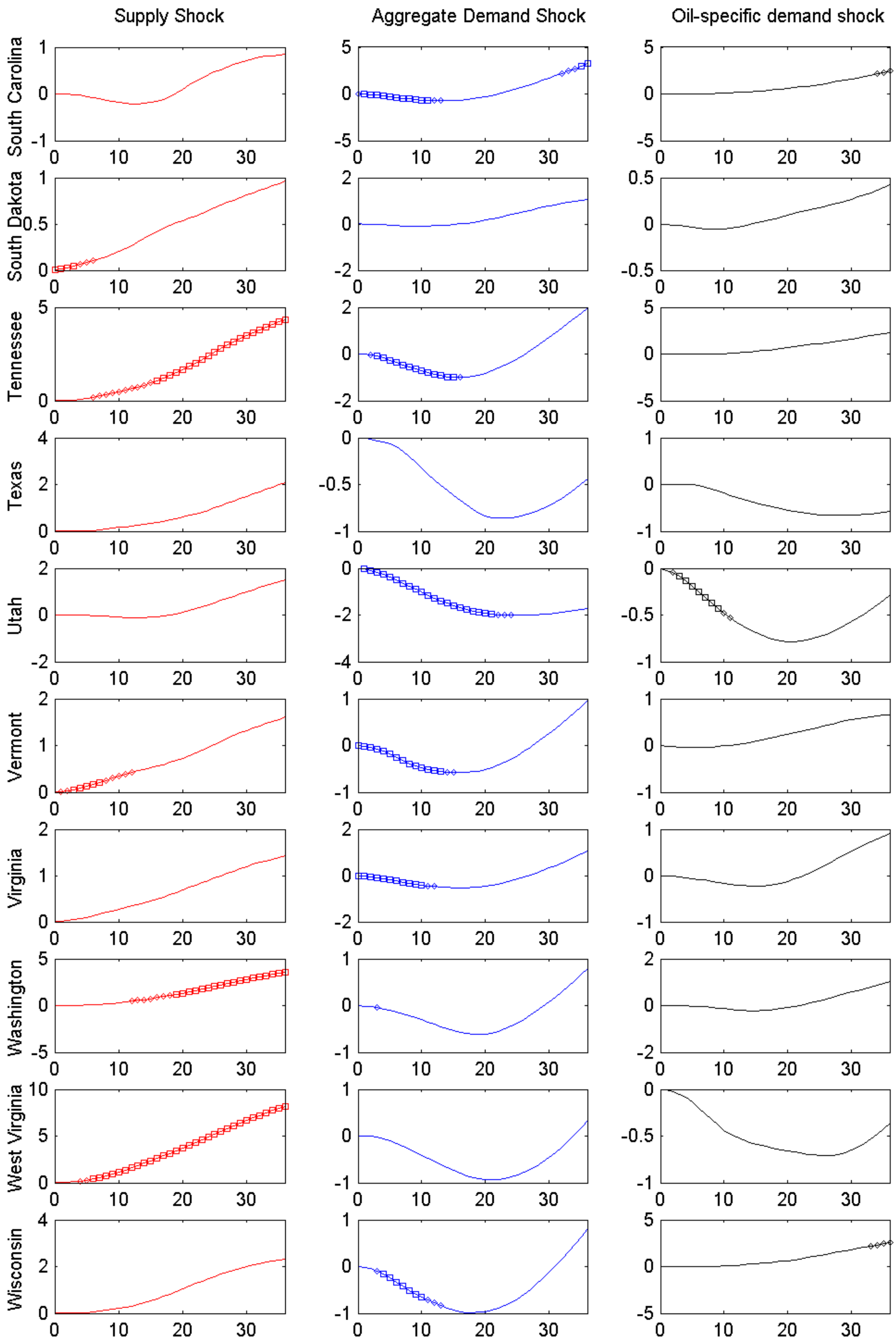
Notes: Squares and diamonds represent significance at the 5% and 10%, respectively.
Computations are based on 10,000 simulations.

