SUPPLEMENTARY RESULTS

Addressing COVID-19 Outliers in BVARs with Stochastic Volatility*

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Abstract

This online appendix provides additional results that complement the results shown in our paper.

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Table S.1: Relative RMSE in 2020

					Relative to CONST ...							
	CONST				SV				SVO			
Variable / Horizons	1	3	12	24	1	3	12	24	1	3	12	24
Real Income	63.42	64.52	–	–	0.92	1.02	–	–	0.93	1.03	–	–
Real Consumption	104.71	93.94	–	–	0.76	0.86	–	–	0.76	0.86	–	–
IP	105.81	132.95	–	–	0.73	0.64	–	–	0.74	0.63	–	–
Capacity Utilization	7.98	26.11	–	–	0.76	0.52	–	–	0.76	0.51	–	–
Unemployment	5.32	14.91	–	–	0.71	0.50	–	–	0.71	0.51	–	–
Nonfarm payrolls	91.42	115.47	–	–	0.77	0.69	–	–	0.78	0.69	–	–
Hours	1.48	3.82	–	–	0.84	0.54	–	–	0.84	0.52	–	–
Hourly Earnings	13.48	6.42	–	–	0.69	1.05	–	–	0.69	0.99	–	–
PPI (fin. goods)	20.25	25.57	–	–	0.99	0.80	–	–	1.01	0.80	–	–
PCE prices	5.12	8.31	–	–	1.54	0.83	–	–	1.62	0.84	–	–
Housing Starts	0.22	0.57	–	–	0.74	0.61	–	–	0.70	0.59	–	–
S&P 500	135.15	218.99	–	–	0.99	0.32	–	–	1.01	0.36	–	–
USD / GBP FX rate	51.38	34.06	–	–	0.64	0.78	–	–	0.66	0.79	–	–
5-Year yield	0.50	0.85	–	–	1.09	1.34	–	–	1.03	1.20	–	–
10-Year yield	0.53	0.76	–	–	1.01	1.26	–	–	0.99	1.15	–	–
Baa spread	1.62	6.30	–	–	0.69	0.43	–	–	0.68	0.42	–	–

Note: Comparison of "CONST" (baseline, in denominator of relative comparisons) against "SV" and "SVO." Values below one indicate improvement over baseline. Evaluation window from 2020:M01 through 2020:M09. Due to the low number of observations in the evaluation window, significance tests have not been performed.

Table S.2: Relative Avg CRPS in 2020

					Relative to CONST ...							
	CONST				SV				SVO			
Variable / Horizons	1	3	12	24	1	3	12	24	1	3	12	24
Real Income	37.11	40.36	–	–	0.94	1.17	–	–	0.88	1.07	–	–
Real Consumption	67.22	67.71	–	–	0.72	0.92	–	–	0.74	0.86	–	–
IP	63.11	82.83	–	–	0.73	0.68	–	–	0.77	0.68	–	–
Capacity Utilization	4.67	14.66	–	–	0.75	0.60	–	–	0.80	0.62	–	–
Unemployment	3.07	10.12	–	–	0.63	0.58	–	–	0.67	0.63	–	–
Nonfarm payrolls	56.30	72.08	–	–	0.67	0.71	–	–	0.75	0.71	–	–
Hours	0.82	2.05	–	–	0.78	0.63	–	–	0.81	0.62	–	–
Hourly Earnings	6.24	3.68	–	–	0.70	1.24	–	–	0.70	1.11	–	–
PPI (fin. goods)	12.11	17.19	–	–	1.01	0.90	–	–	1.03	0.85	–	–
PCE prices	2.62	4.89	–	–	1.47	0.91	–	–	1.56	0.88	–	–
Housing Starts	0.12	0.32	–	–	0.92	0.77	–	–	0.86	0.72	–	–
S&P 500	78.58	98.01	–	–	1.07	0.60	–	–	1.05	0.54	–	–
USD / GBP FX rate	28.38	22.50	–	–	0.72	0.78	–	–	0.72	0.71	–	–
5-Year yield	0.23	0.40	–	–	1.08	1.42	–	–	1.04	1.25	–	–
10-Year yield	0.34	0.45	–	–	0.92	1.20	–	–	0.91	1.09	–	–
Baa spread	0.94	3.11	–	–	0.70	0.51	–	–	0.70	0.51	–	–

Note: Comparison of "CONST" (baseline, in denominator of relative comparisons) against "SV" and "SVO." Values below one indicate improvement over baseline. Evaluation window from 2020:M01 through 2020:M09. Due to the low number of observations in the evaluation window, significance tests have not been performed.

Table S.3: Relative RMSE in 2020 (alternative models)

					Relative to SVO ...							
	SVO				SV-t(5)				SV-OutMiss			
Variable / Horizons	1	3	12	24	1	3	12	24	1	3	12	24
Real Income	58.89	66.65	–	–	0.98	1.00	–	–	1.00	0.96	–	–
Real Consumption	79.46	81.02	–	–	1.01	1.00	–	–	1.01	1.01	–	–
IP	78.12	84.00	–	–	0.99	1.00	–	–	0.92	0.96	–	–
Capacity Utilization	6.10	13.35	–	–	0.98	1.00	–	–	0.84	0.81	–	–
Unemployment	3.80	7.53	–	–	1.00	1.00	–	–	1.01	0.95	–	–
Nonfarm payrolls	71.12	79.50	–	–	0.99	1.00	–	–	0.96	0.97	–	–
Hours	1.24	1.98	–	–	1.02	1.02	–	–	0.80	0.82	–	–
Hourly Earnings	9.32	6.33	–	–	1.01	1.02	–	–	0.50	0.79	–	–
PPI (fin. goods)	20.51	20.34	–	–	1.02	1.03	–	–	0.85	0.94	–	–
PCE prices	8.27	7.01	–	–	0.95	0.99	–	–	0.57	0.87	–	–
Housing Starts	0.15	0.34	–	–	1.06	1.03	–	–	1.20	1.03	–	–
S&P 500	135.99	78.60	–	–	0.99	0.95	–	–	0.89	0.73	–	–
USD / GBP FX rate	34.01	26.98	–	–	0.96	0.92	–	–	1.02	1.36	–	–
5-Year yield	0.51	1.02	–	–	1.06	1.00	–	–	0.83	1.04	–	–
10-Year yield	0.52	0.87	–	–	1.04	0.99	–	–	0.67	1.04	–	–
Baa spread	1.10	2.64	–	–	1.05	1.09	–	–	0.89	0.79	–	–

Note: Comparison of "SVO" (baseline, in denominator of relative comparisons) against "SV-t(5)" and "SV-OutMiss." Values below one indicate improvement over baseline. Evaluation window from 2020:M01 through 2020:M09. Due to the low number of observations in the evaluation window, significance tests have not been performed.

Table S.4: Relative Avg CRPS in 2020 (alternative models)

					Relative to SVO ...							
	SVO				SV-t(5)				SV-OutMiss			
Variable / Horizons	1	3	12	24	1	3	12	24	1	3	12	24
Real Income	32.50	43.17	–	–	1.01	1.03	–	–	0.98	0.90	–	–
Real Consumption	49.87	57.99	–	–	0.99	1.04	–	–	1.07	0.96	–	–
IP	48.55	56.09	–	–	1.00	1.02	–	–	0.91	0.92	–	–
Capacity Utilization	3.72	9.05	–	–	0.98	1.00	–	–	0.84	0.84	–	–
Unemployment	2.05	6.42	–	–	0.99	0.99	–	–	0.95	0.87	–	–
Nonfarm payrolls	42.31	51.37	–	–	0.96	1.00	–	–	0.91	0.92	–	–
Hours	0.66	1.27	–	–	1.02	1.03	–	–	0.79	0.86	–	–
Hourly Earnings	4.39	4.10	–	–	1.02	1.02	–	–	0.55	0.84	–	–
PPI (fin. goods)	12.49	14.55	–	–	1.05	1.02	–	–	0.86	0.89	–	–
PCE prices	4.09	4.28	–	–	0.96	1.01	–	–	0.62	0.88	–	–
Housing Starts	0.10	0.23	–	–	1.03	1.02	–	–	1.08	1.02	–	–
S&P 500	82.68	52.93	–	–	0.98	0.96	–	–	0.83	0.70	–	–
USD / GBP FX rate	20.55	15.93	–	–	0.97	0.96	–	–	1.03	1.20	–	–
5-Year yield	0.24	0.50	–	–	1.06	1.04	–	–	0.90	1.16	–	–
10-Year yield	0.31	0.49	–	–	1.03	1.02	–	–	0.71	1.08	–	–
Baa spread	0.65	1.58	–	–	1.03	1.08	–	–	0.87	0.83	–	–

Note: Comparison of "SVO" (baseline, in denominator of relative comparisons) against "SV-t(5)" and "SV-OutMiss." Values below one indicate improvement over baseline. Evaluation window from 2020:M01 through 2020:M09. Due to the low number of observations in the evaluation window, significance tests have not been performed.

Table S.5: Relative RMSE around the GFC

					Relative to CONST ...							
	CONST				SV				SVO			
Variable / Horizons	1	3	12	24	1	3	12	24	1	3	12	24
Real Income	11.09	11.01	11.04	9.26	0.98	0.99	1.00	1.43	0.98	0.99	1.00	1.01
Real Consumption	4.10	3.86	4.43	4.58	1.01	1.02	0.92	1.06	0.99	1.00	0.89	0.90
IP	8.03	8.76	9.96	9.21	0.97	1.00	1.07**	0.99	0.97	1.00	1.06**	0.95***
Capacity Utilization	0.51	1.05	3.61	4.81	0.95**	0.97	1.02	1.11	0.95	0.95	1.00	1.06**
Unemployment	0.15	0.27	1.11	2.25	1.02	1.07	1.00	0.94*	1.02	1.06	1.00	0.94
Nonfarm payrolls	1.36	1.54	2.33	2.67	0.88***	0.92**	0.95	0.91	0.88	0.93	0.94	0.90
Hours	0.20	0.24	0.51	0.50	0.98	1.05	1.02	0.99	0.99	1.07**	1.01	0.99
Hourly Earnings	2.16	2.12	2.50	3.20	0.96	1.03	0.89	0.85	0.95	1.02	0.88**	0.76
PPI (fin. goods)	10.05	10.63	11.77	11.01	1.00	0.98	0.94	0.88	1.00	0.98	0.93	0.85
PCE prices	2.68	3.52	4.52	5.22	1.01	0.95	0.84	0.76**	1.00	0.95	0.84	0.74**
Housing Starts	0.09	0.15	0.40	0.65	1.04	1.04	0.96	0.90***	1.04	1.03	0.95	0.91
S&P 500	49.93	52.15	52.70	39.08	1.04	1.00	1.01	1.06*	1.04	1.00	1.01	1.01
USD / GBP FX rate	28.03	29.80	29.89	27.40	0.95	0.96	0.95	0.98	0.94	0.96	0.95	0.97
5-Year yield	0.29	0.67	1.28	1.42	0.87***	0.88**	0.85**	1.10	0.87	0.88	0.87	1.09
10-Year yield	0.27	0.65	1.39	1.53	0.92**	0.88**	0.81**	0.86	0.92	0.88	0.81	0.86
Baa spread	0.41	1.08	2.09	1.78	0.81**	0.74	0.86	0.80	0.79**	0.71**	0.82	0.78

Note: Comparison of "CONST" (baseline, in denominator of relative comparisons) against "SV" and "SVO." Values below one indicate improvement over baseline. Evaluation window from 2007:M01 through 2014:M12. Significance assessed by Diebold-Mariano test using Newey-West standard errors with $h + 1$ lags.

Table S.6: Relative Avg CRPS around the GFC

					Relative to CONST ...							
	CONST				SV				SVO			
Variable / Horizons	1	3	12	24	1	3	12	24	1	3	12	24
Real Income	5.20	4.83	4.94	4.11	0.88***	1.03	1.12**	1.30**	0.87	0.97**	1.05**	1.10***
Real Consumption	2.38	2.36	2.63	2.74	0.93**	0.90***	0.96	1.13***	0.92	0.90	0.96	1.08**
IP	4.15	4.43	5.00	5.04	0.95*	0.97	1.14***	1.15***	0.95	0.98*	1.14	1.13
Capacity Utilization	0.28	0.57	1.91	2.80	0.94***	0.92**	1.00	1.16**	0.95	0.93*	1.02	1.13
Unemployment	0.08	0.15	0.59	1.36	1.03**	1.05*	0.95	0.88***	1.03	1.05	0.96	0.89
Nonfarm payrolls	0.77	0.87	1.30	1.49	0.85***	0.89***	0.97	1.06	0.86	0.90*	0.99	1.06
Hours	0.11	0.14	0.28	0.29	0.97	1.04	1.00	1.12***	0.97	1.06**	1.01	1.10
Hourly Earnings	1.28	1.29	1.49	1.81	0.92**	0.96	0.93**	0.98	0.91	0.96	0.95*	0.98
PPI (fin. goods)	5.57	5.83	6.64	6.04	0.96	0.98	0.93	0.96	0.96	0.98	0.93	0.96
PCE prices	1.40	1.81	2.47	2.73	0.96*	0.94	0.84	0.81**	0.96	0.94	0.83	0.81
Housing Starts	0.05	0.08	0.24	0.40	1.02	1.00	0.89*	0.85***	1.02	1.00	0.88	0.86
S&P 500	25.21	26.40	27.14	21.85	1.06*	1.01	1.09*	1.27***	1.07	1.00	1.07	1.24*
USD / GBP FX rate	15.40	16.10	16.35	15.36	0.95	0.97	0.99	1.11***	0.93*	0.97	0.98	1.07***
5-Year yield	0.16	0.37	0.76	0.78	0.87***	0.86***	0.81***	0.93	0.87	0.86	0.81	0.93
10-Year yield	0.15	0.35	0.82	0.92	0.92***	0.88**	0.81**	0.84	0.92	0.89	0.81	0.85
Baa spread	0.21	0.54	1.14	0.99	0.74***	0.73**	0.86	1.01	0.72**	0.70**	0.83	1.03

Note: Comparison of "CONST" (baseline, in denominator of relative comparisons) against "SV" and "SVO." Values below one indicate improvement over baseline. Evaluation window from 2007:M01 through 2014:M12. Significance assessed by Diebold-Mariano test using Newey-West standard errors with $h + 1$ lags.

Table S.7: Relative RMSE around the GFC (alternative models)

					Relative to SVO ...							
	SVO				SV-t(5)				SV-OutMiss			
Variable / Horizons	1	3	12	24	1	3	12	24	1	3	12	24
Real Income	10.86	10.90	11.03	9.35	1.00	1.01**	1.00	1.01	1.00	1.00	1.00	0.98*
Real Consumption	4.08	3.87	3.96	4.10	1.01	1.01	1.02*	1.06*	0.98	0.96	1.03*	1.02
IP	7.76	8.73	10.53	8.80	1.00	1.00	1.01	1.01	1.01	1.03	1.00	1.00
Capacity Utilization	0.48	1.00	3.61	5.10	1.00	1.01	1.02**	1.01	1.01	1.08	1.01	1.00
Unemployment	0.15	0.29	1.10	2.12	0.99	0.98	0.99	0.99*	1.01	1.01	1.00	1.00
Nonfarm payrolls	1.20	1.43	2.20	2.39	0.99	1.01	0.99	1.04*	0.99	1.03	1.00	1.01
Hours	0.20	0.26	0.52	0.50	0.98***	0.98***	1.01	1.03	0.99	1.01	1.01	1.00
Hourly Earnings	2.06	2.17	2.19	2.44	1.02	0.99	1.02	1.01	0.98	0.98	1.01	1.02
PPI (fin. goods)	10.09	10.46	10.95	9.32	1.01	1.00	1.01**	1.01**	1.00	1.00	1.00	1.02
PCE prices	2.69	3.36	3.79	3.85	1.01	1.00	1.02*	1.02	1.02	0.99	1.02	1.02
Housing Starts	0.09	0.15	0.38	0.59	1.00	1.01	1.02	1.04	1.01	1.01	1.01	1.00
S&P 500	51.77	52.20	53.22	39.50	1.01	1.00	1.00	1.00	1.04	1.00	1.00	0.99
USD / GBP FX rate	26.45	28.75	28.36	26.64	1.01*	1.00	1.00	1.01	1.00	0.99	1.00	1.00***
5-Year yield	0.25	0.58	1.11	1.55	1.01**	1.03**	1.05*	0.95	1.01	1.01	0.97**	0.91
10-Year yield	0.25	0.57	1.12	1.31	1.01	1.03**	1.06*	1.02	1.00	1.02	1.00*	0.96***
Baa spread	0.32	0.77	1.71	1.39	1.02	1.03*	1.09	0.94	1.06	1.06	1.04	1.05***

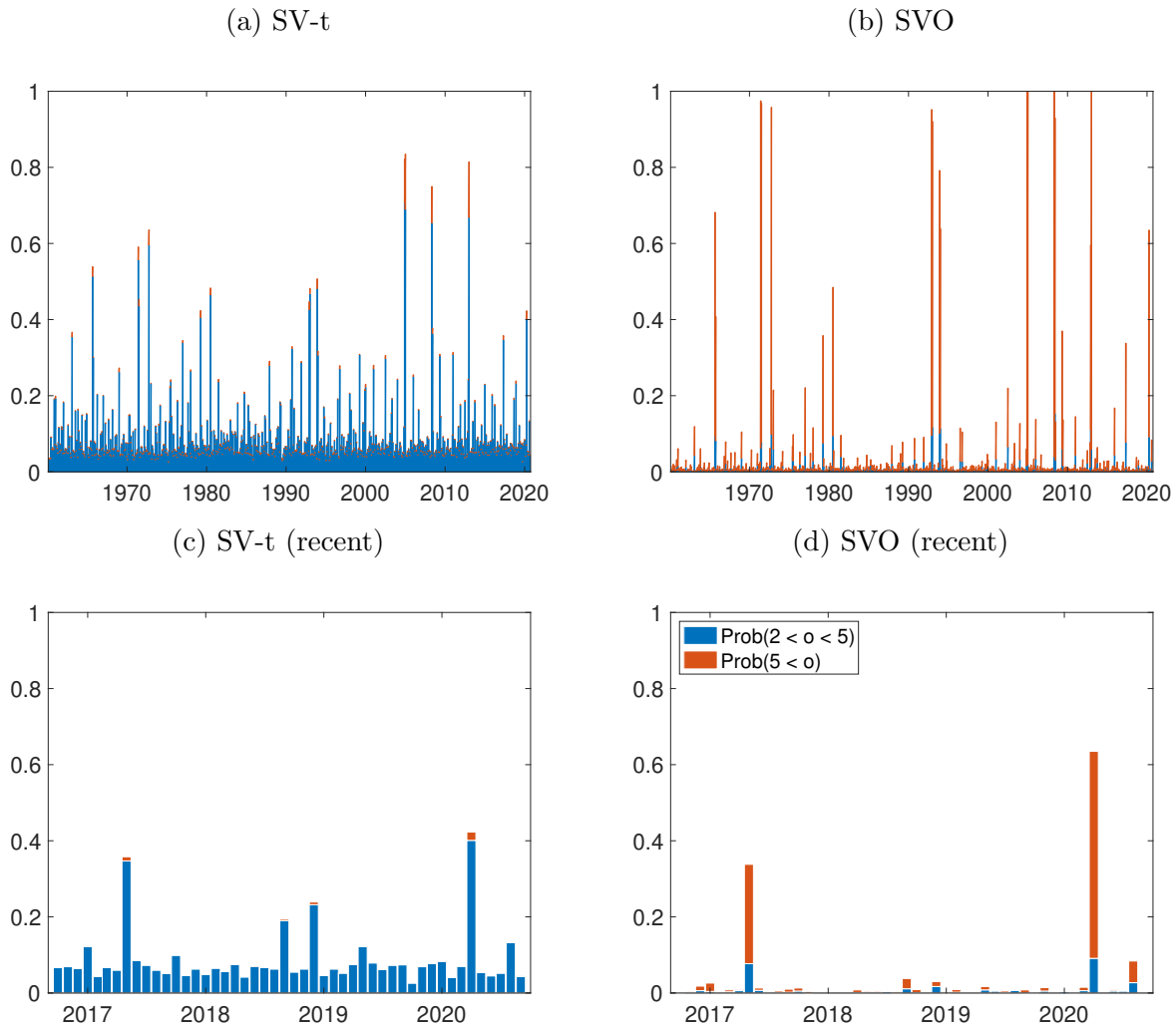
Note: Comparison of "SVO" (baseline, in denominator of relative comparisons) against "SV-t(5)" and "SV-OutMiss." Values below one indicate improvement over baseline. Evaluation window from 2007:M01 through 2014:M12. Significance assessed by Diebold-Mariano test using Newey-West standard errors with $h + 1$ lags. Due to the close behavior of some of the models compared, and rounding of the report values, a few comparisons show a significant relative RMSE (alternative models) of 1.00. These cases arise from persistent differences in performance that are, however, too small to be relevant after rounding.

Table S.8: Relative Avg CRPS around the GFC (alternative models)

					Relative to SVO ...							
	SVO				SV-t(5)				SV-OutMiss			
Variable / Horizons	1	3	12	24	1	3	12	24	1	3	12	24
Real Income	4.50	4.70	5.21	4.54	1.00	1.01*	0.99	0.98*	1.00	0.99	0.98	0.94***
Real Consumption	2.20	2.13	2.51	2.95	1.01	0.99	0.95***	0.94***	0.97	0.94*	0.97***	0.94
IP	3.93	4.32	5.70	5.71	1.00	1.00	0.97	0.92***	1.01	1.03	0.98	0.95***
Capacity Utilization	0.27	0.53	1.94	3.17	0.99	1.00	0.99	0.97	0.99	1.05	0.99	0.96
Unemployment	0.09	0.16	0.57	1.21	0.99	0.99	0.98	0.99	1.02	1.00	1.00	1.00*
Nonfarm payrolls	0.66	0.79	1.28	1.58	0.98***	0.99	0.95**	0.94***	0.97	1.00	0.97*	0.95
Hours	0.11	0.14	0.28	0.32	0.98**	0.97***	0.98	0.95	0.98	1.01*	1.00	0.98
Hourly Earnings	1.17	1.24	1.41	1.77	0.99	0.97***	0.94***	0.90***	0.97	0.96	0.96***	0.96***
PPI (fin. goods)	5.33	5.70	6.14	5.77	1.01*	1.00	1.00	0.96**	1.00	1.00	1.00	0.98**
PCE prices	1.34	1.70	2.05	2.20	1.01*	1.01	1.01	0.96***	1.01	1.00	1.00	0.98
Housing Starts	0.05	0.08	0.21	0.34	1.01	1.01	1.03	1.03	1.00	1.02	1.01	1.00
S&P 500	26.89	26.46	29.16	26.99	0.99	0.99	0.97	0.92***	1.02	1.00	0.99	0.97***
USD / GBP FX rate	14.32	15.61	16.09	16.45	1.02**	1.01	0.99	0.97*	1.01	1.00	1.00	1.00*
5-Year yield	0.14	0.32	0.61	0.73	1.01	1.03***	1.07**	1.02	1.01	1.01	1.00**	0.97
10-Year yield	0.14	0.31	0.66	0.78	1.00	1.02	1.05	1.03	1.00	1.01	1.00*	0.99**
Baa spread	0.15	0.38	0.94	1.02	1.02*	1.03*	1.05	0.88***	1.04	1.04	1.03	0.96***

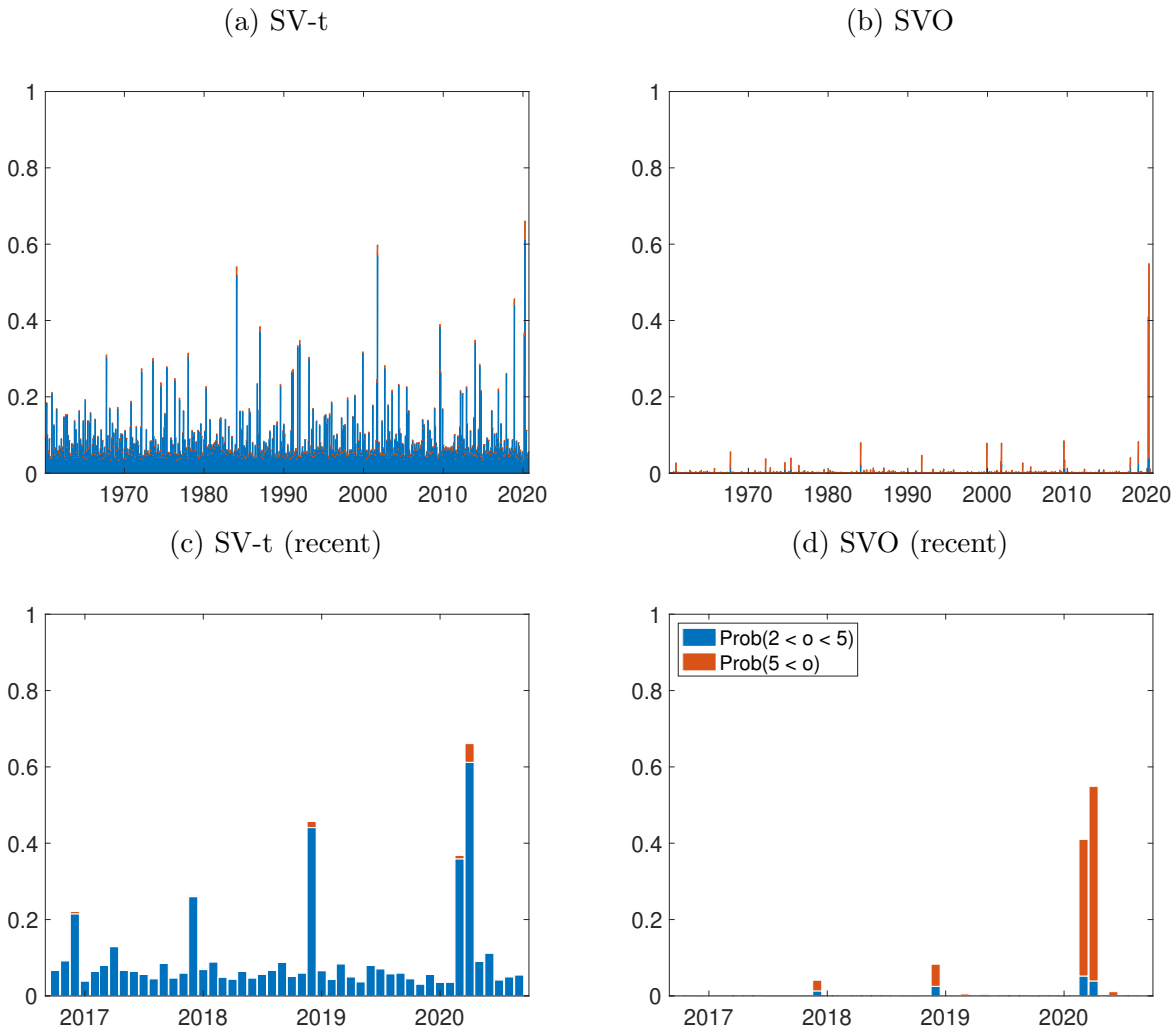
Note: Comparison of "SVO" (baseline, in denominator of relative comparisons) against "SV-t(5)" and "SV-OutMiss." Values below one indicate improvement over baseline. Evaluation window from 2007:M01 through 2014:M12. Significance assessed by Diebold-Mariano test using Newey-West standard errors with $h + 1$ lags. Due to the close behavior of some of the models compared, and rounding of the report values, a few comparisons show a significant relative CRPS (alternative models) of 1.00. These cases arise from persistent differences in performance that are, however, too small to be relevant after rounding.