Figure A.2d: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock



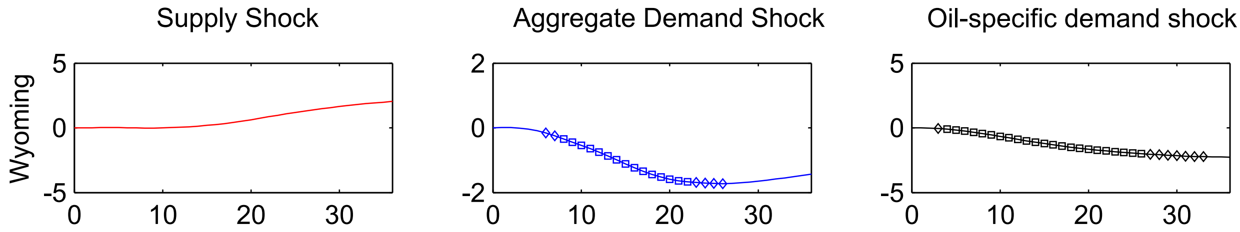
Notes: Squares and diamonds represent significance at the 5% and 10%, respectively. Computations are based on 10,000 simulations.

Figure A.2e: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock



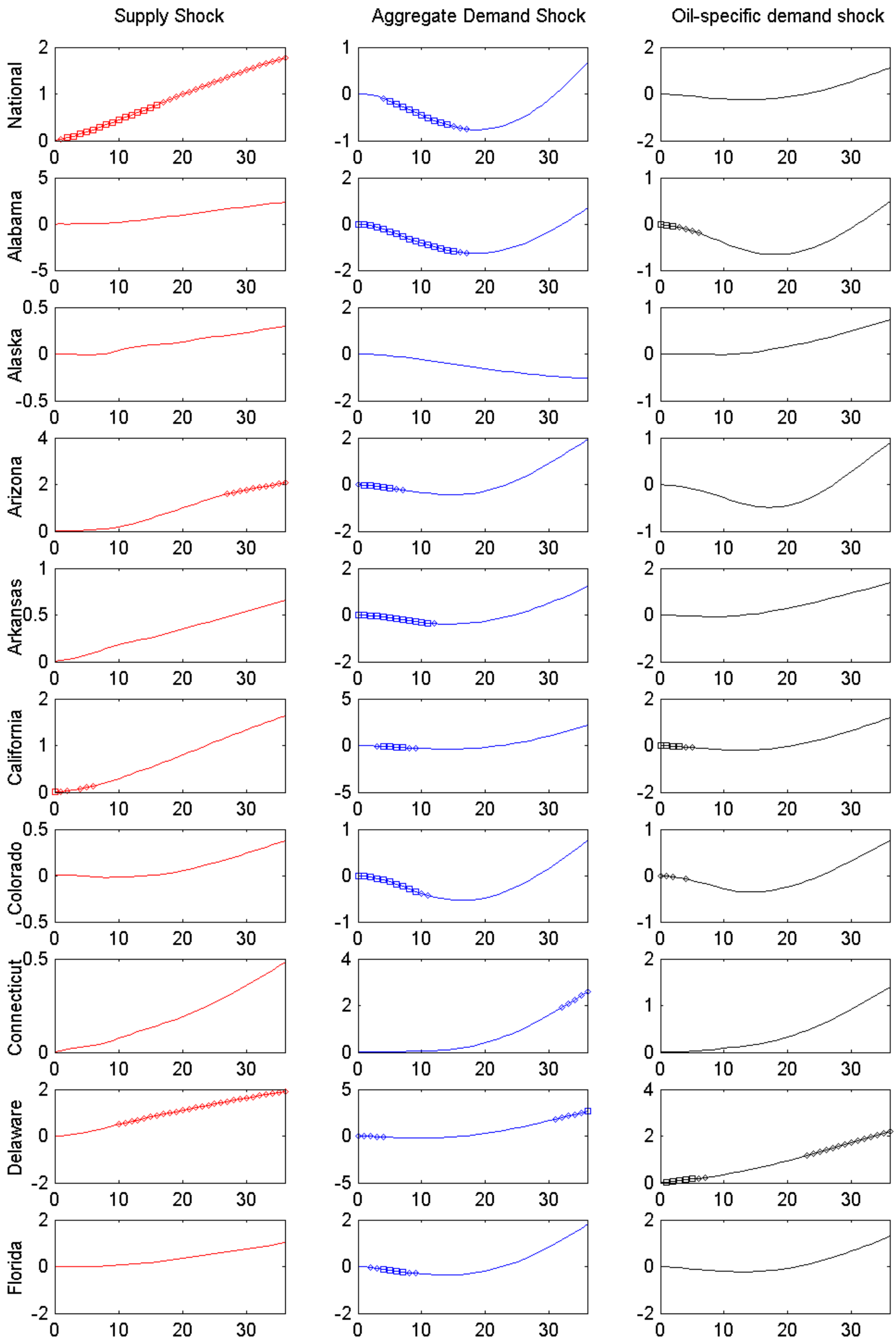
Notes: Squares and diamonds represent significance at the 5% and 10%, respectively. Computations are based on 10,000 simulations.

Figure A.2f: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock



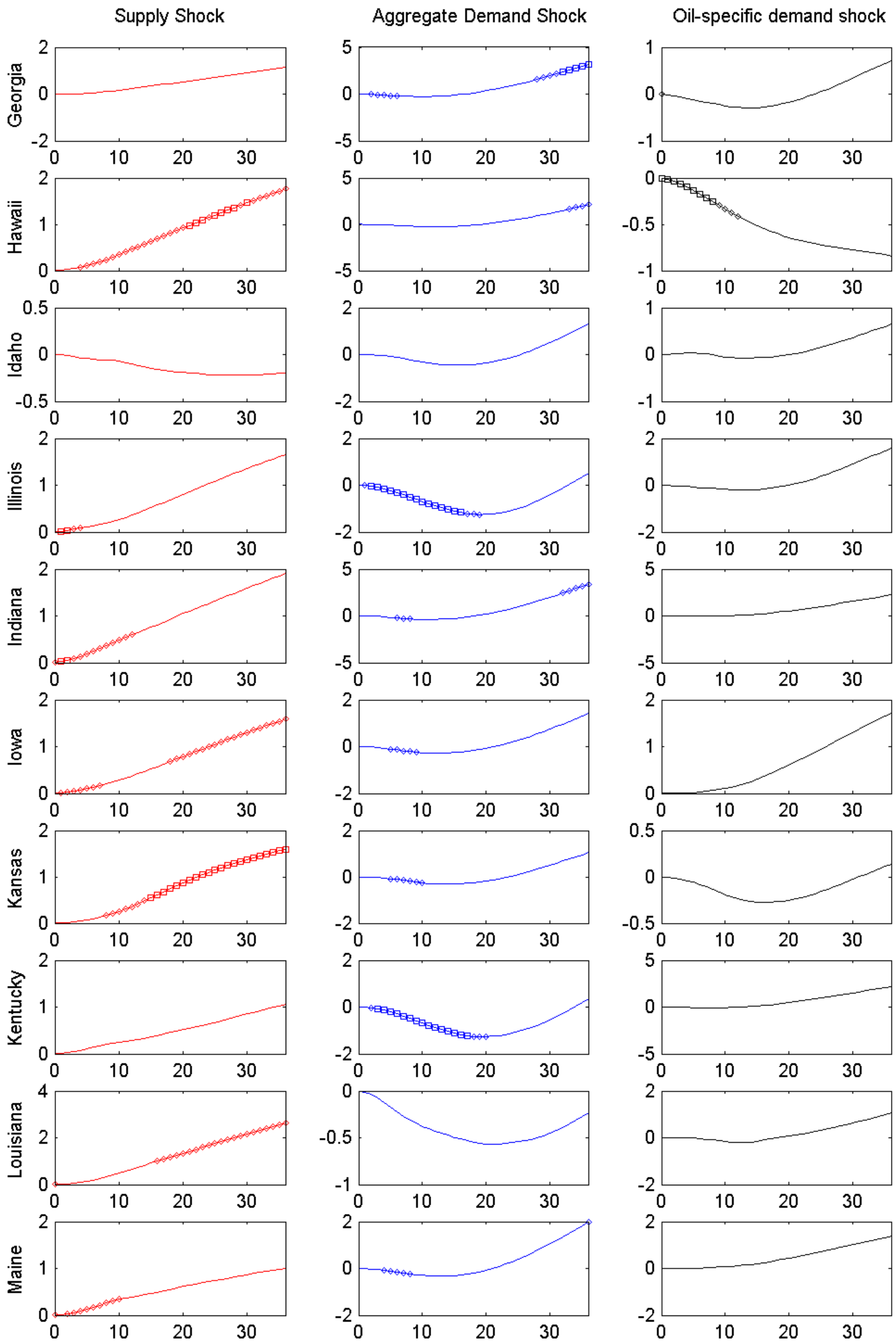
Notes: Squares and diamonds represent significance at the 5% and 10%, respectively.
Computations are based on 10,000 simulations.