Figure S.1: Posteriors of Outlier States for Real Income



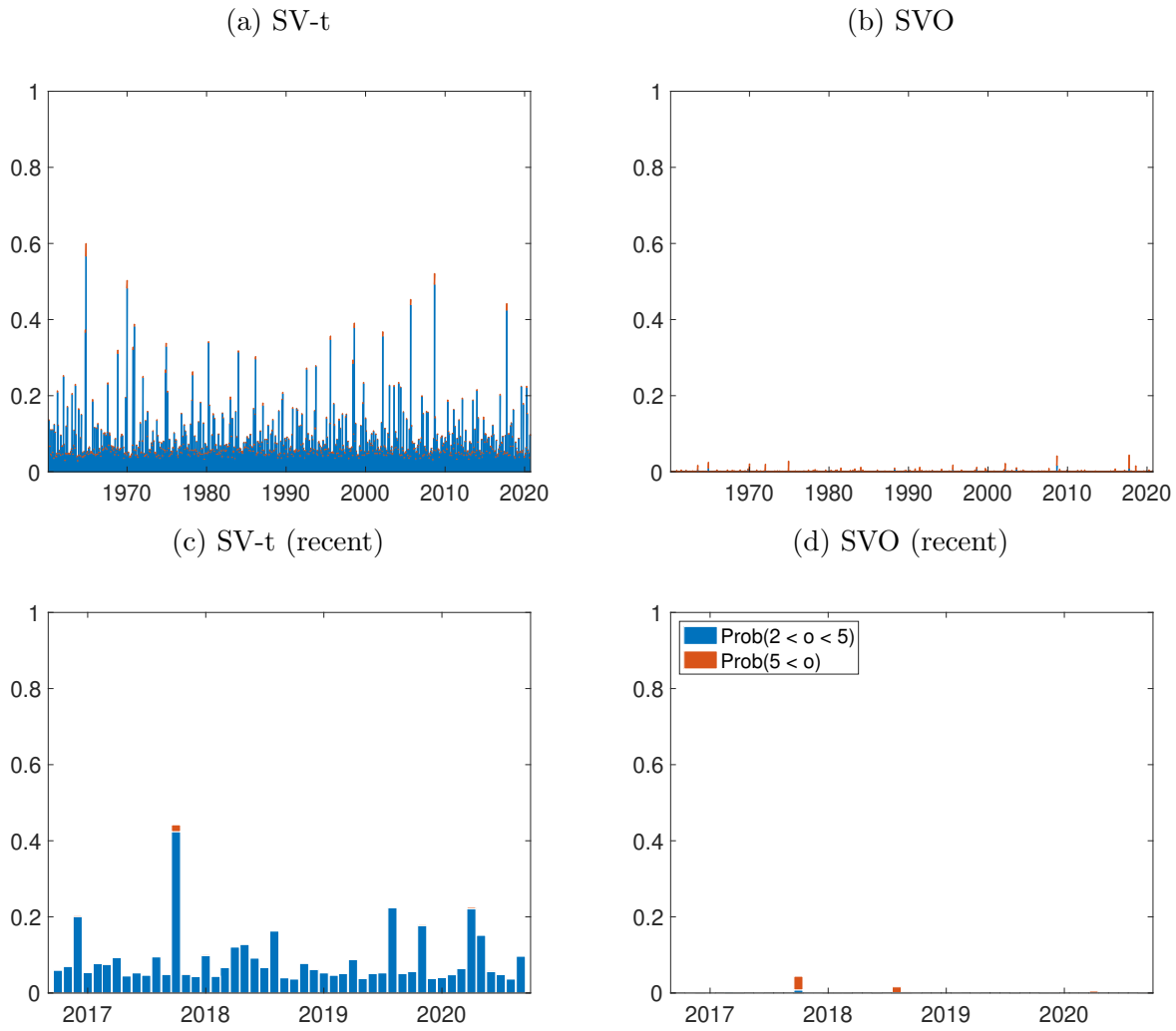
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.2: Posteriors of Outlier States for Real Consumption



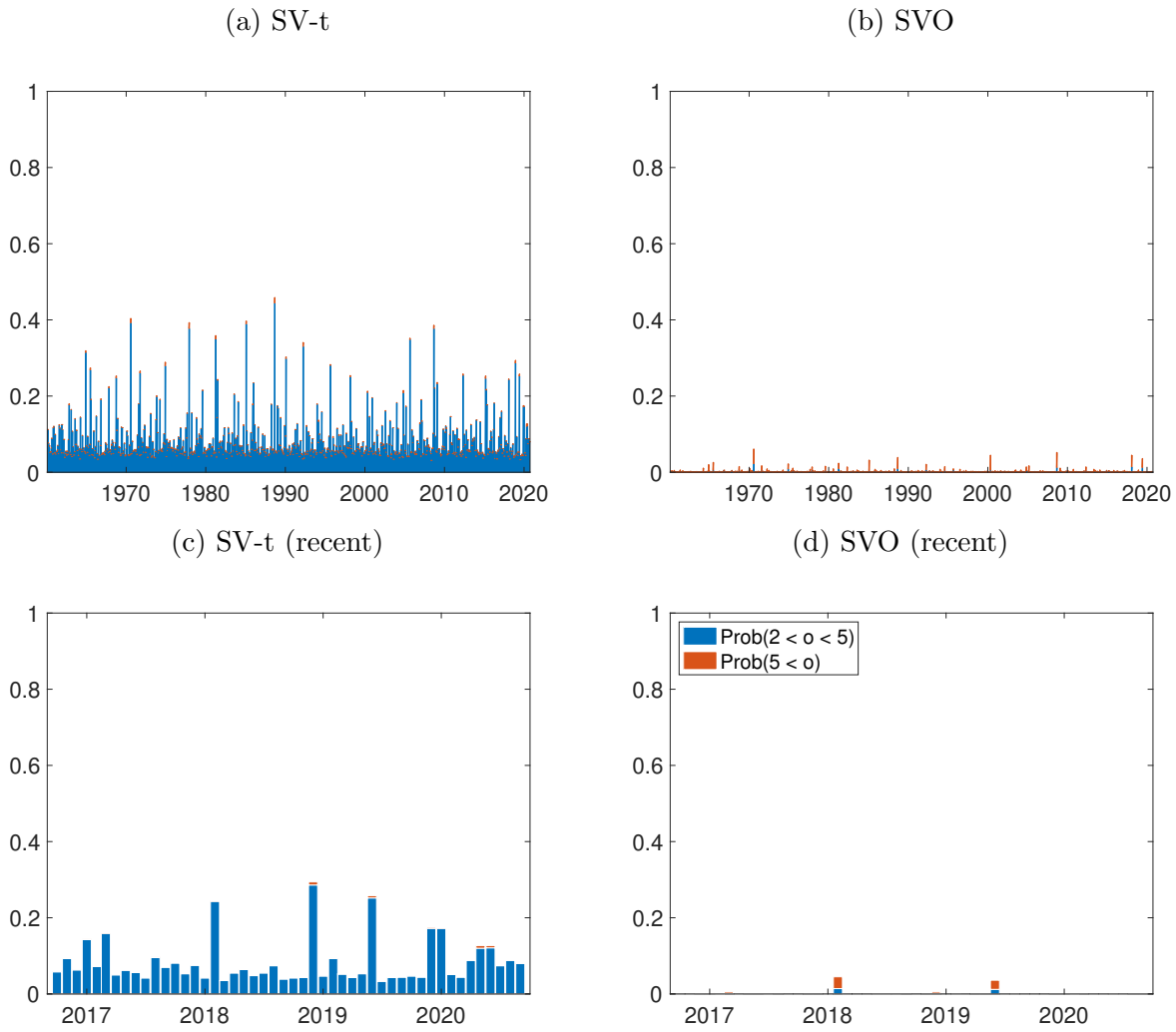
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.3: Posteriors of Outlier States for IP



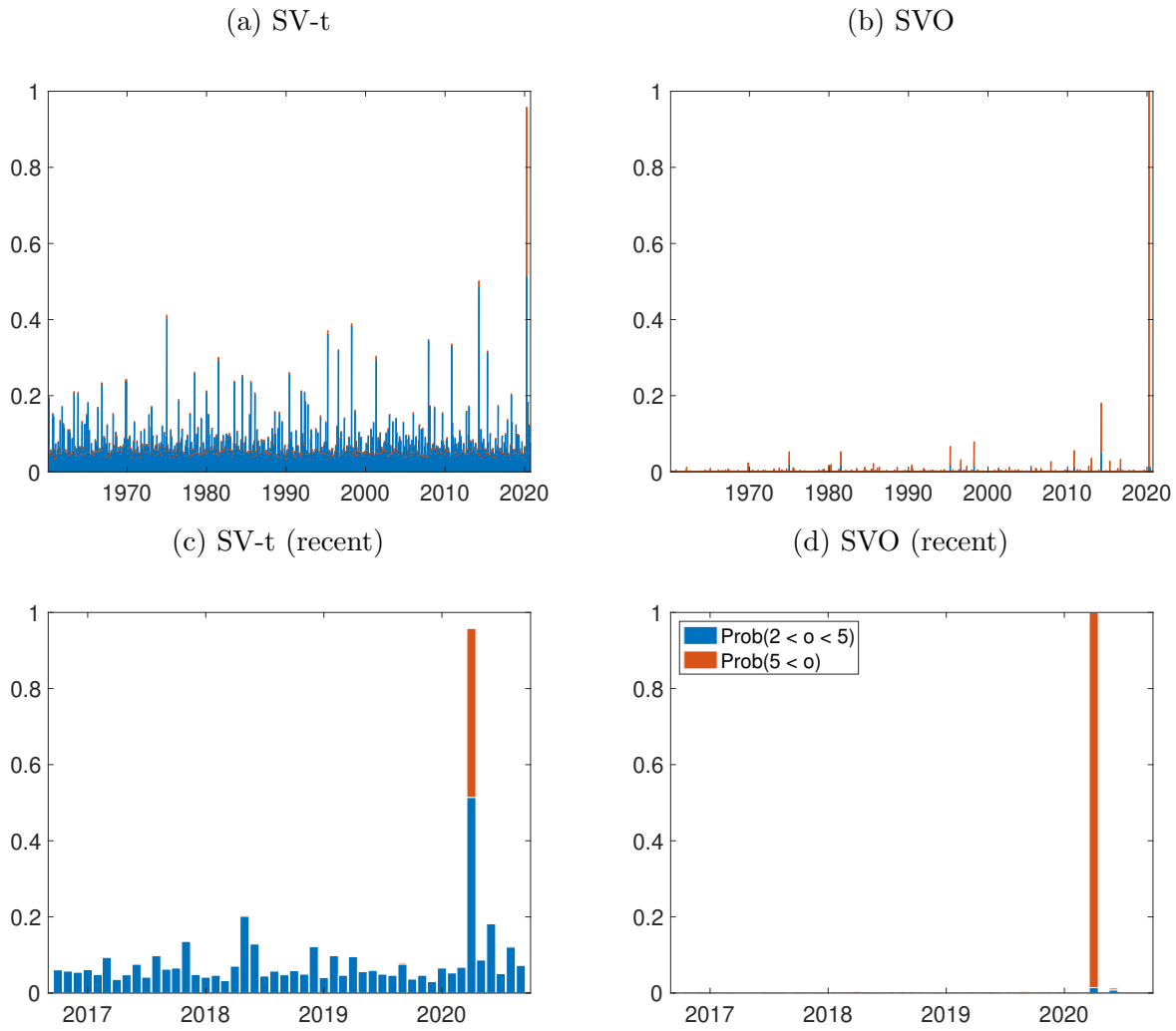
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.4: Posteriors of Outlier States for Capacity Utilization



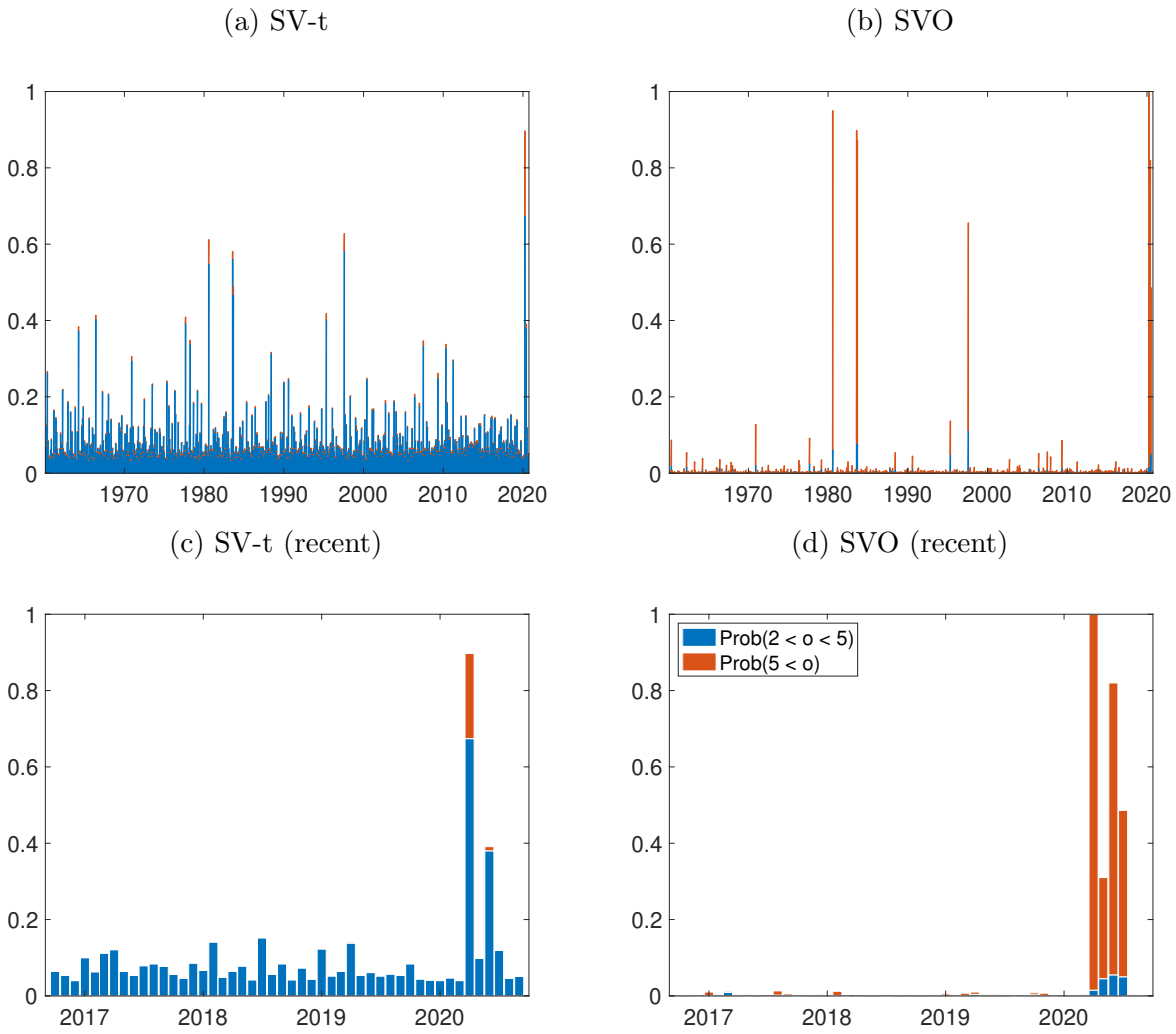
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.5: Posteriors of Outlier States for Unemployment



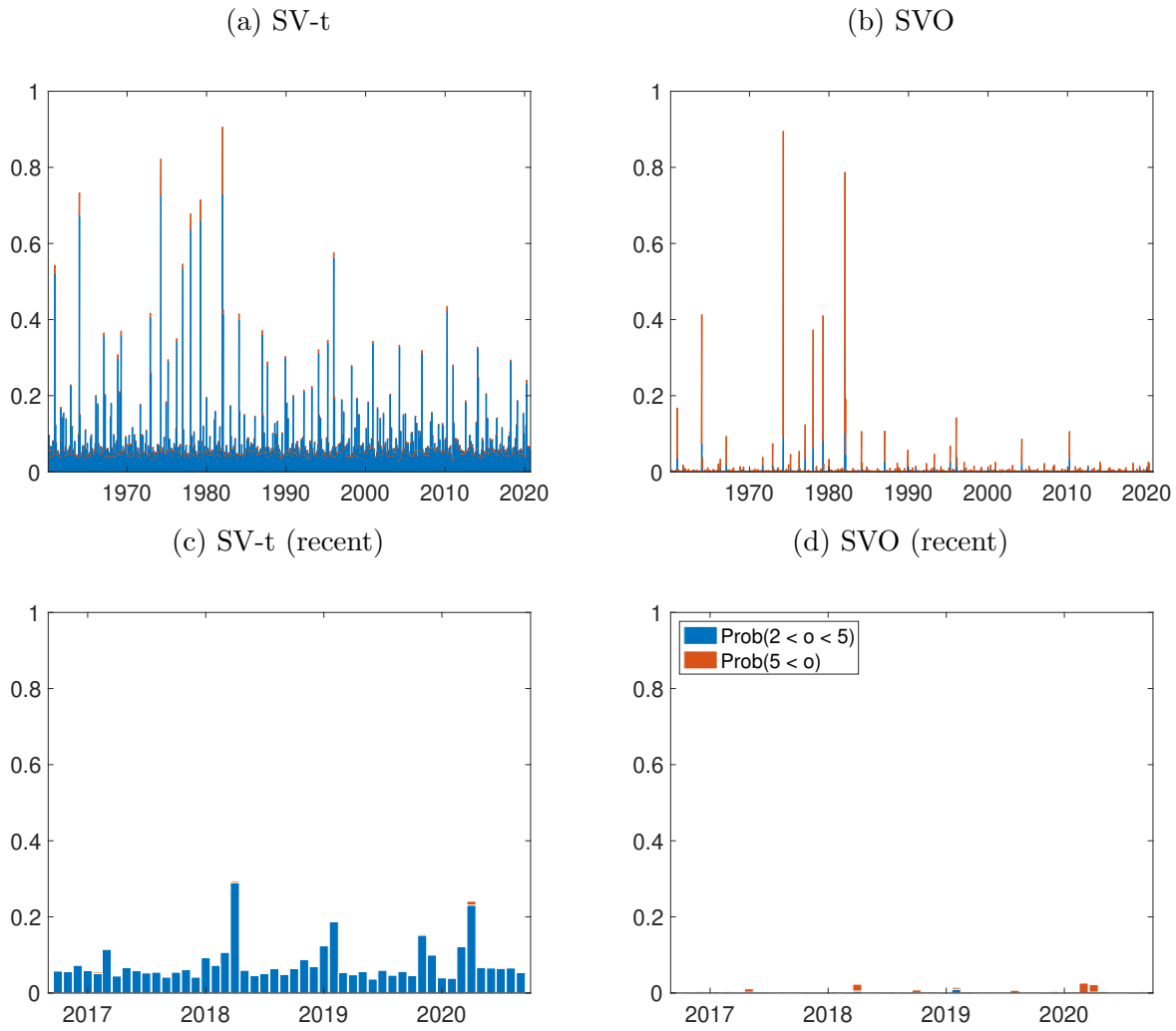
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.6: Posteriors of Outlier States for Nonfarm Payrolls



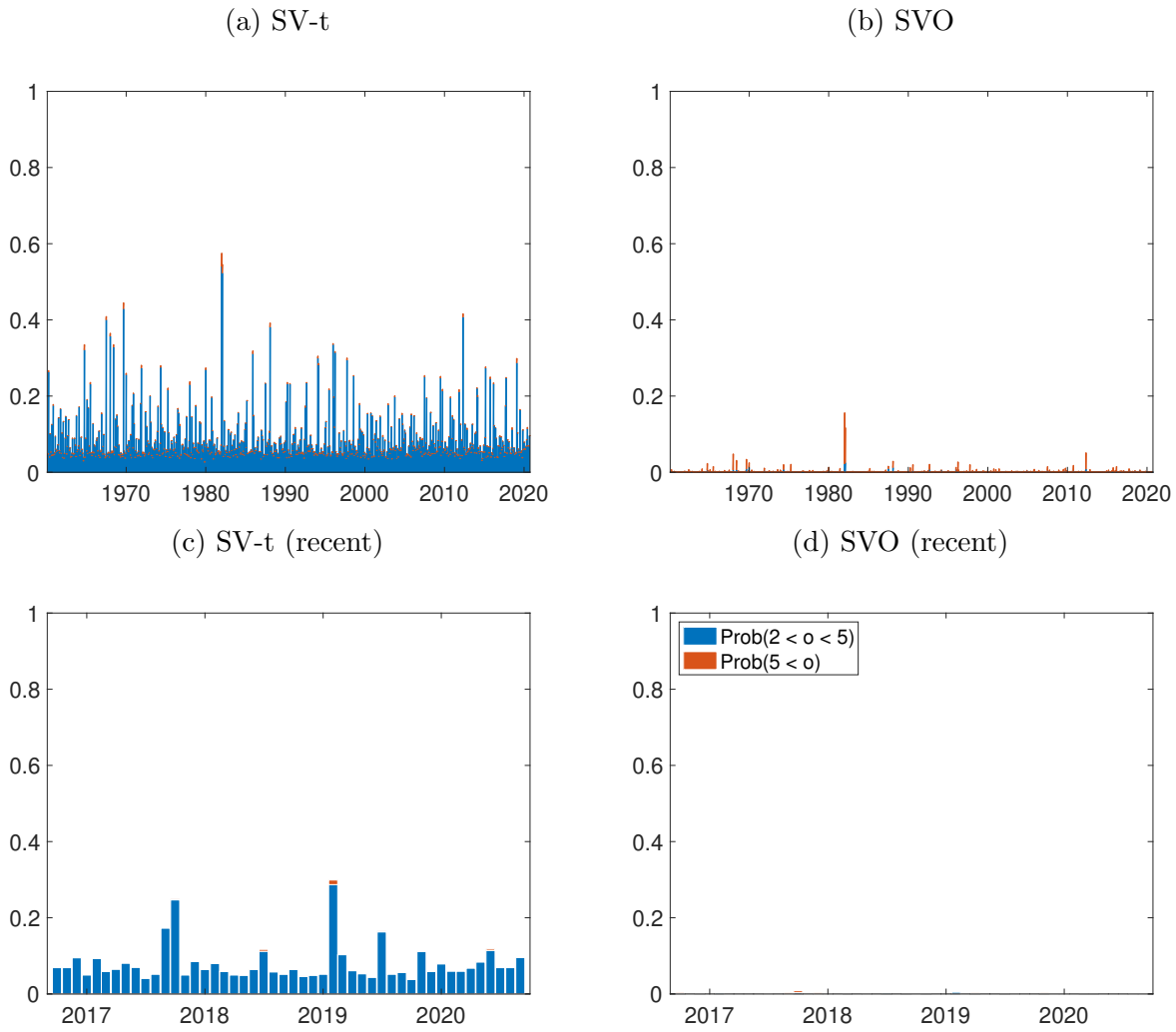
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.7: Posteriors of Outlier States for Hours