Figure A.3a: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock (p=12)



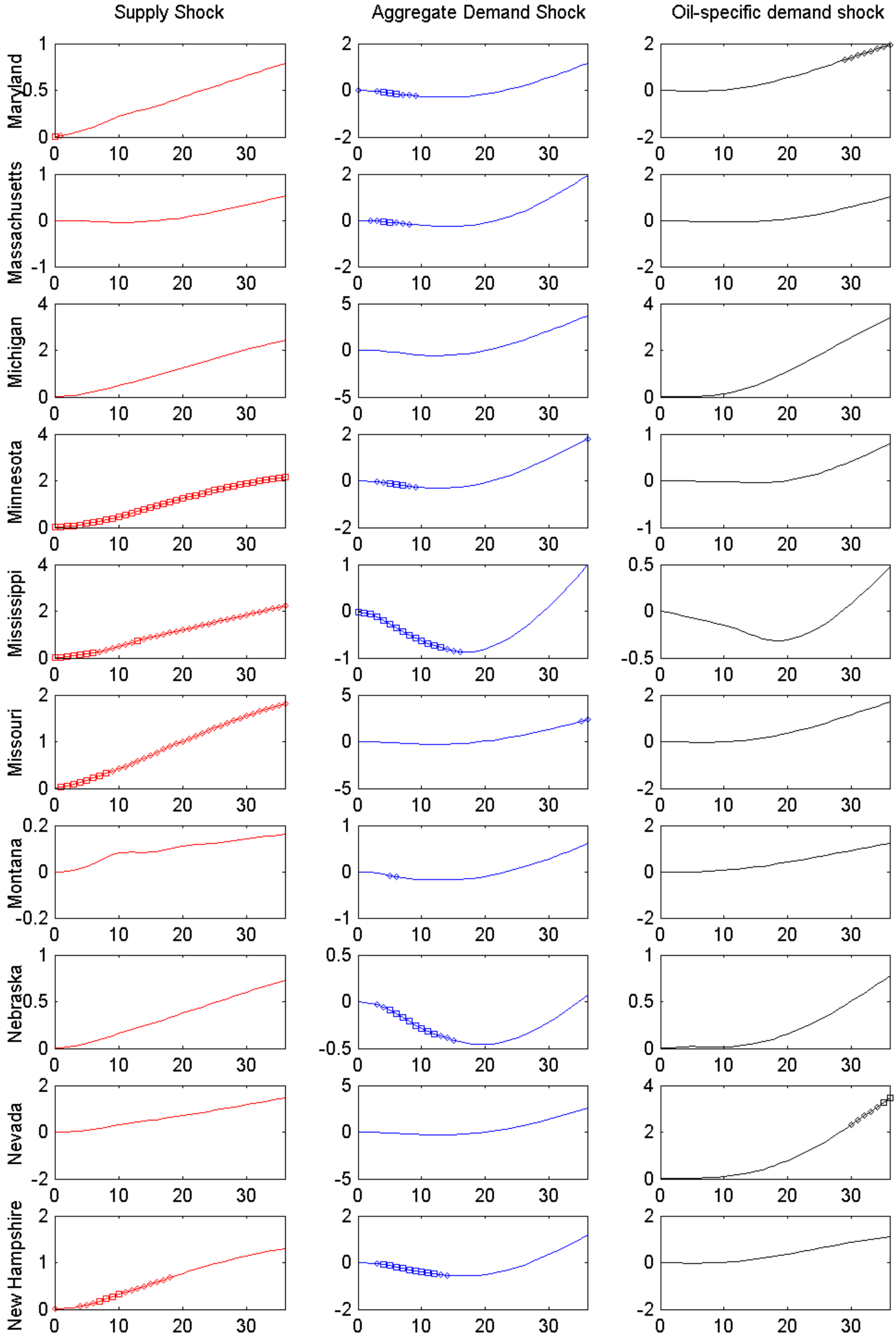
Notes: Squares and diamonds represent significance at the 5% and 10%, respectively.
Computations are based on 10,000 simulations.

Figure A.3b: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock (p=12)



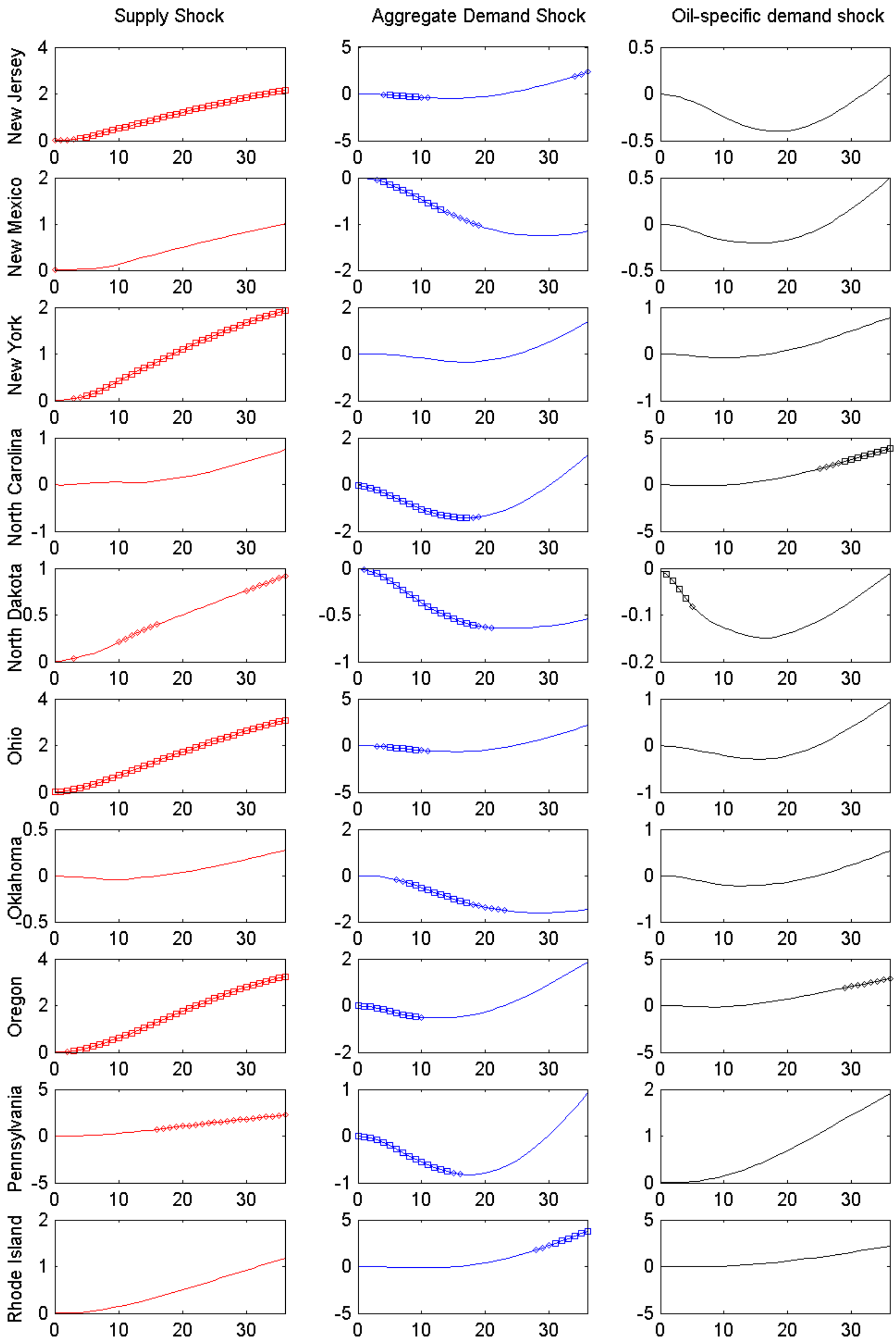
Notes: Squares and diamonds represent significance at the 5% and 10%, respectively. Computations are based on 10,000 simulations.

Figure A.3c: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock (p=12)