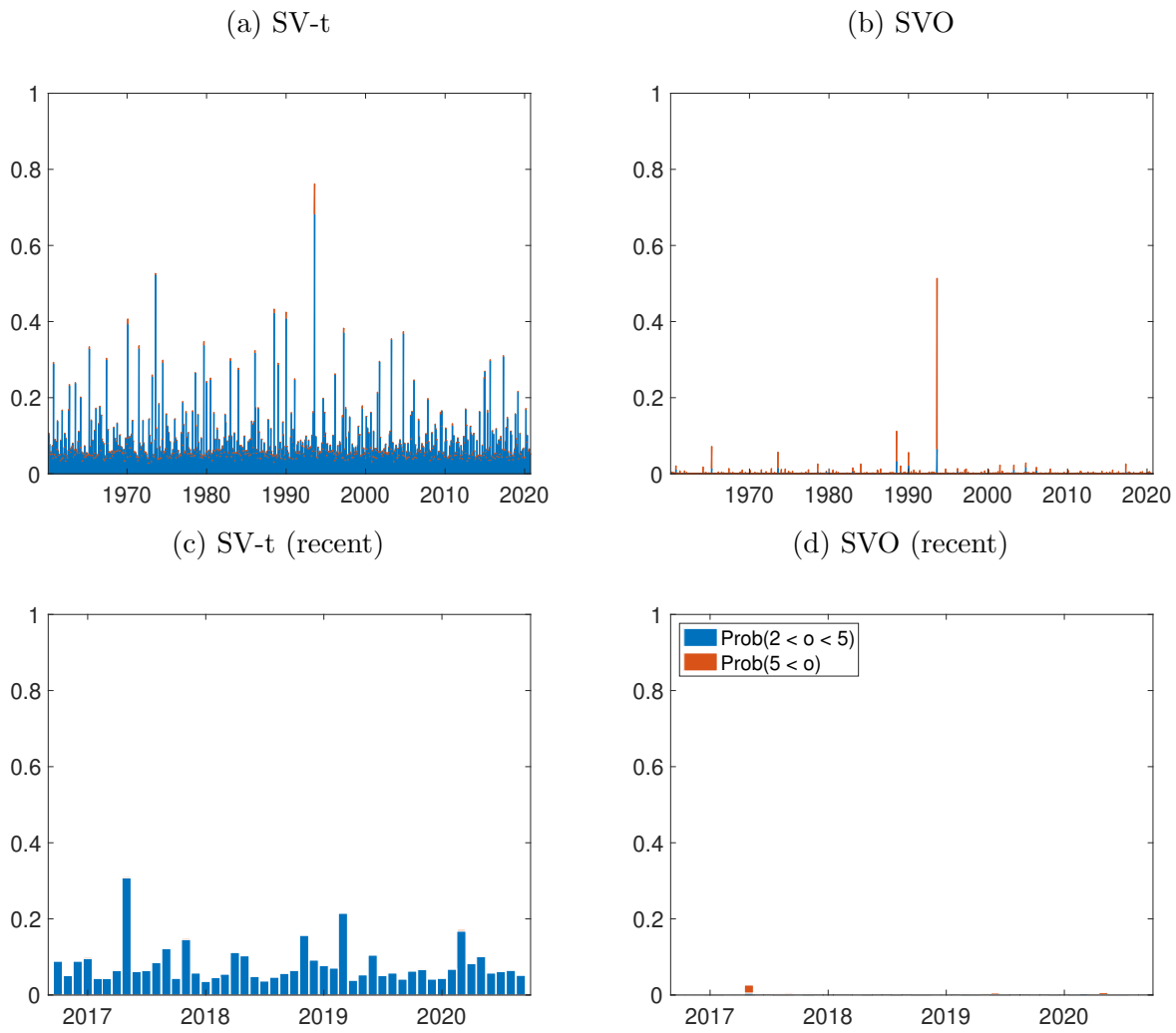
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.8: Posteriors of Outlier States for Hourly Earnings



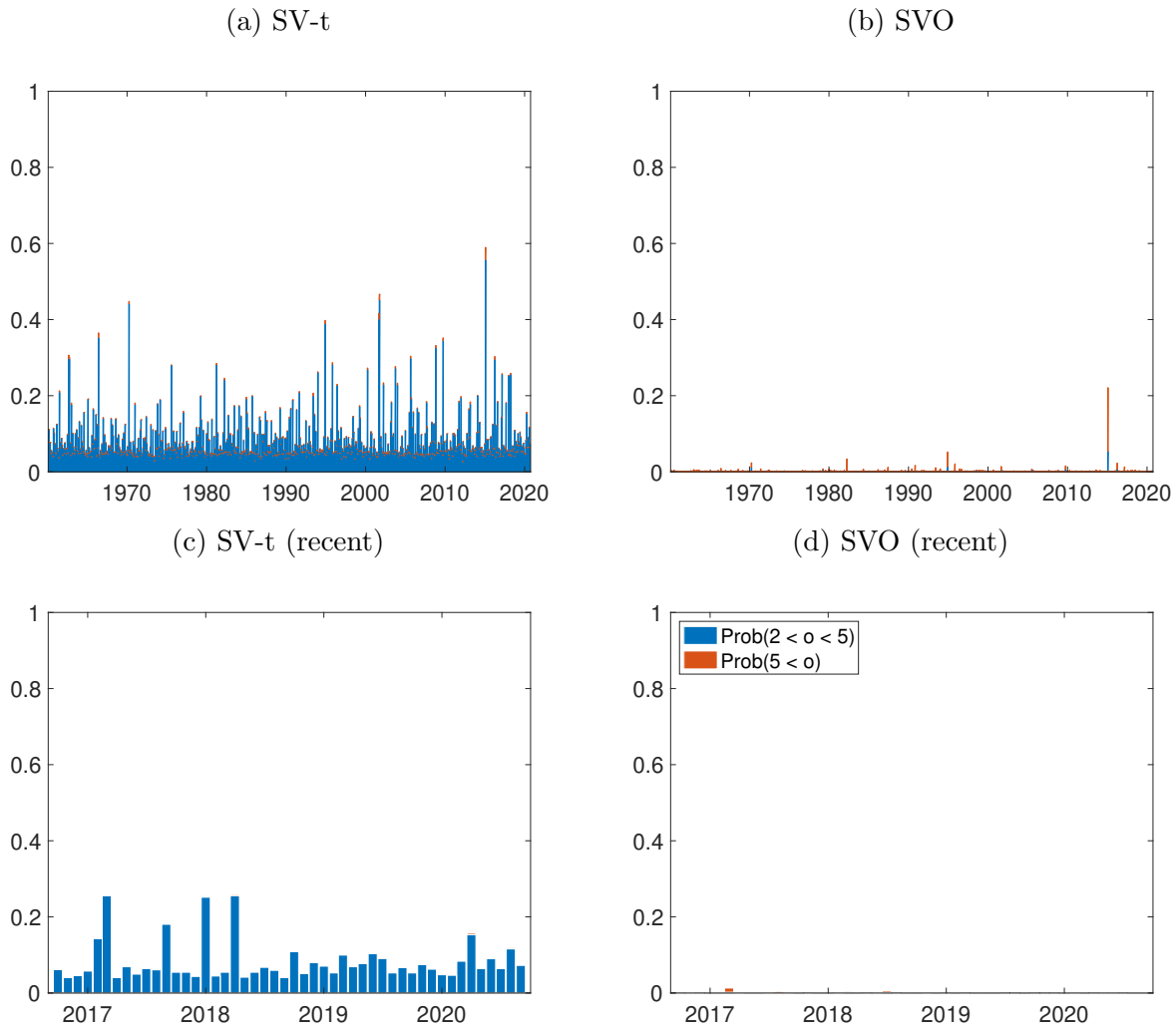
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.9: Posteriors of Outlier States for PPI (fin. goods)



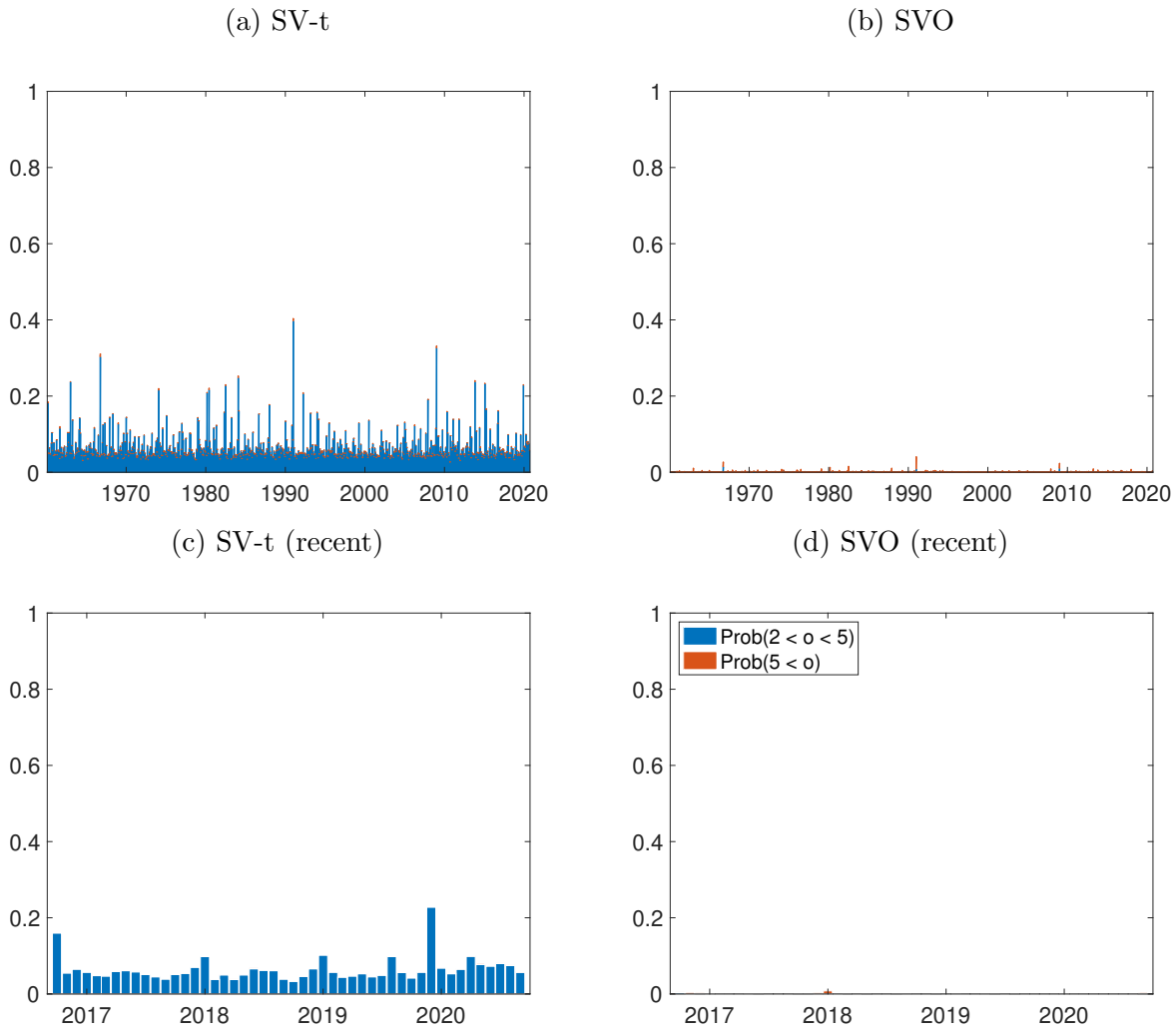
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.10: Posteriors of Outlier States for PCE prices



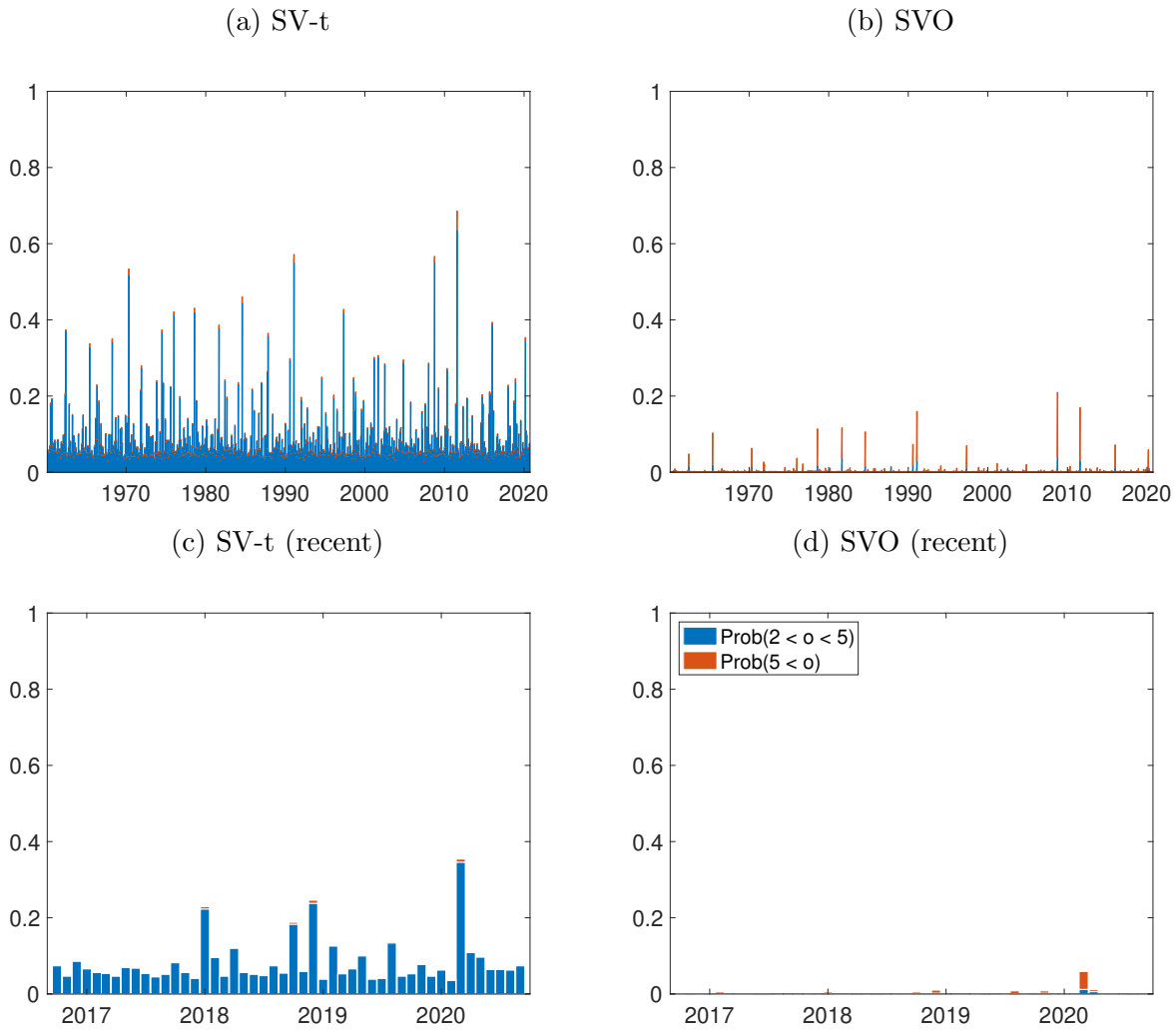
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.11: Posteriors of Outlier States for Housing Starts



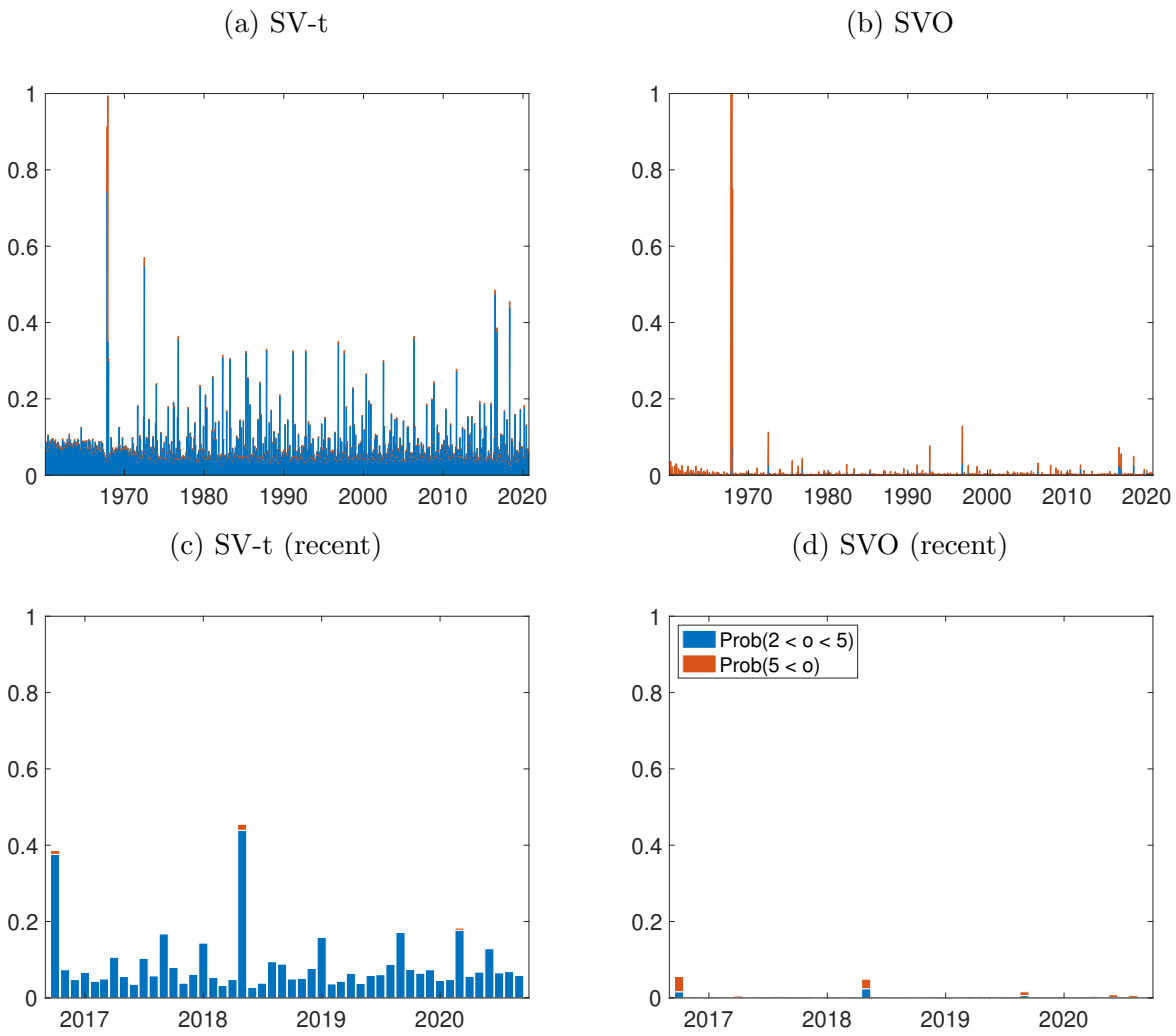
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.12: Posteriors of Outlier States for SP500



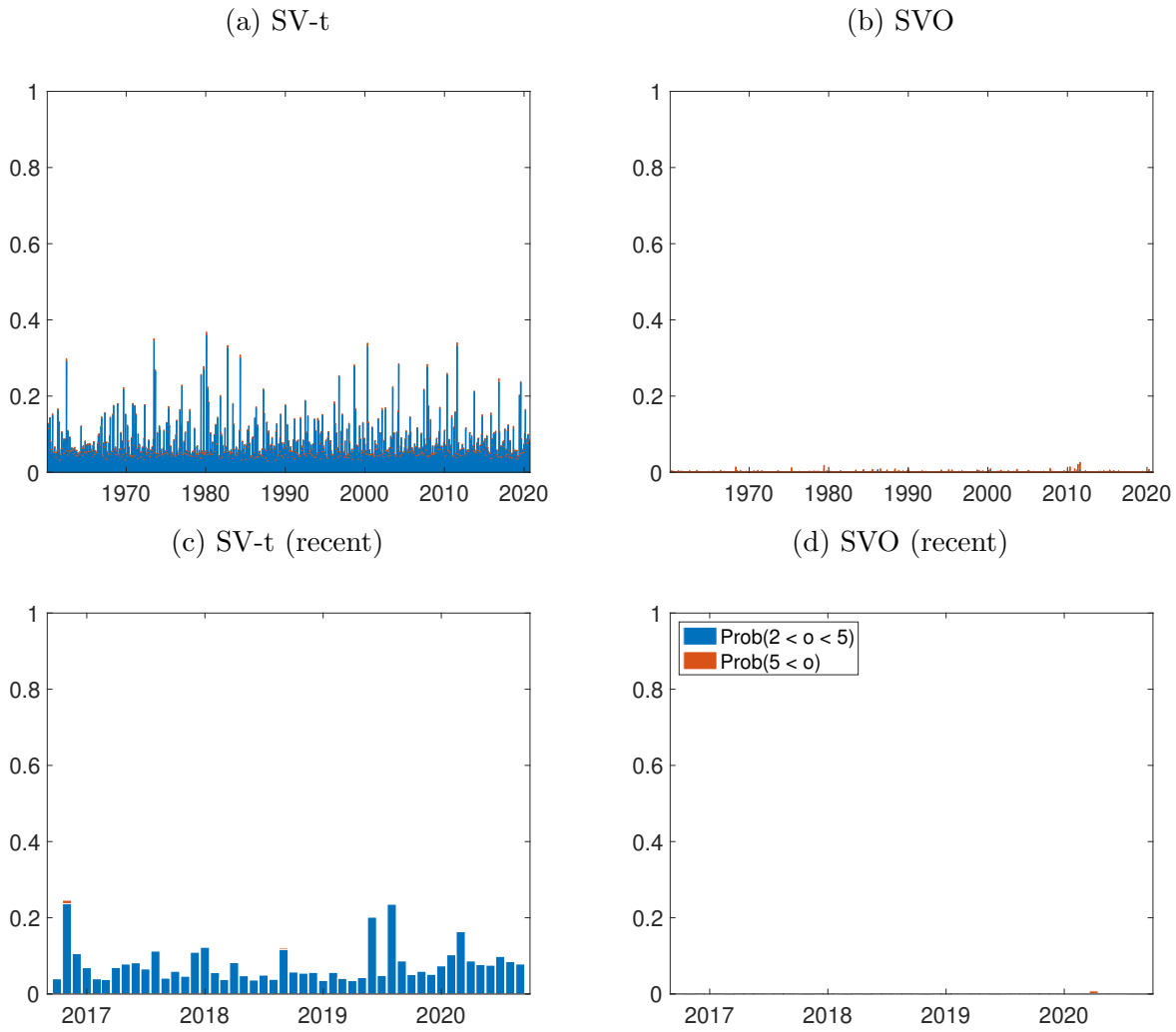
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.13: Posteriors of Outlier States for U.S. / U.K. Forex



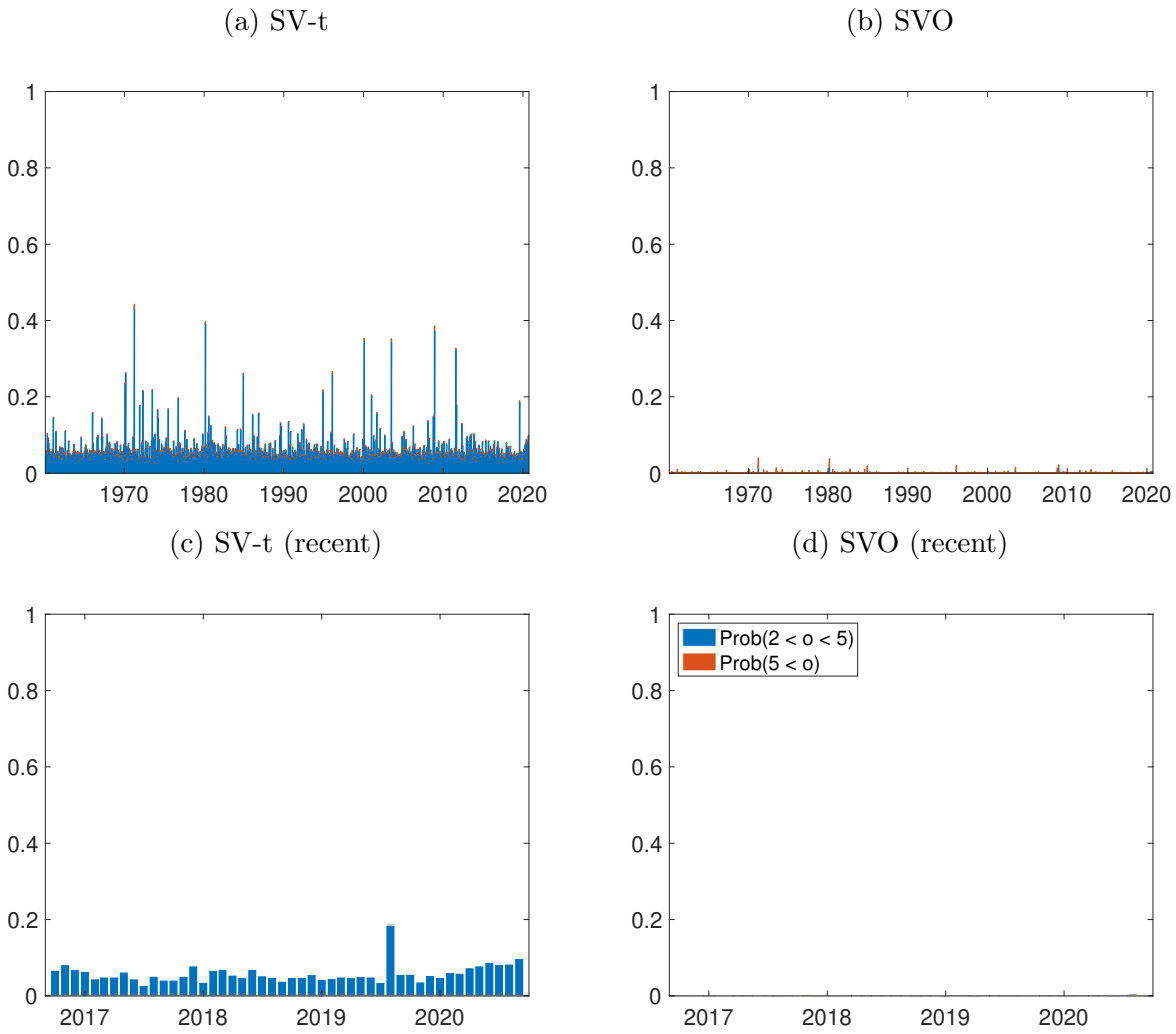
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.14: Posteriors of Outlier States for 5-Year yield



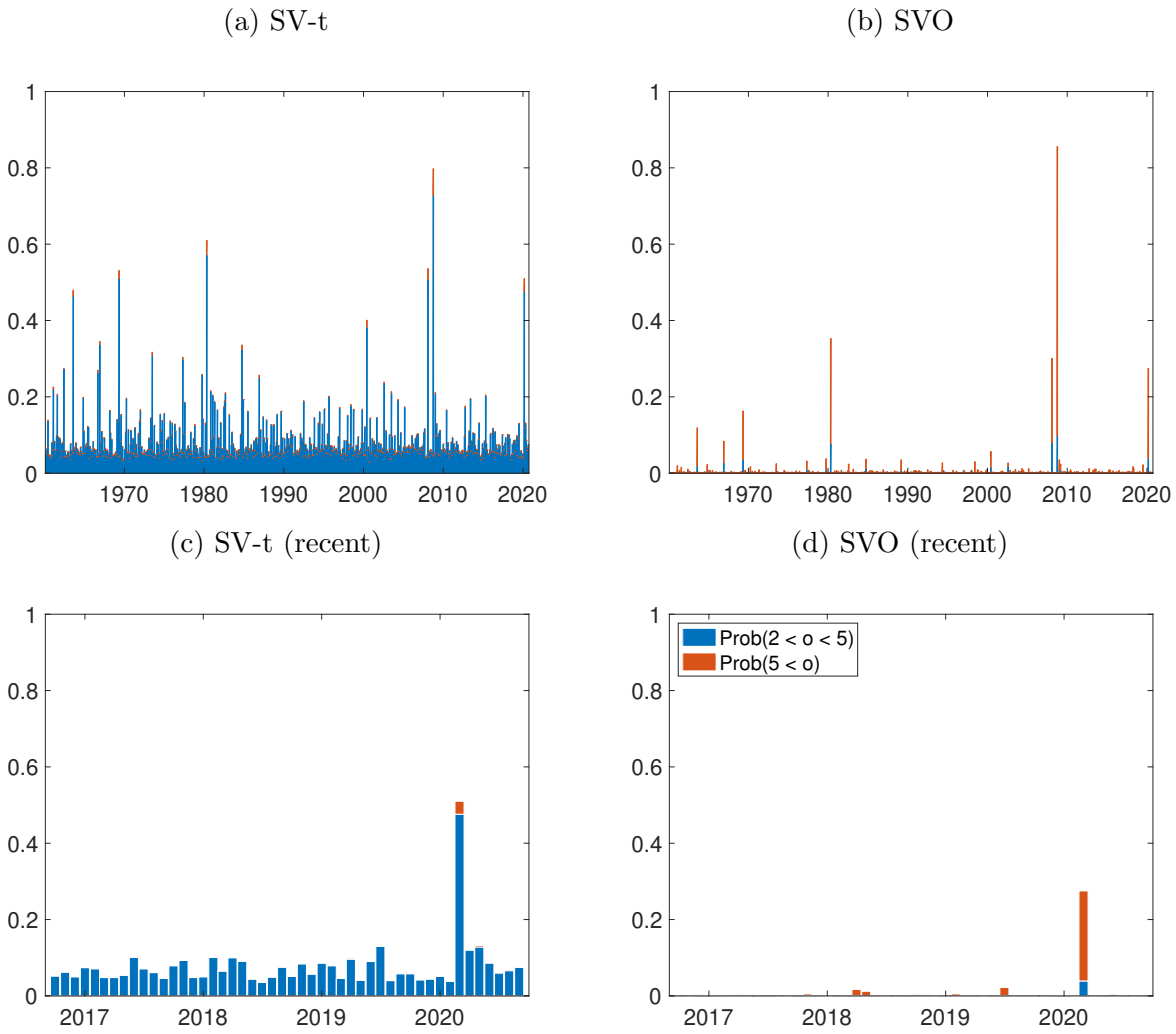
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.15: Posteriors of Outlier States for 10-Year yield



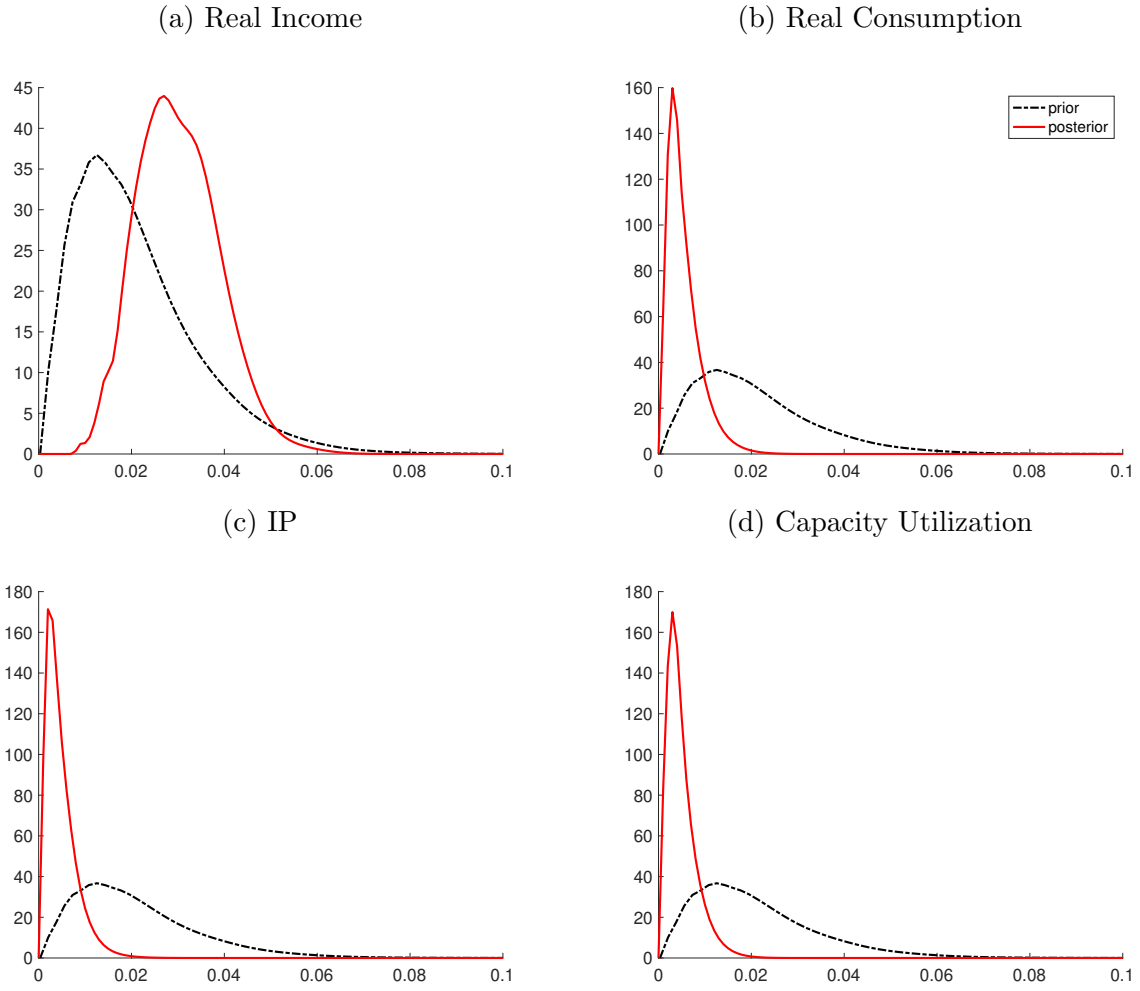
Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

Figure S.16: Posteriors of Outlier States for Baa spread



Note: Full-sample estimates per September 2020 of posterior probabilities for realizations of $o_{j,t}$ in SV-t and SVO models. Each panel shows posterior probabilities for $o_{j,t}$ to fall into a range between two and five (blue bars) or to be larger than five (orange bars) in a given month of the sample. The lower row of panels zooms in on results for the last few years (numbers are identical to the corresponding results in the upper-row panels). The SV-t model is estimated with five degrees of freedom.

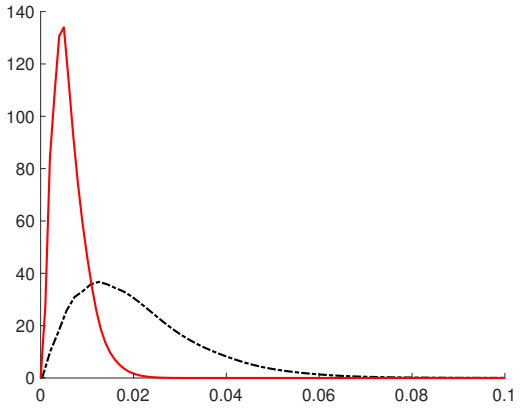
Figure S.17: SVO outlier probabilities



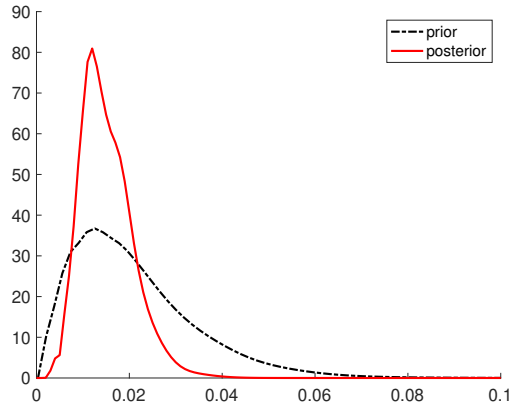
Note: Prior and posterior distribution of the outlier probability p_j in the SVO model for selected variables, estimated from the full sample of data available from Match 1959 through September 2020.

Figure S.17: SVO outlier probabilities (ctd.)

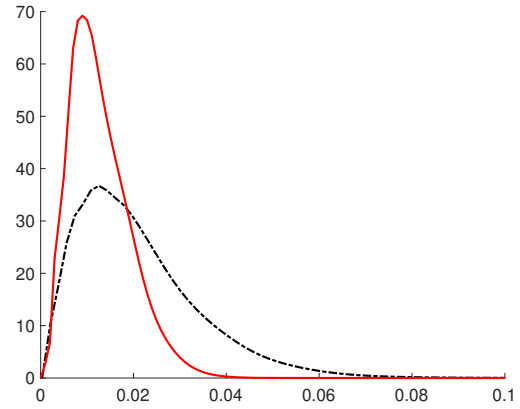
(e) Unemployment



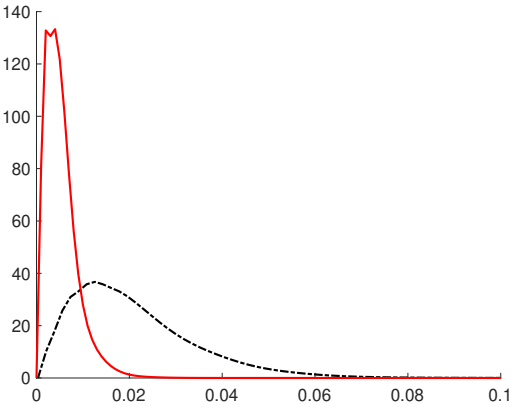
(f) Nonfarm Payrolls



(g) Hours

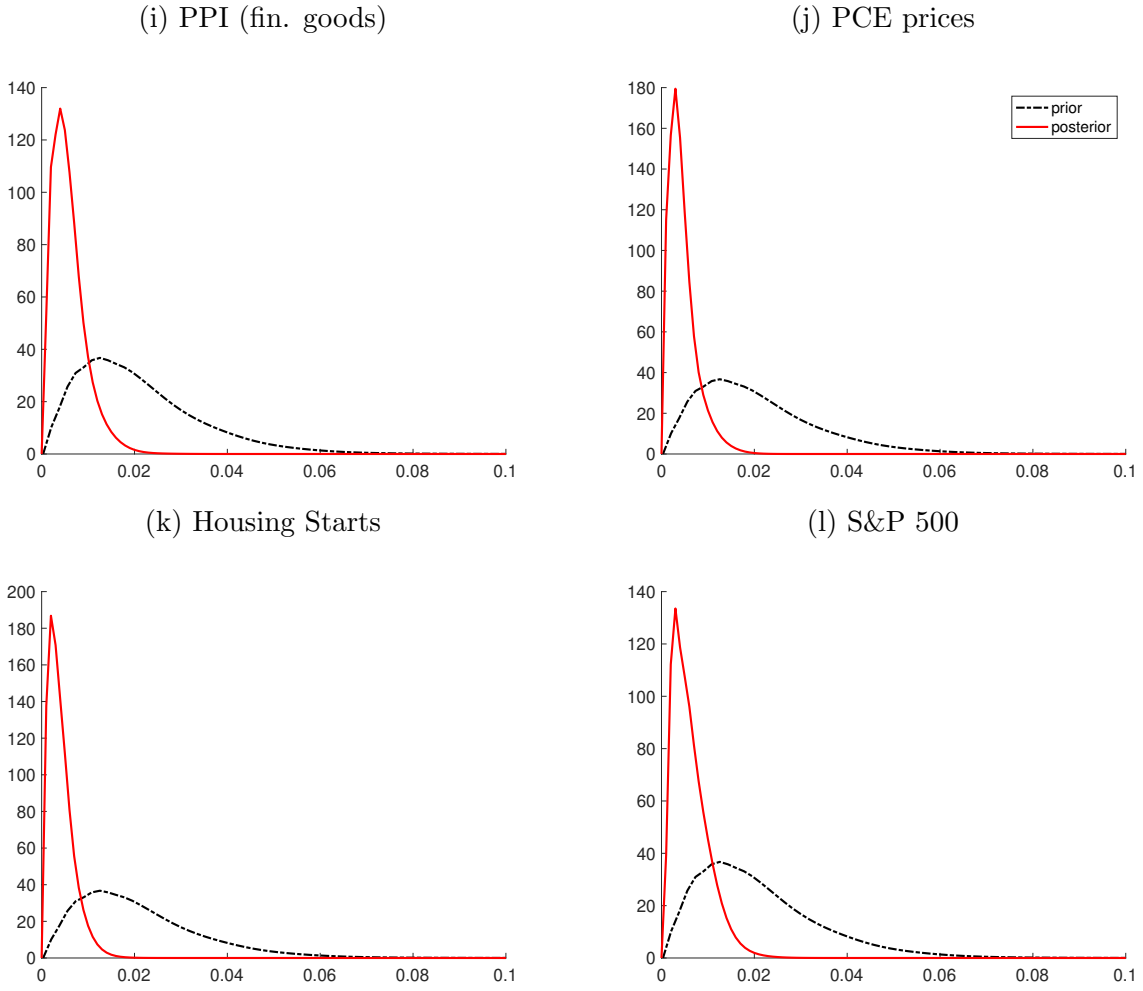


(h) Hourly Earnings



Note: Prior and posterior distribution of the outlier probability p_j in the SVO model for selected variables, estimated from the full sample of data available from Match 1959 through September 2020.

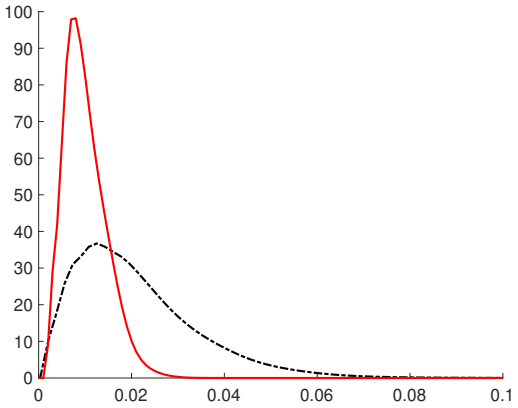
Figure S.17: SVO outlier probabilities (ctd.)



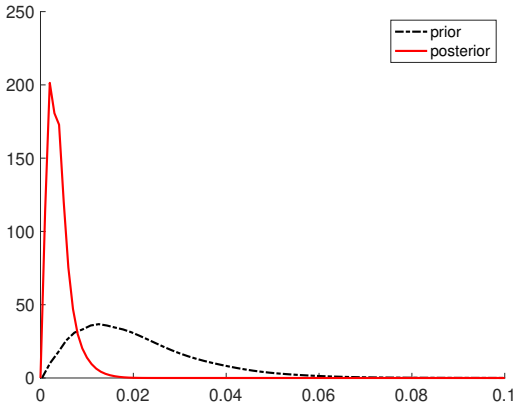
Note: Prior and posterior distribution of the outlier probability p_j in the SVO model for selected variables, estimated from the full sample of data available from Match 1959 through September 2020.

Figure S.17: SVO outlier probabilities (ctd.)