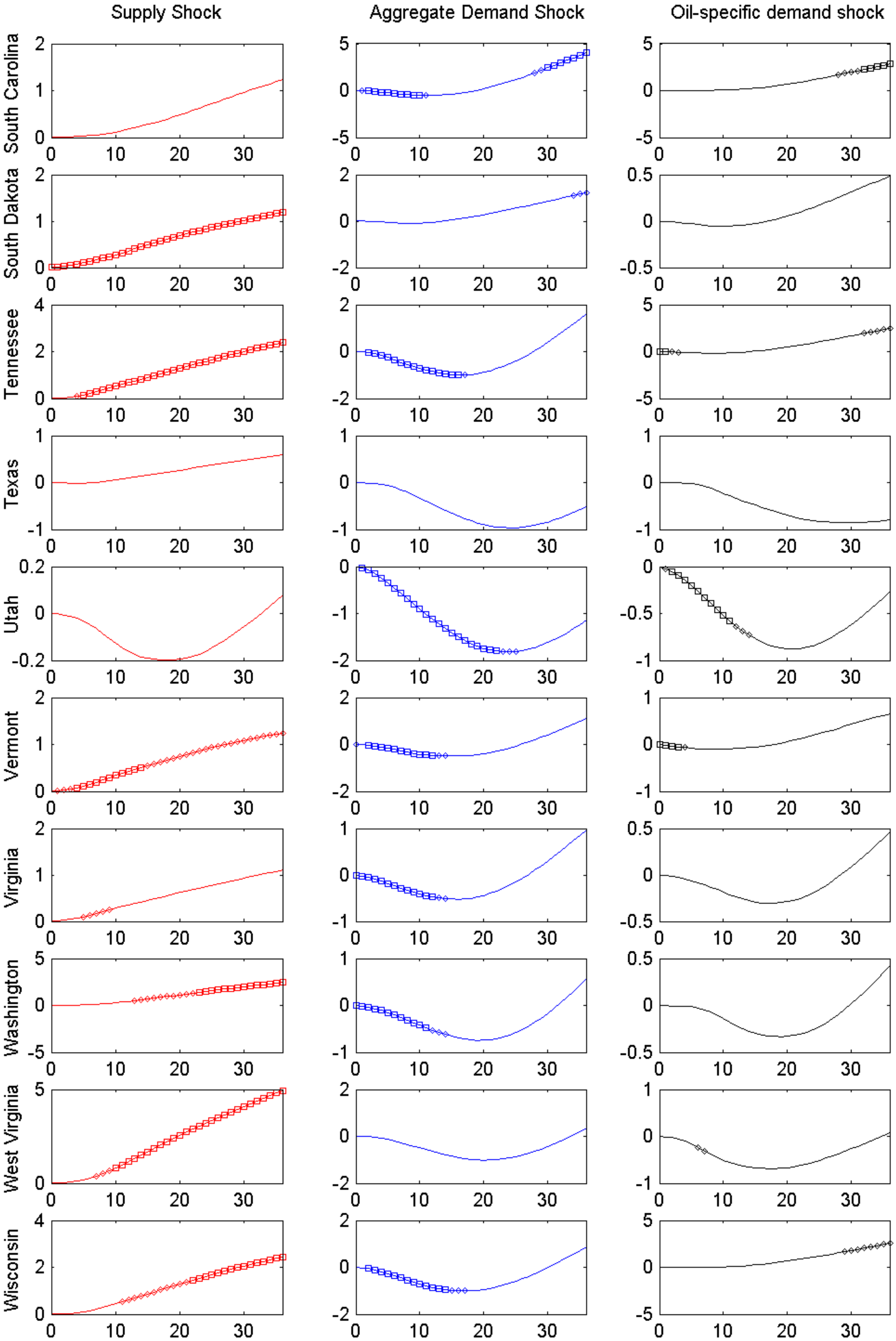
Notes: Squares and diamonds represent significance at the 5% and 10%, respectively.
Computations are based on 10,000 simulations.

Figure A.3d: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock (p=12)



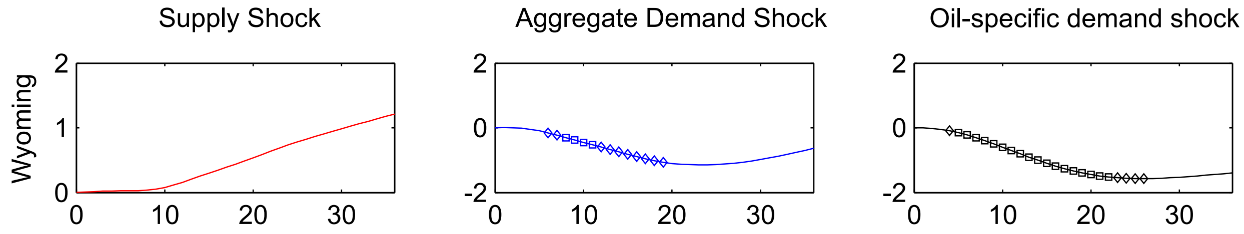
Notes: Squares and diamonds represent significance at the 5% and 10%, respectively.
Computations are based on 10,000 simulations.

Figure A.3e: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock (p=12)



Notes: Squares and diamonds represent significance at the 5% and 10%, respectively.
Computations are based on 10,000 simulations.

Figure A.3f: The responses of unemployment to a negative supply shock, positive aggregate demand shock and positive oil specific demand shock (p=12)



Notes: Squares and diamonds represent significance at the 5% and 10%, respectively.
Computations are based on 10,000 simulations.