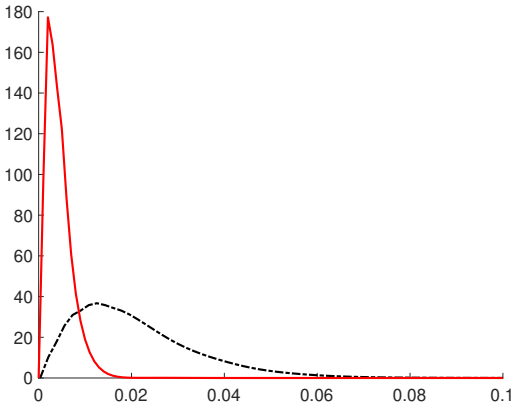
(m) USD / GBP FX rate



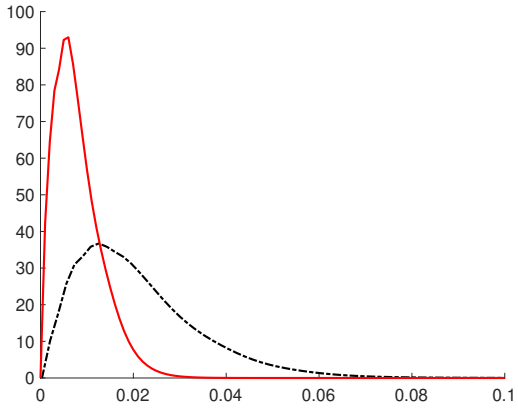
(n) 5-Year yield



(o) 10-Year yield

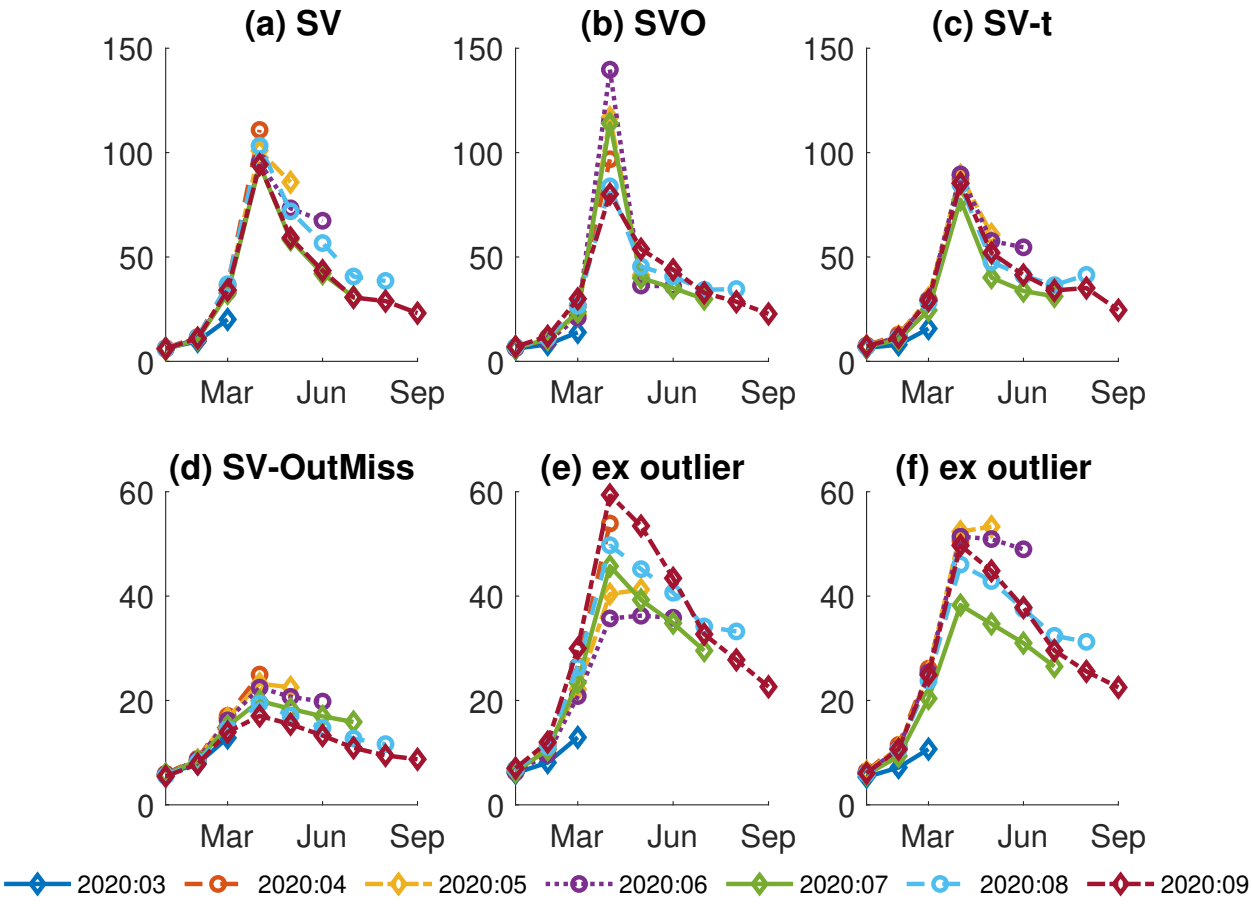


(p) Baa spread



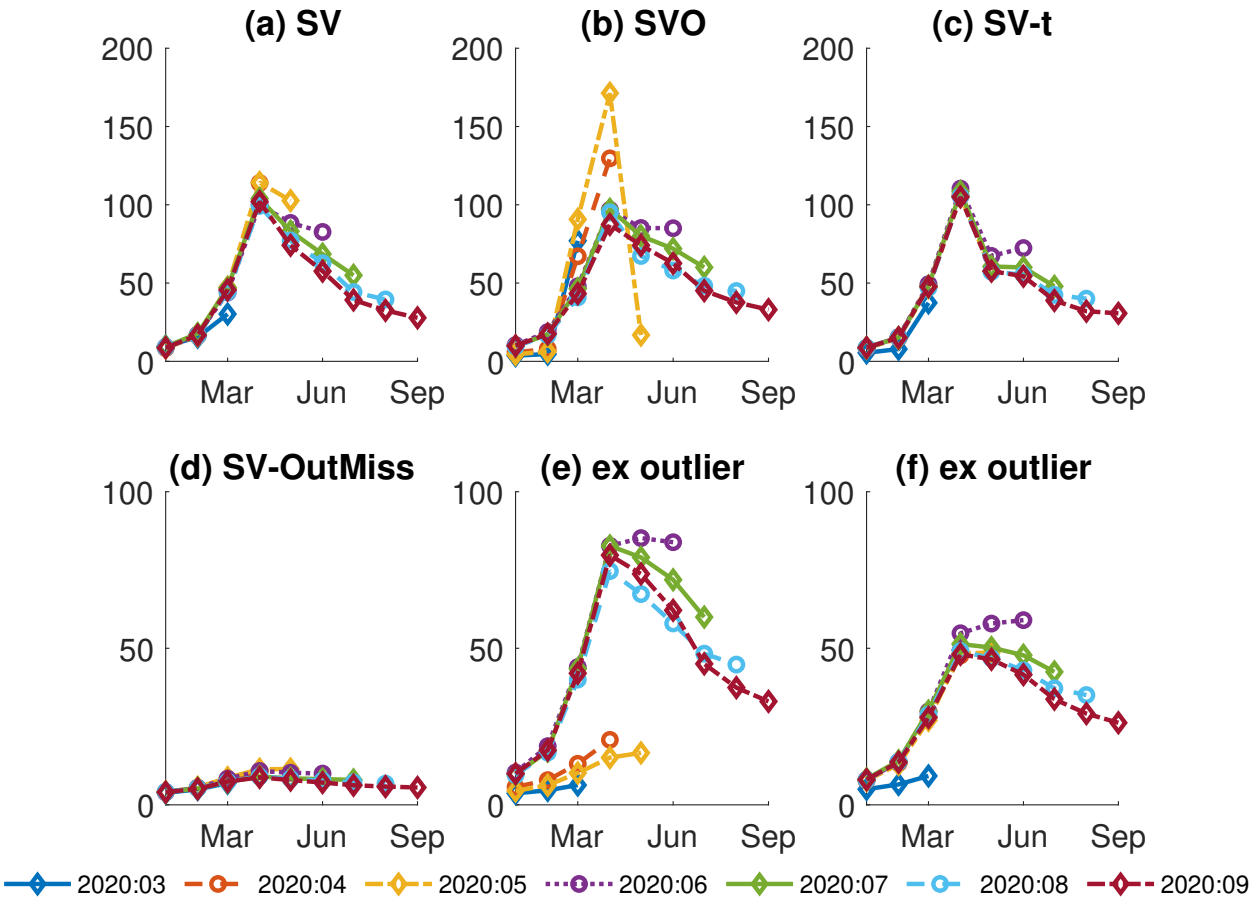
Note: Prior and posterior distribution of the outlier probability p_j in the SVO model for selected variables, estimated from the full sample of data available from Match 1959 through September 2020.

Figure S.18: Time-varying volatilities of Real Income in 2020



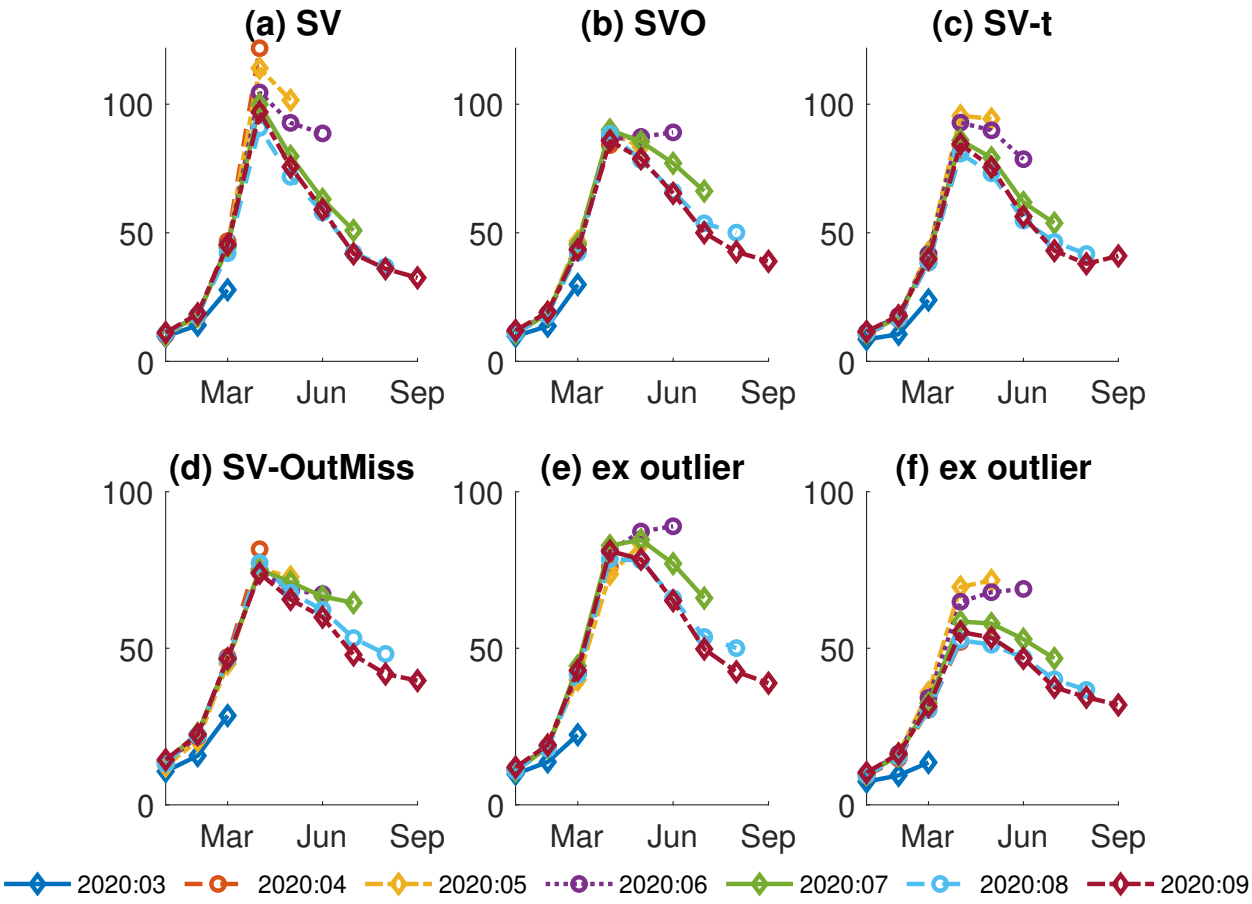
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1} \Lambda_t A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.19: Time-varying volatilities of Real Consumption in 2020



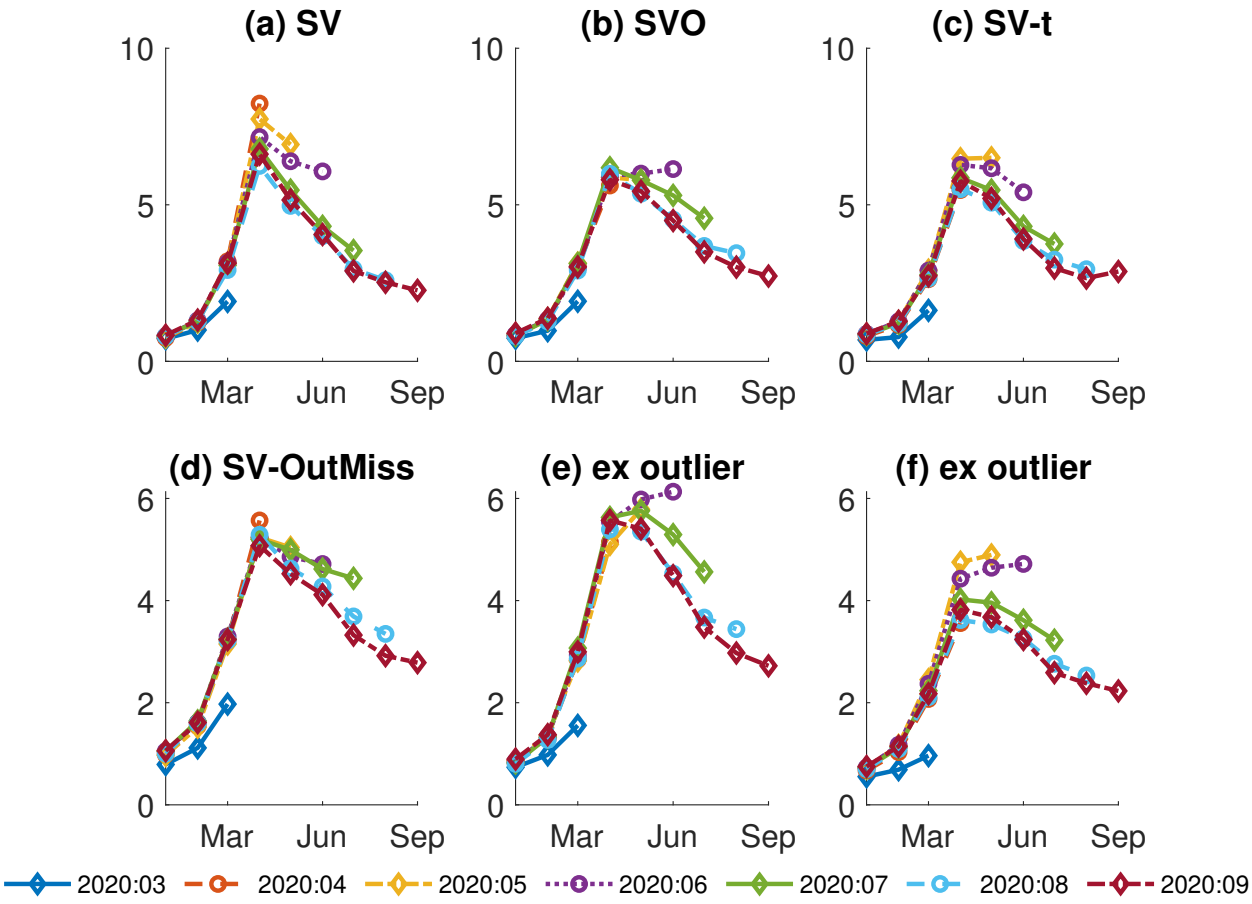
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.20: Time-varying volatilities of IP in 2020



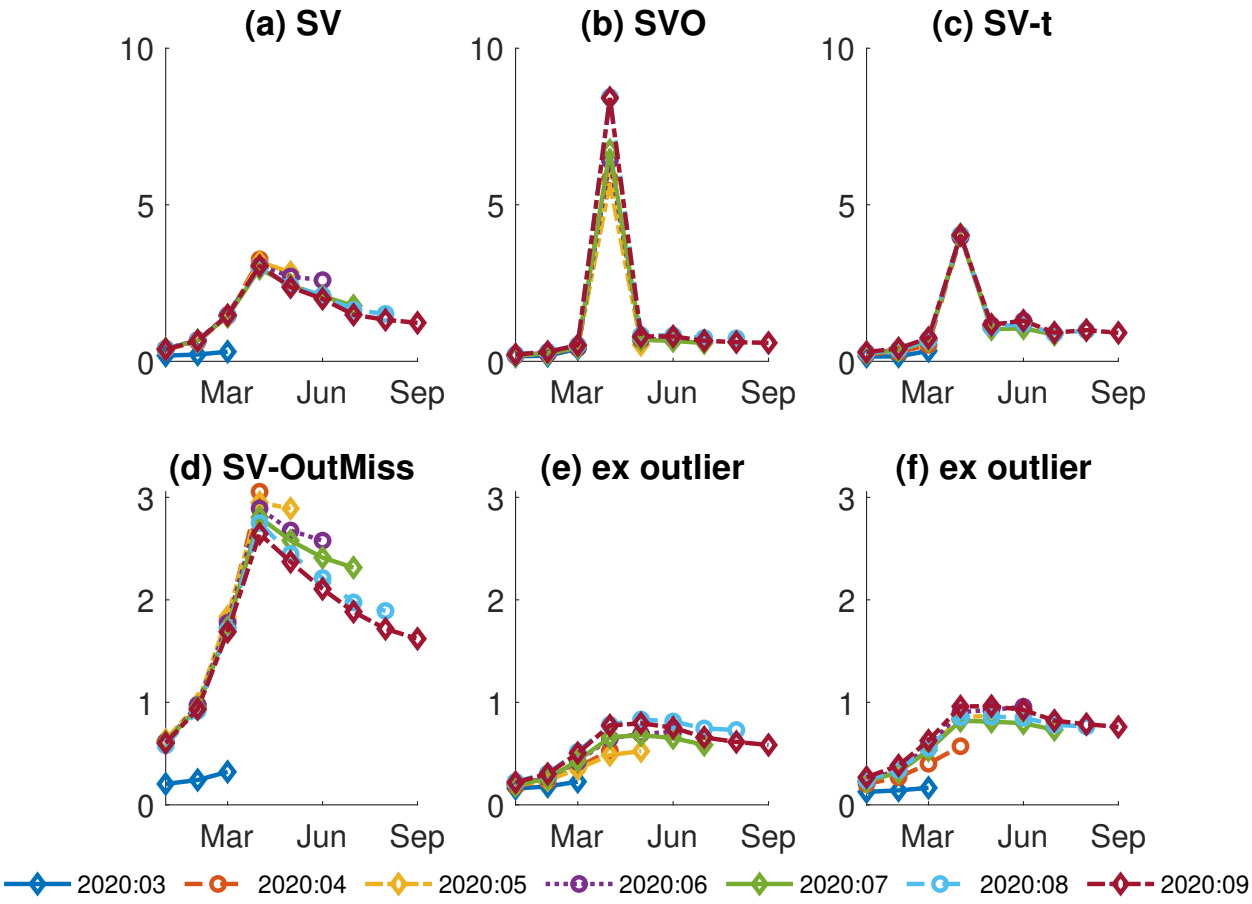
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.21: Time-varying volatilities of Capacity Utilization in 2020



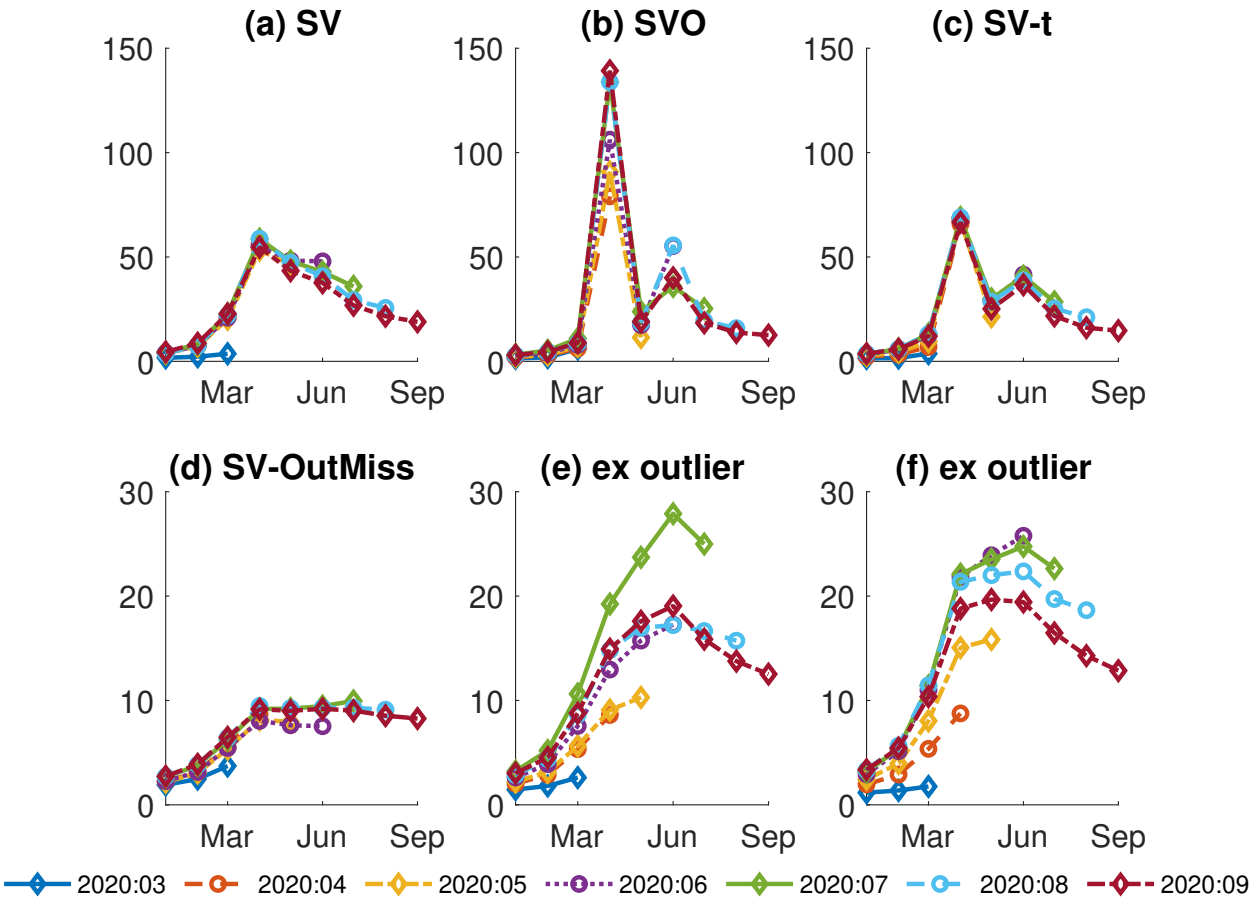
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.22: Time-varying volatilities of Unemployment in 2020



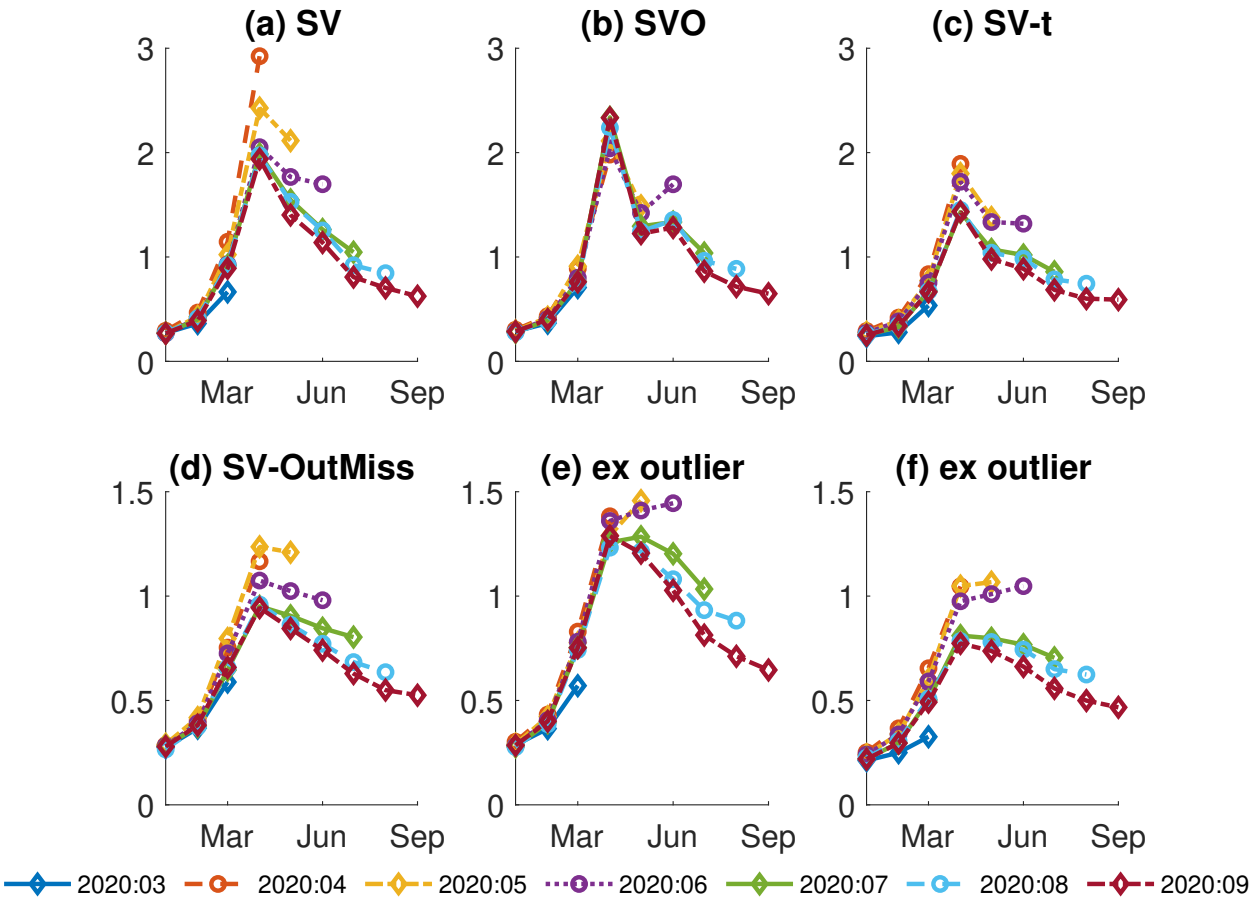
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.23: Time-varying volatilities of Nonfarm Payrolls in 2020



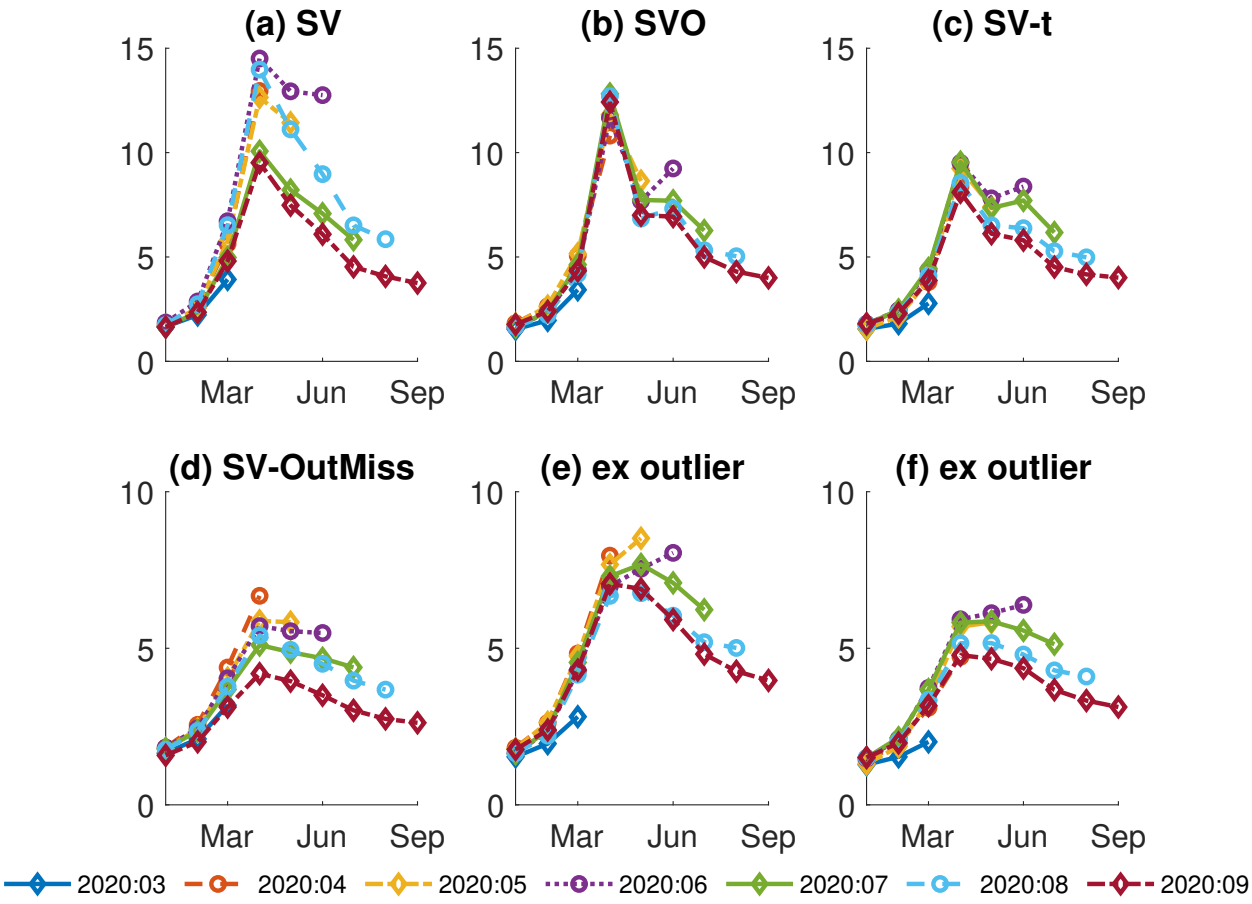
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.24: Time-varying volatilities of Hours in 2020



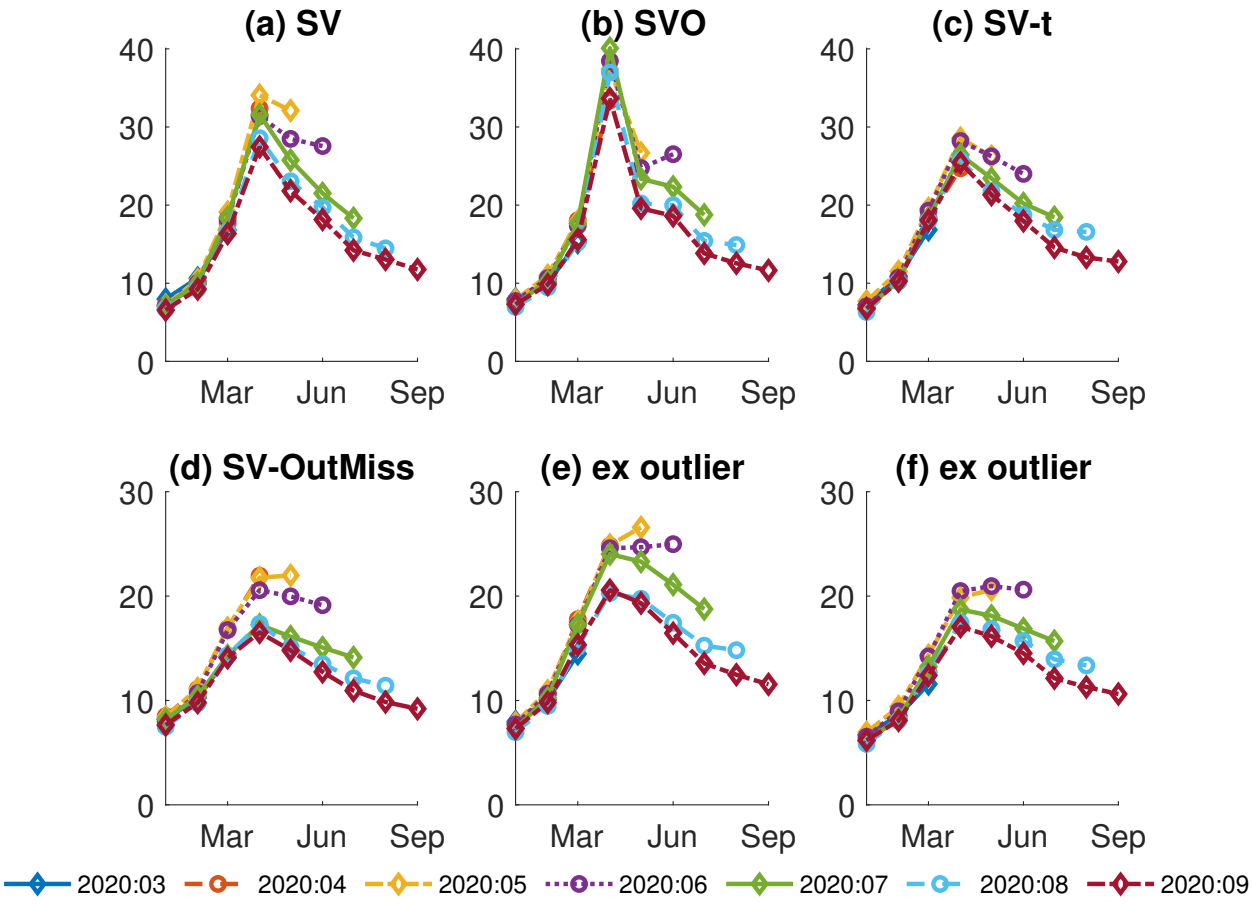
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.25: Time-varying volatilities of Hourly Earnings in 2020



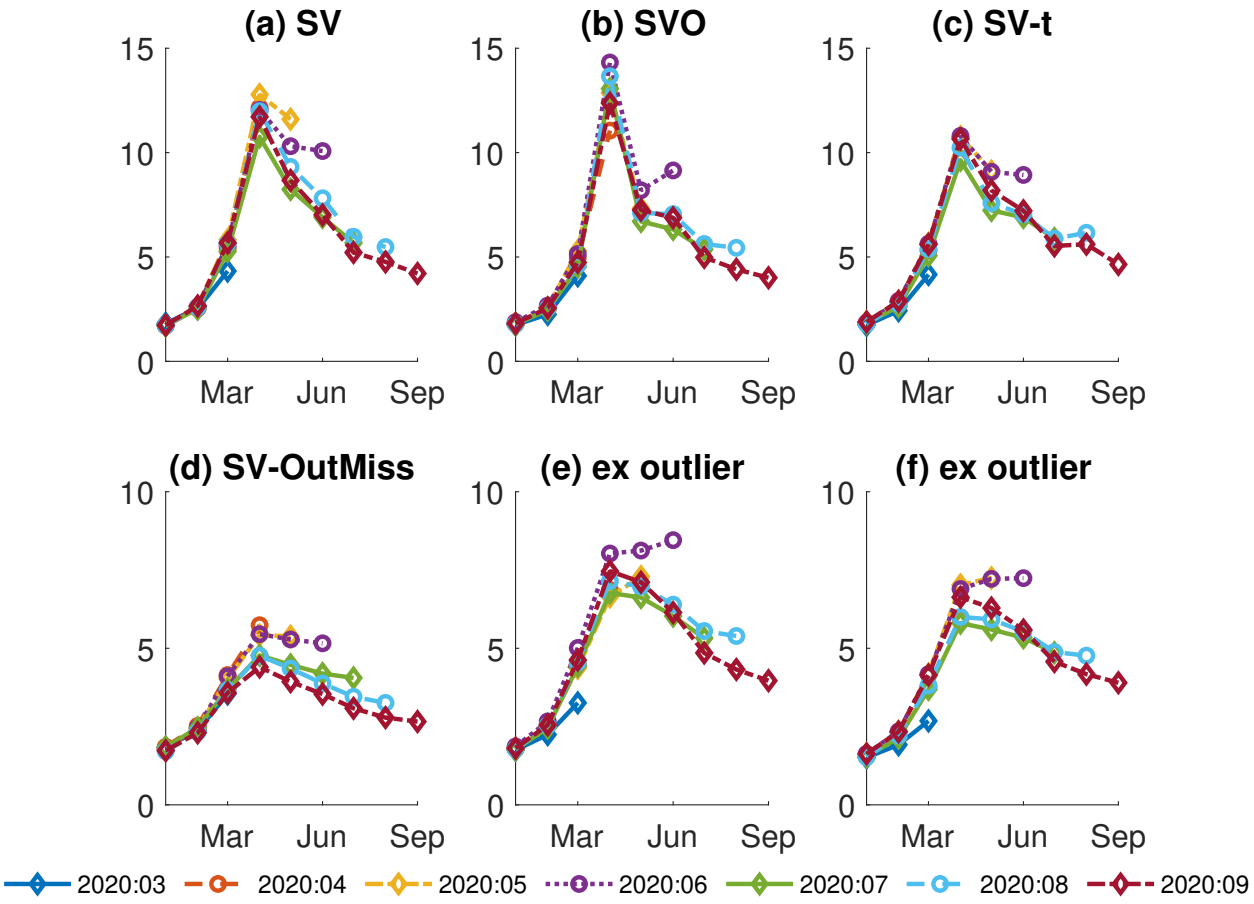
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.26: Time-varying volatilities of PPI (fin. goods) in 2020



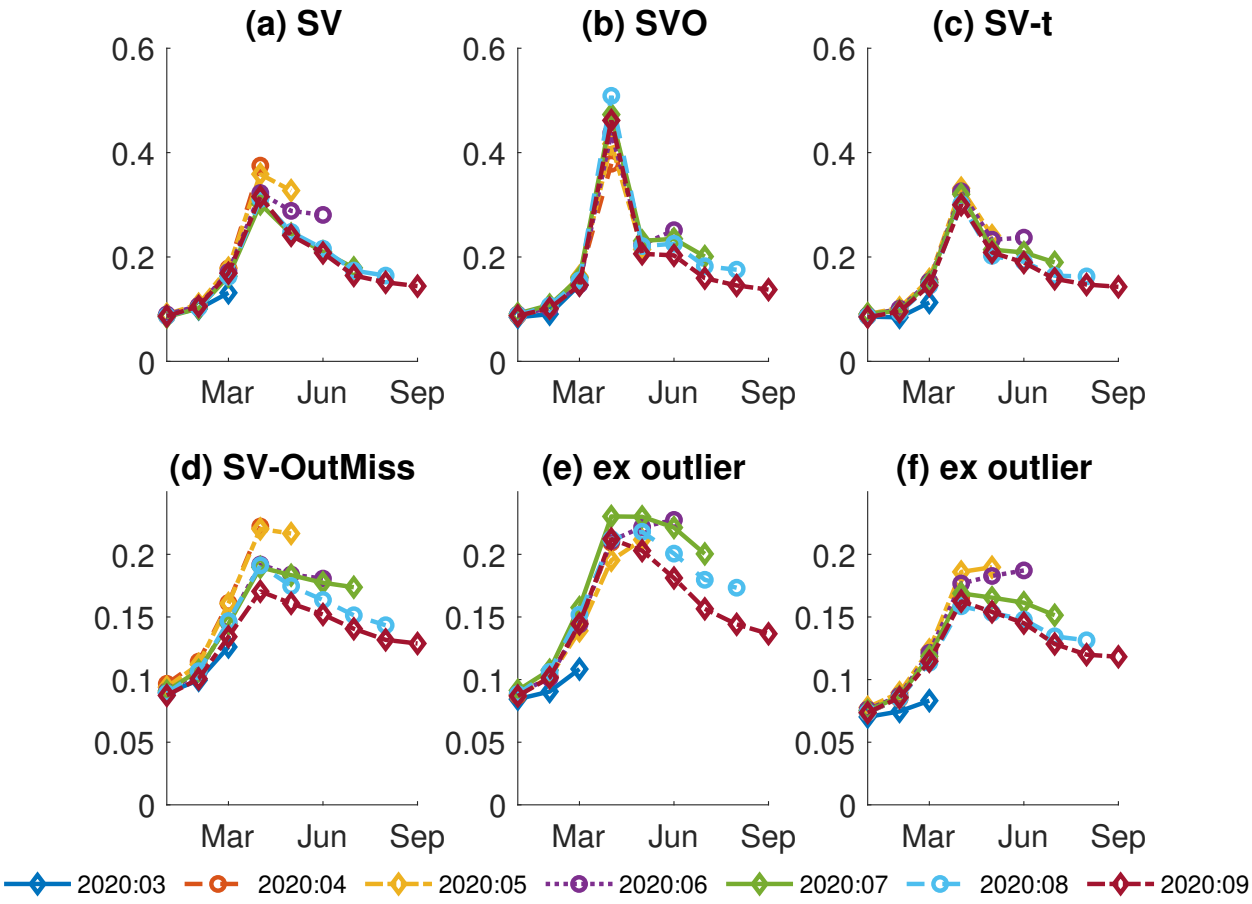
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.27: Time-varying volatilities of PCE prices in 2020



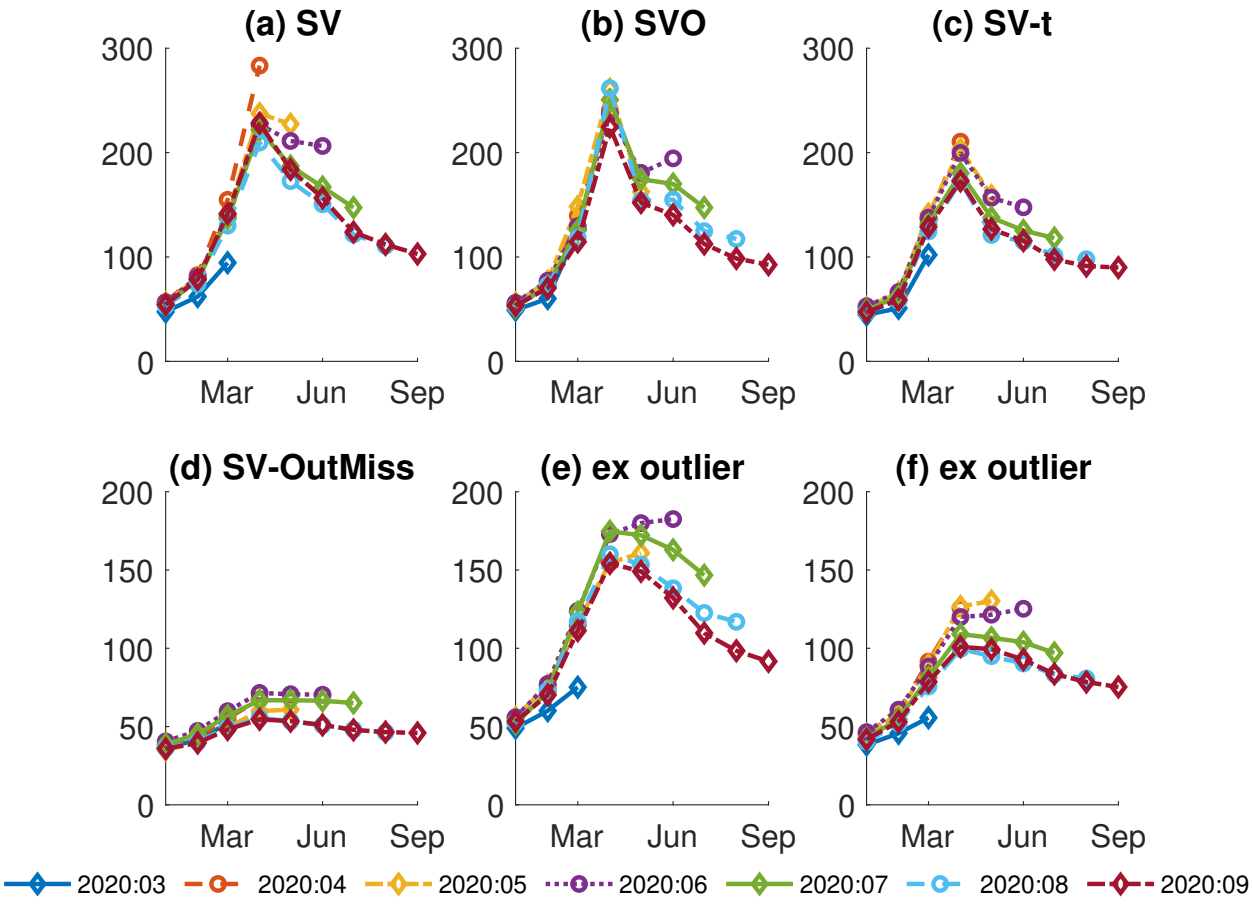
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.28: Time-varying volatilities of Housing Starts in 2020



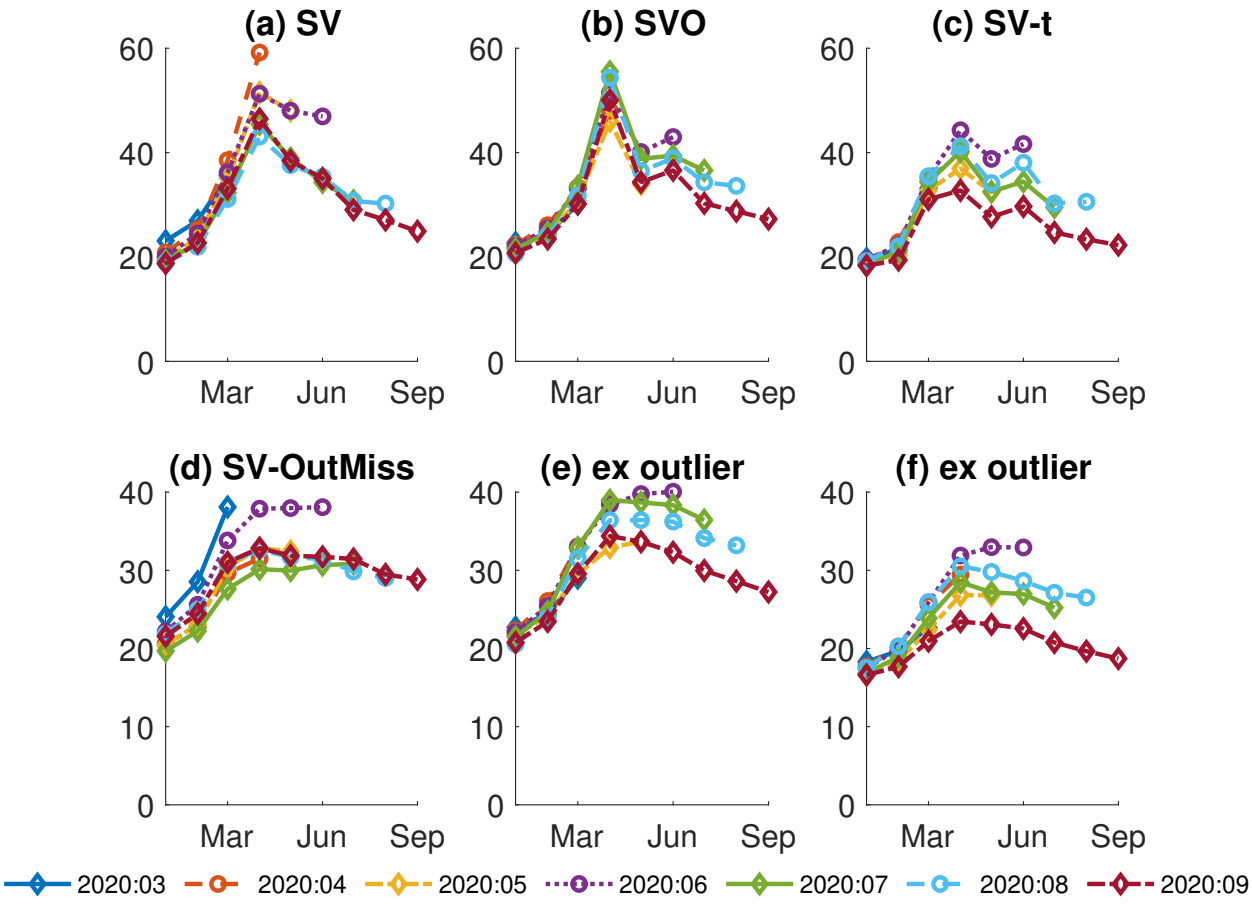
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.29: Time-varying volatilities of S&P 500 in 2020



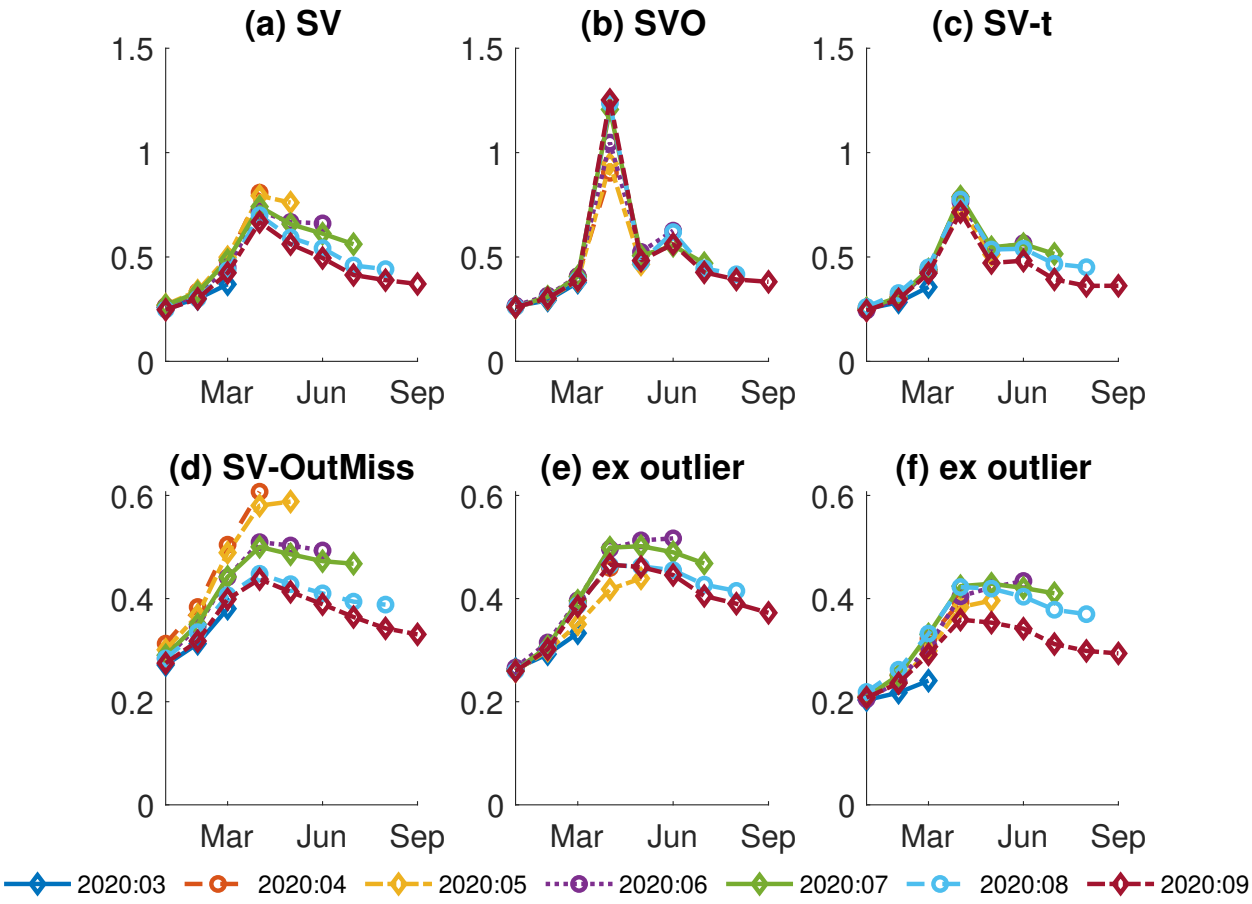
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.30: Time-varying volatilities of USD / GBP FX rate in 2020



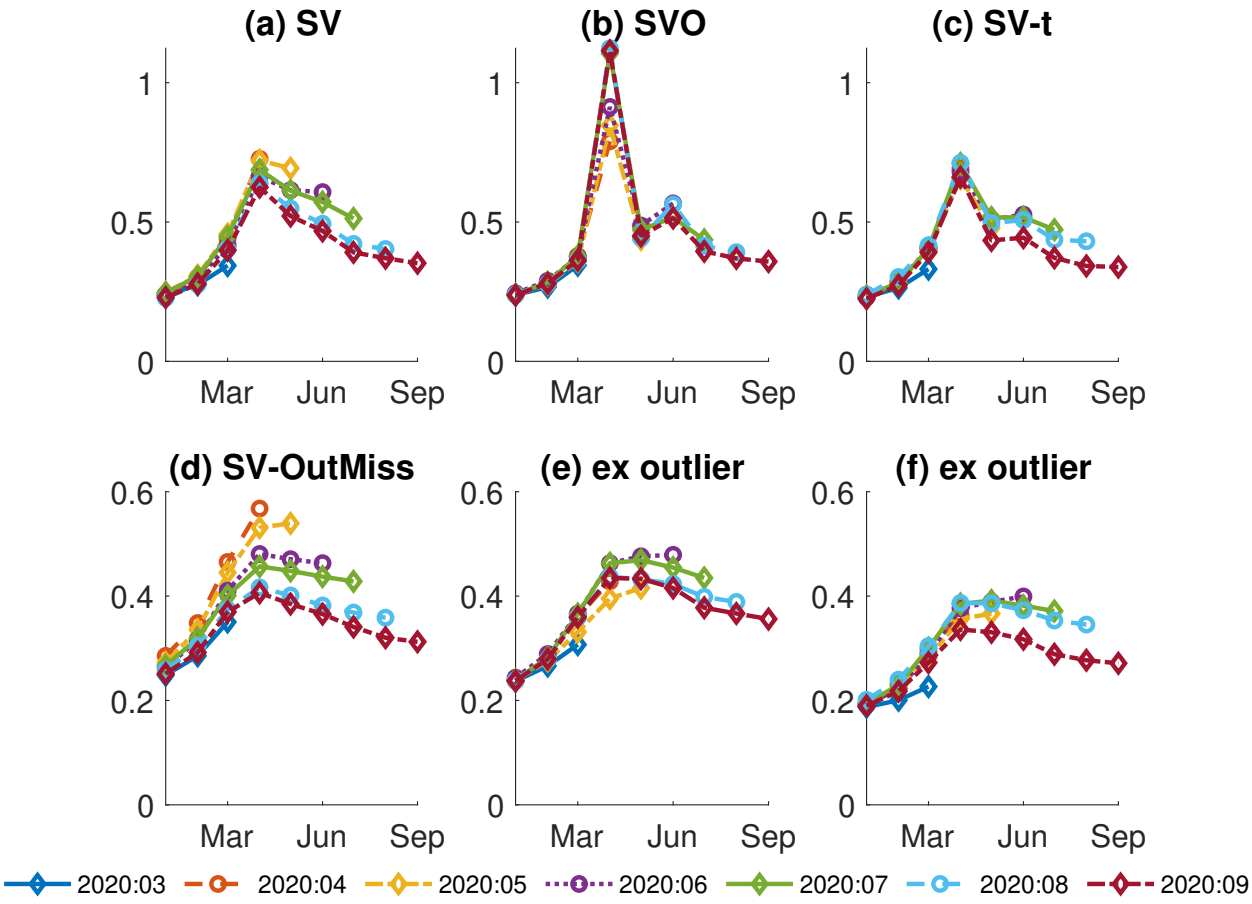
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1} \Lambda_t A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.31: Time-varying volatilities of 5-Year yield in 2020



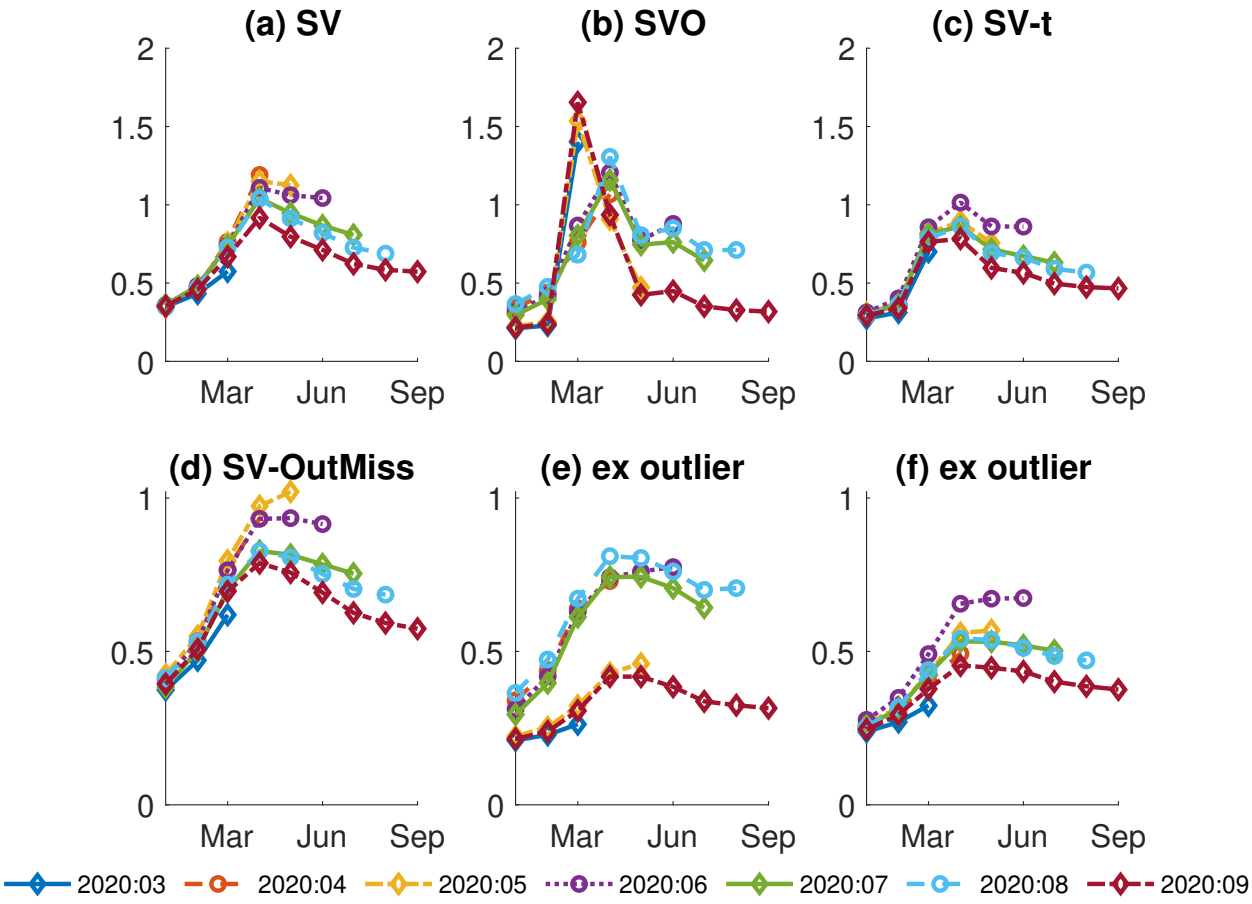
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.32: Time-varying volatilities of 10-Year yield in 2020



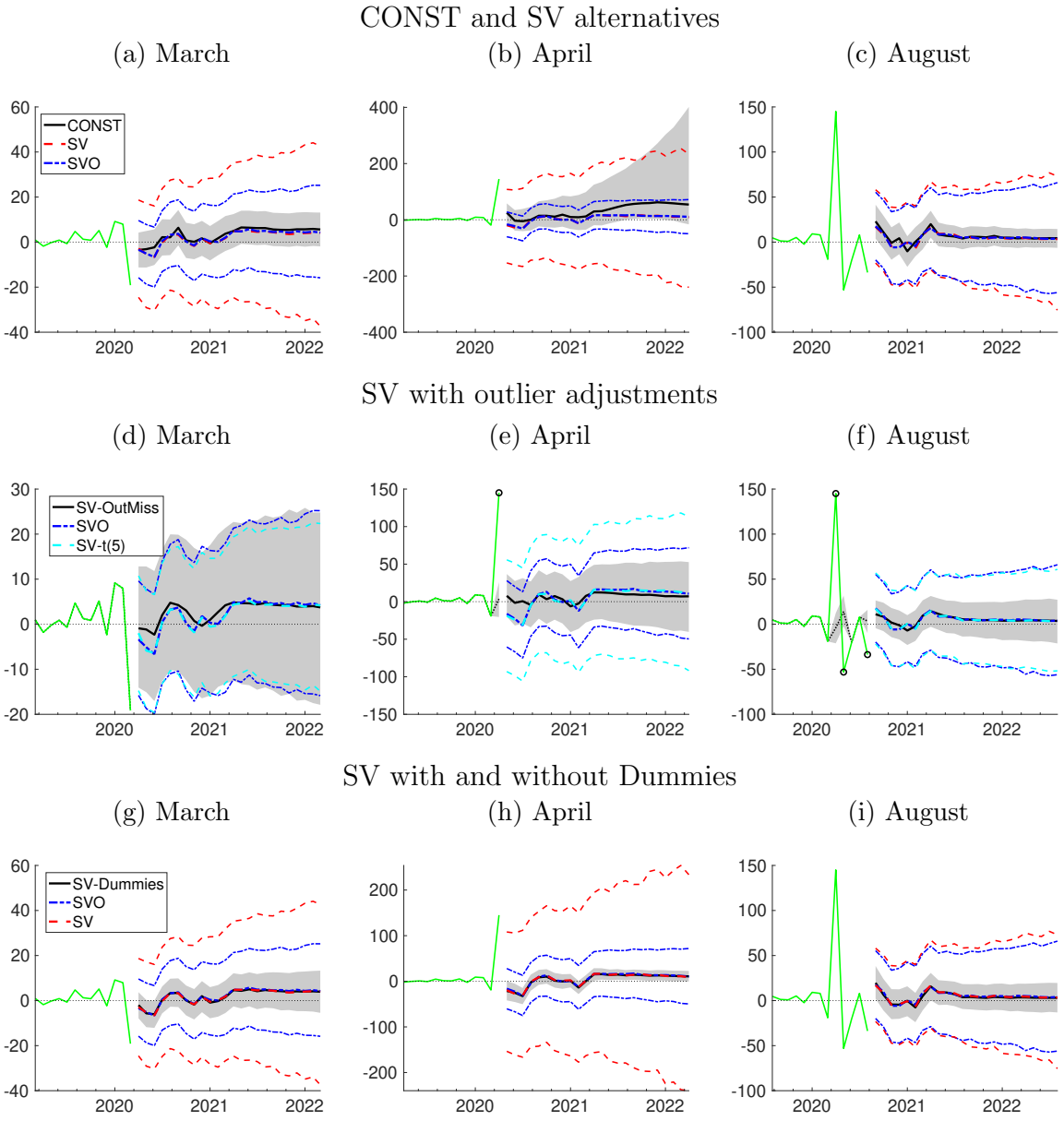
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.33: Time-varying volatilities of Baa spread in 2020



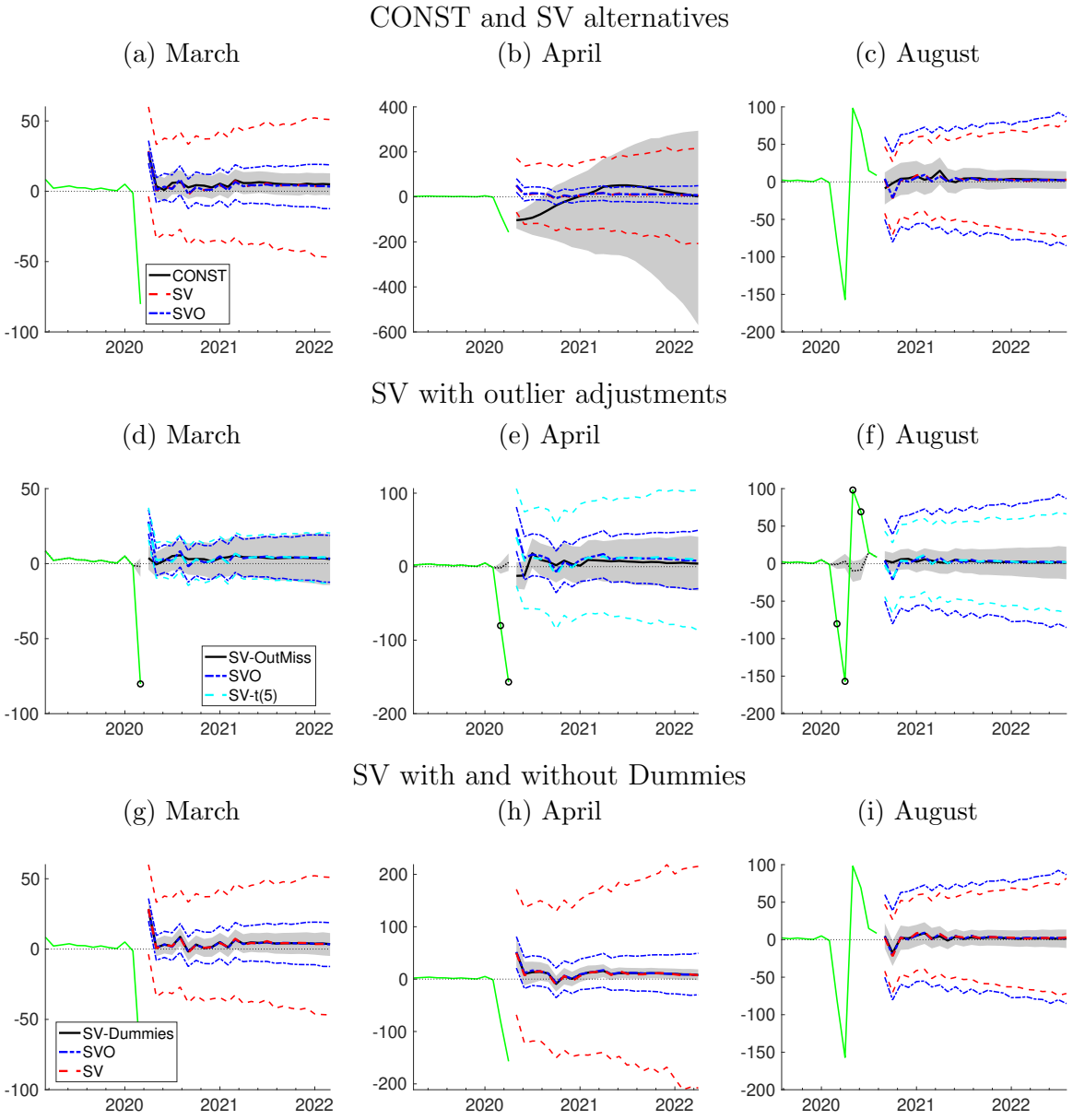
Note: Quasi-real-time trajectories of time-varying volatility in VAR residuals, measured by the diagonal elements of Σ_t. Medians of (smoothed) posterior obtained from different data samples ending at forecast origins as indicated in the figure legend. Panels (e) and (f) display estimates of stochastic volatility for SVO and SV-t, respectively, that ignore the contributions from outliers computed from $\Sigma_t = A^{-1}\,\Lambda_t\,A^{-T}$ (i.e. neglecting the O_t components in the computation of the uncertainty measures shown here, while including outliers in estmation of A^{-1}, Λ_t, etc.). Reflecting the sizable differences in the size of estimates resulting with and without outlier treatment, different scales are used in upper- and lower-row panels.

Figure S.34: Predictive densities since March 2020 for Real Income



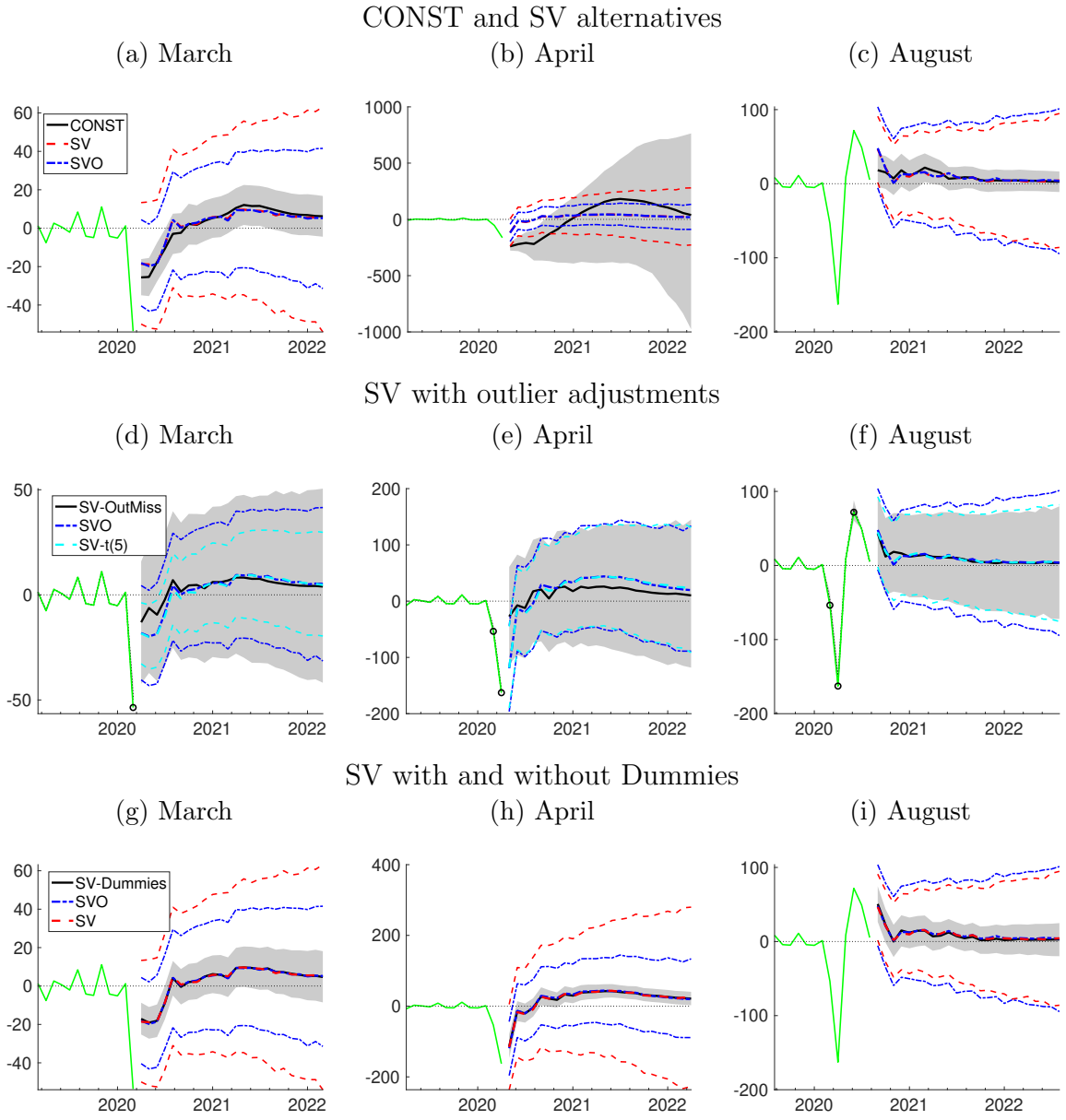
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.35: Predictive densities since March 2020 for Real Consumption



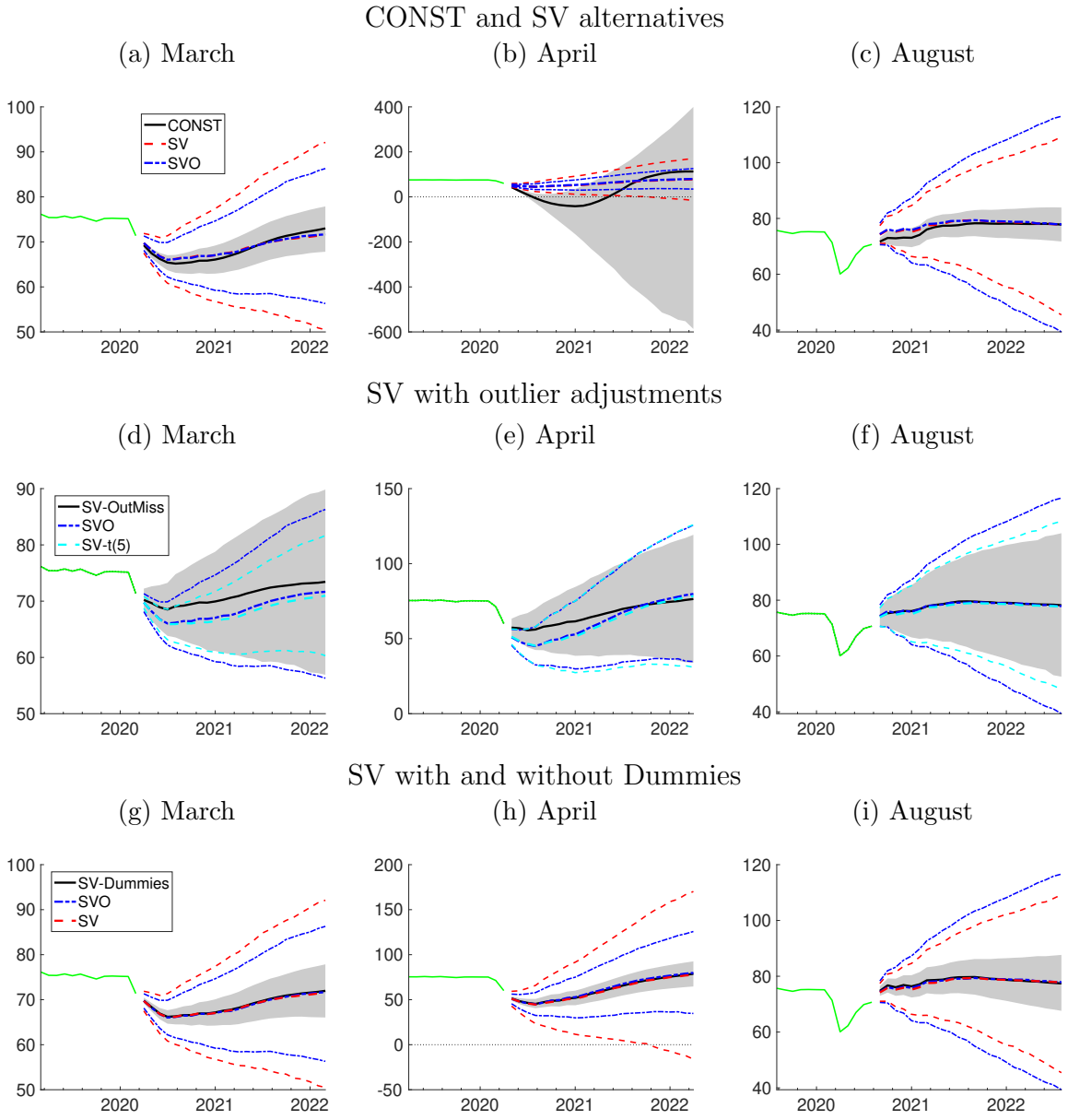
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.36: Predictive densities since March 2020 for IP



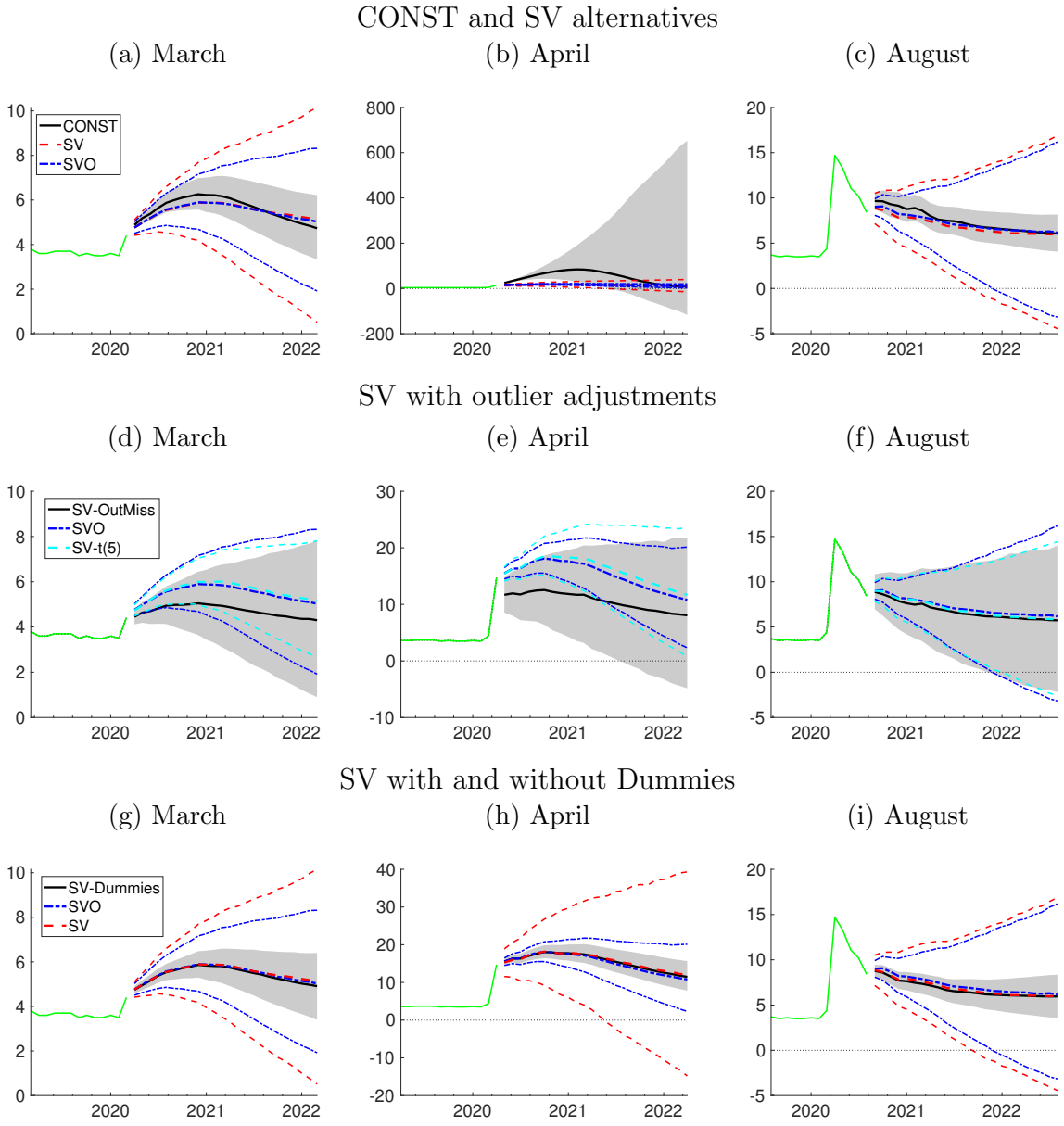
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.37: Predictive densities since March 2020 for Capacity Utilization



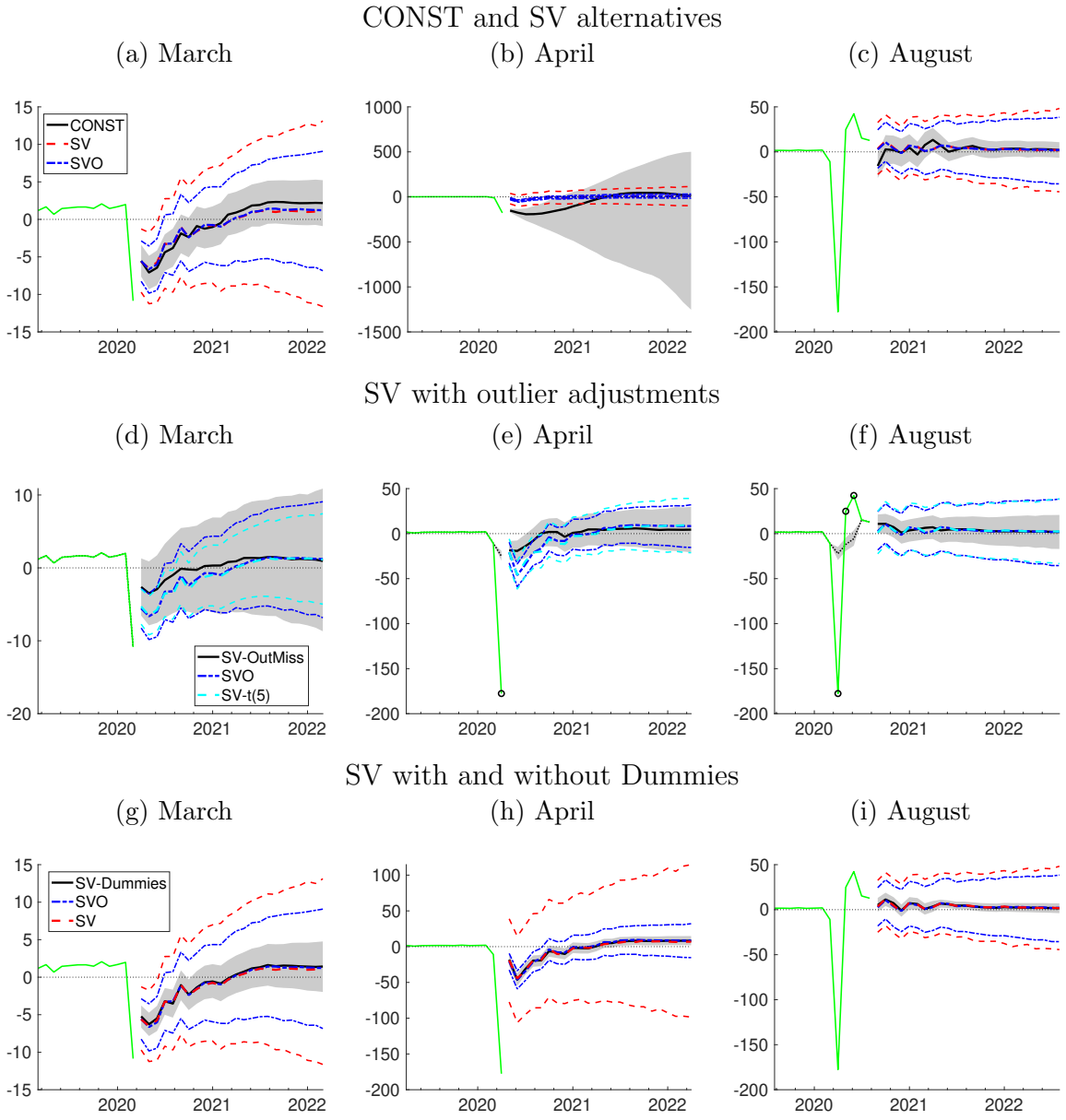
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.38: Predictive densities since March 2020 for Unemployment



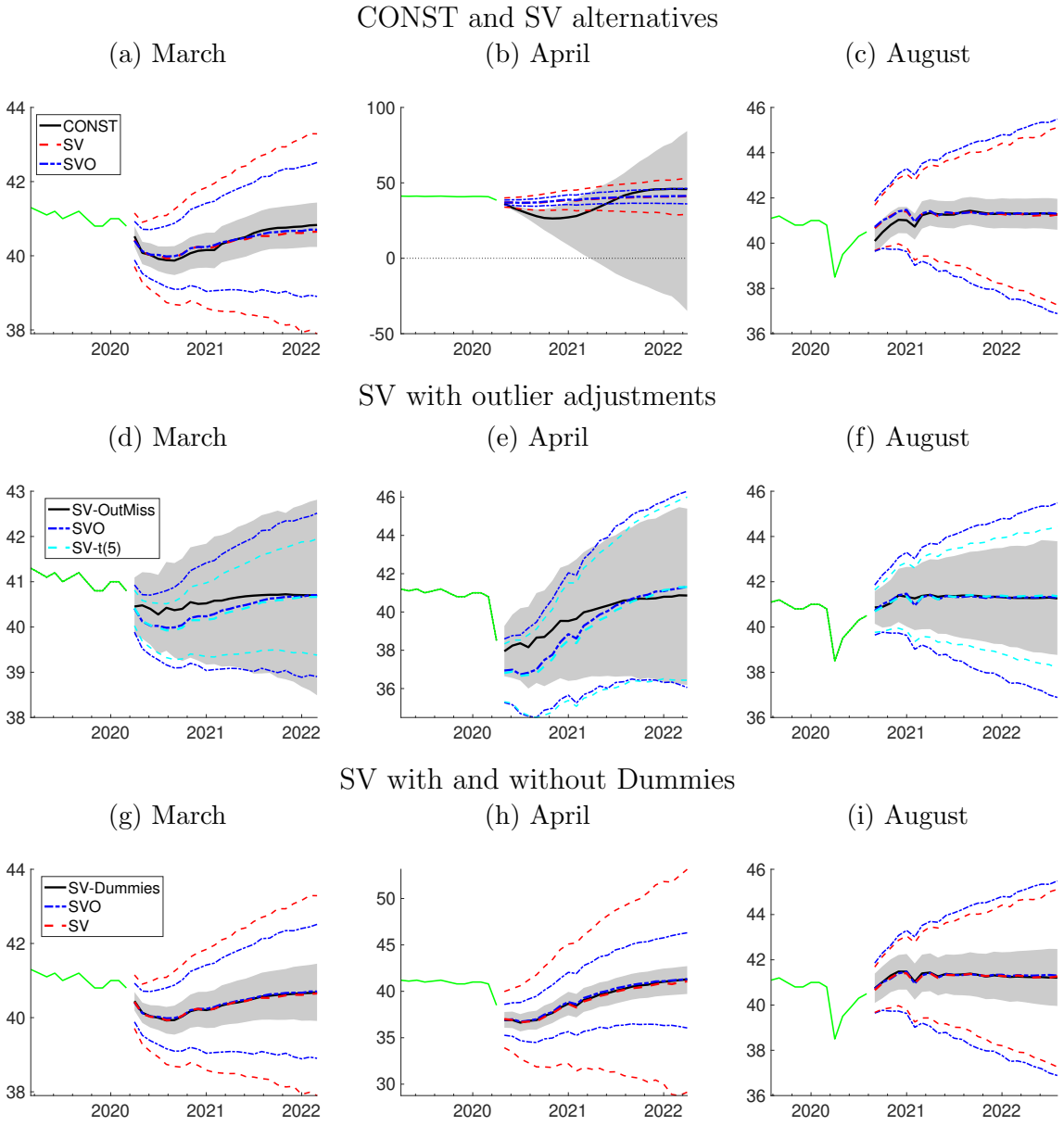
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.39: Predictive densities since March 2020 for Nonfarm Payrolls



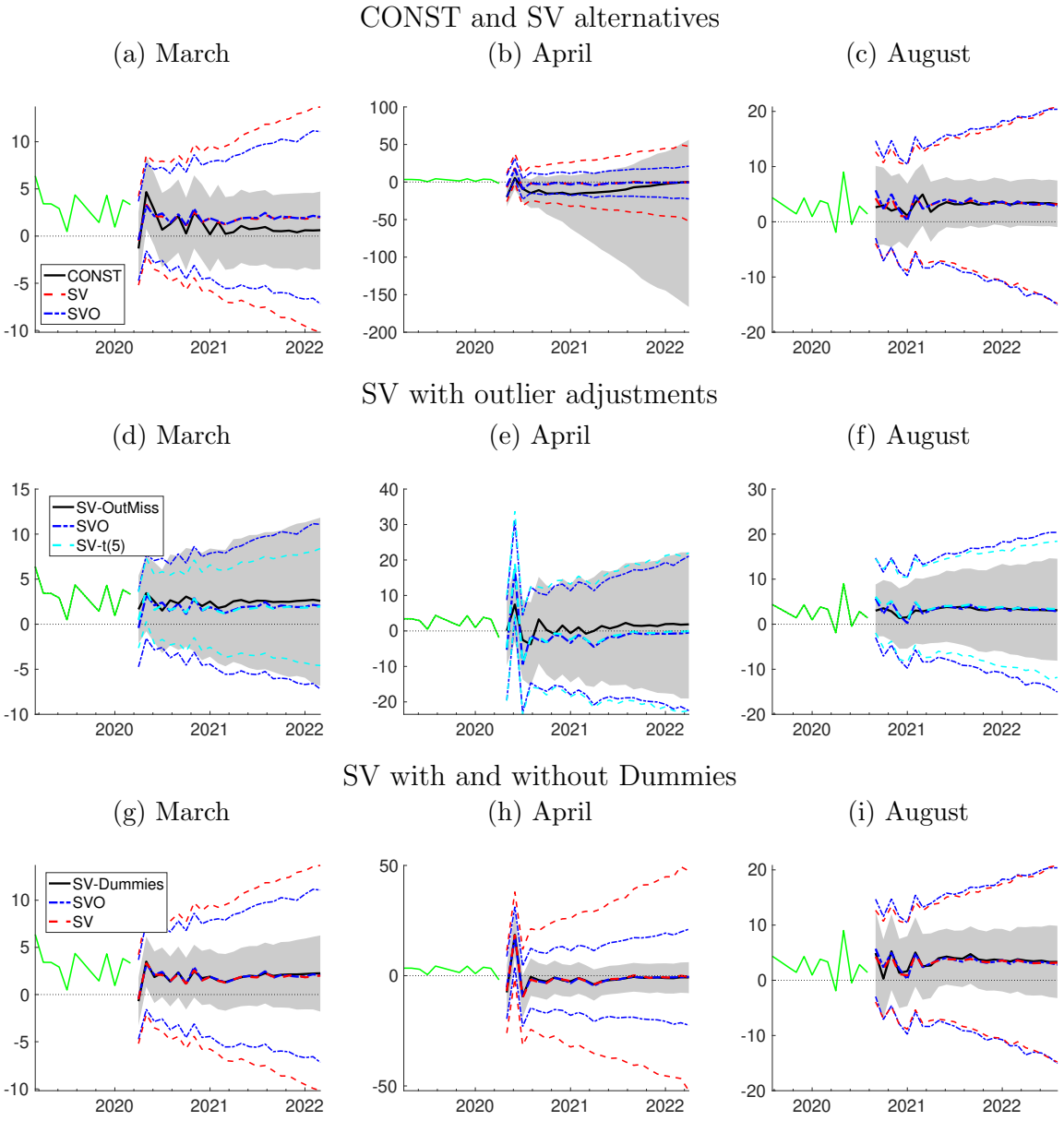
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.40: Predictive densities since March 2020 for Hours



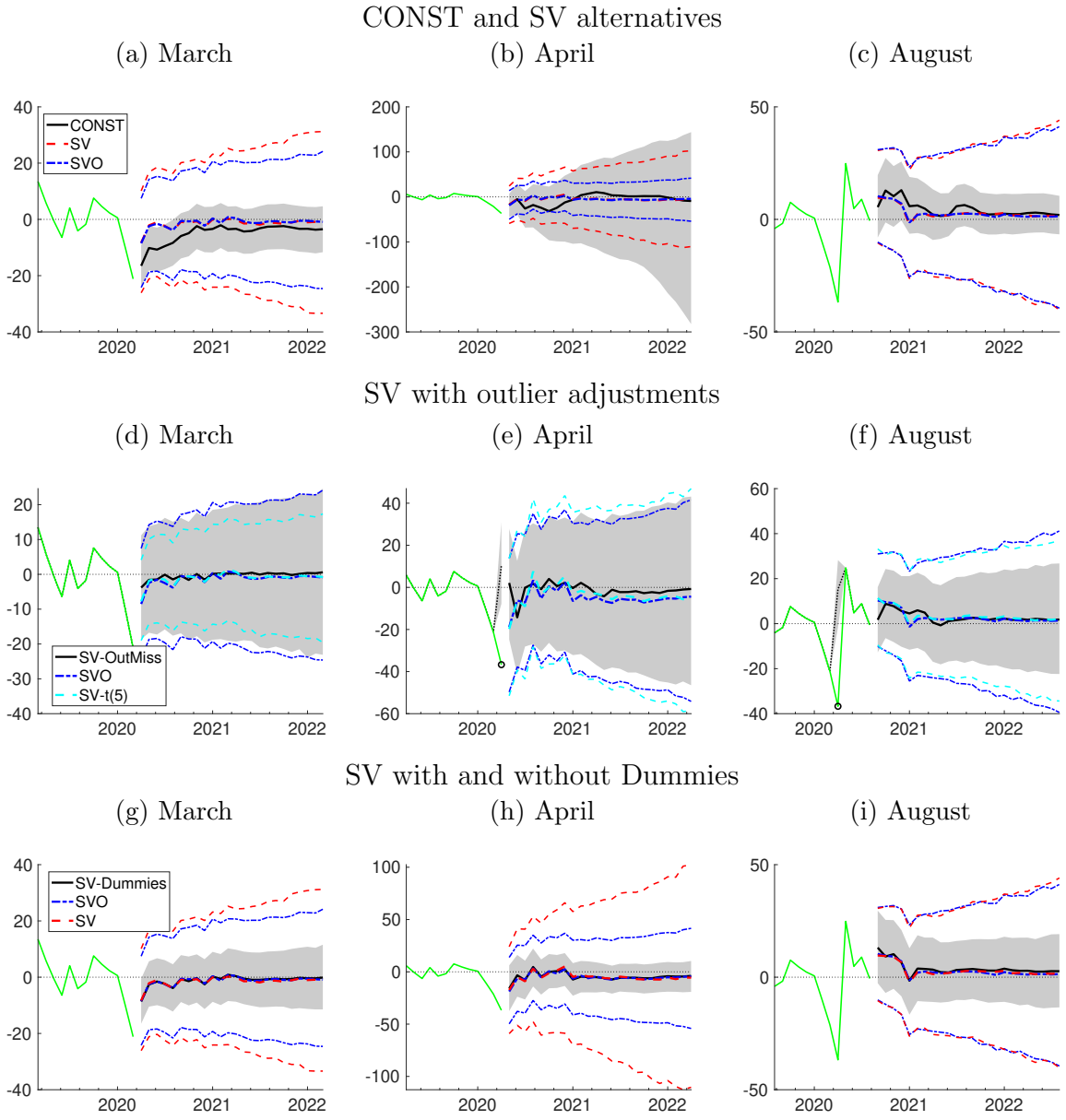
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.41: Predictive densities since March 2020 for Hourly Earnings



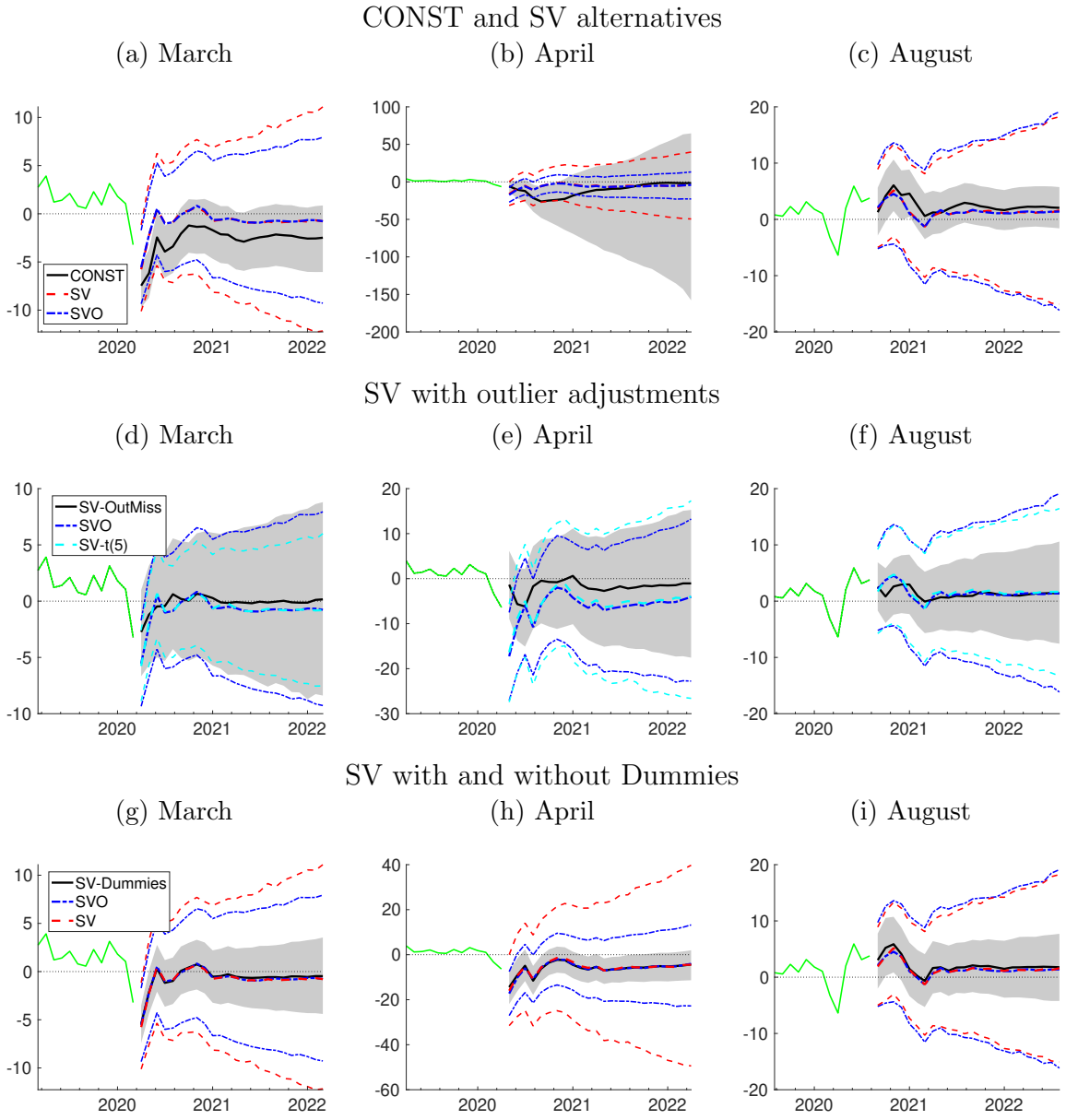
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.42: Predictive densities since March 2020 for PPI (fin. goods)



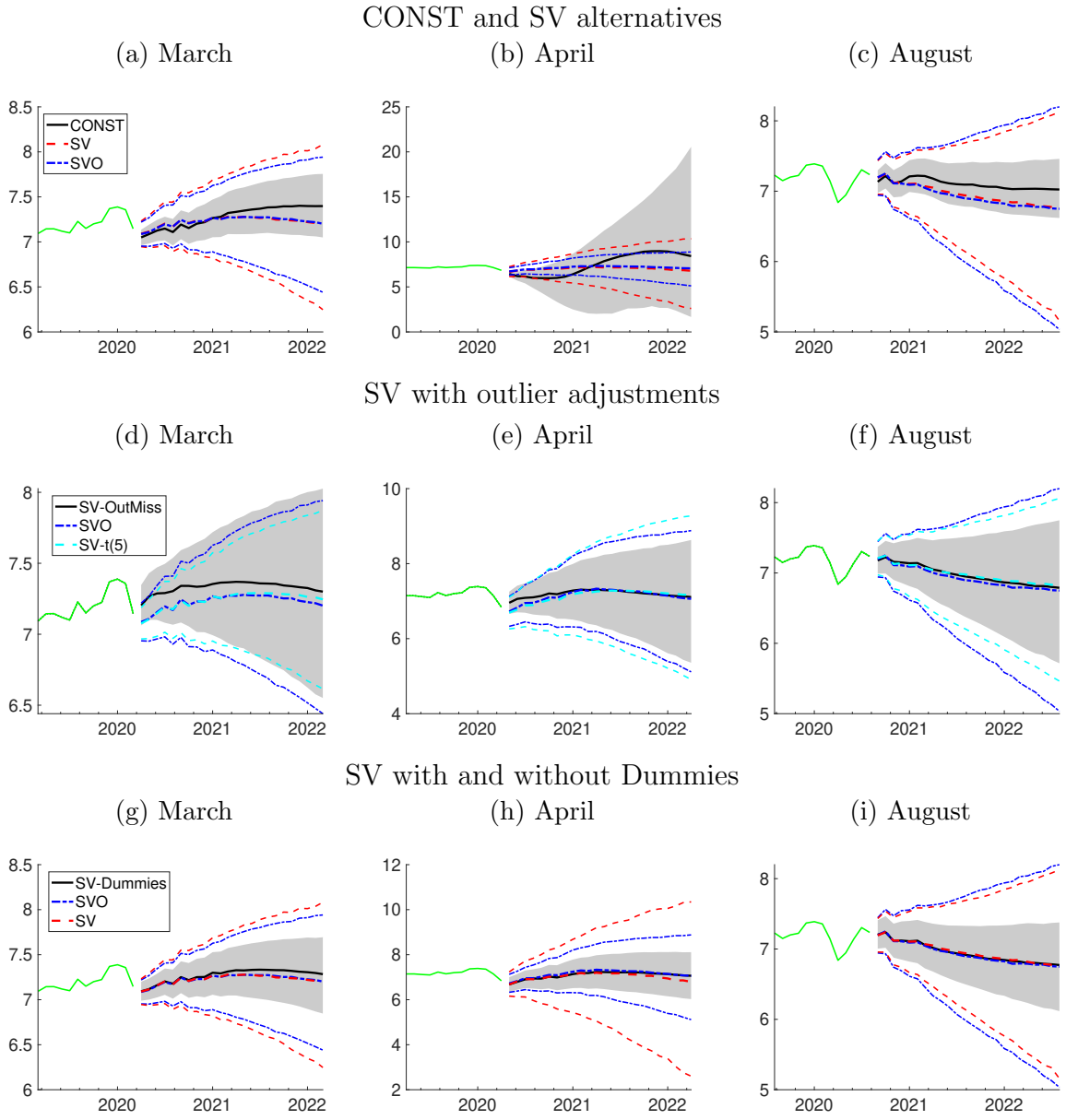
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.43: Predictive densities since March 2020 for PCE prices



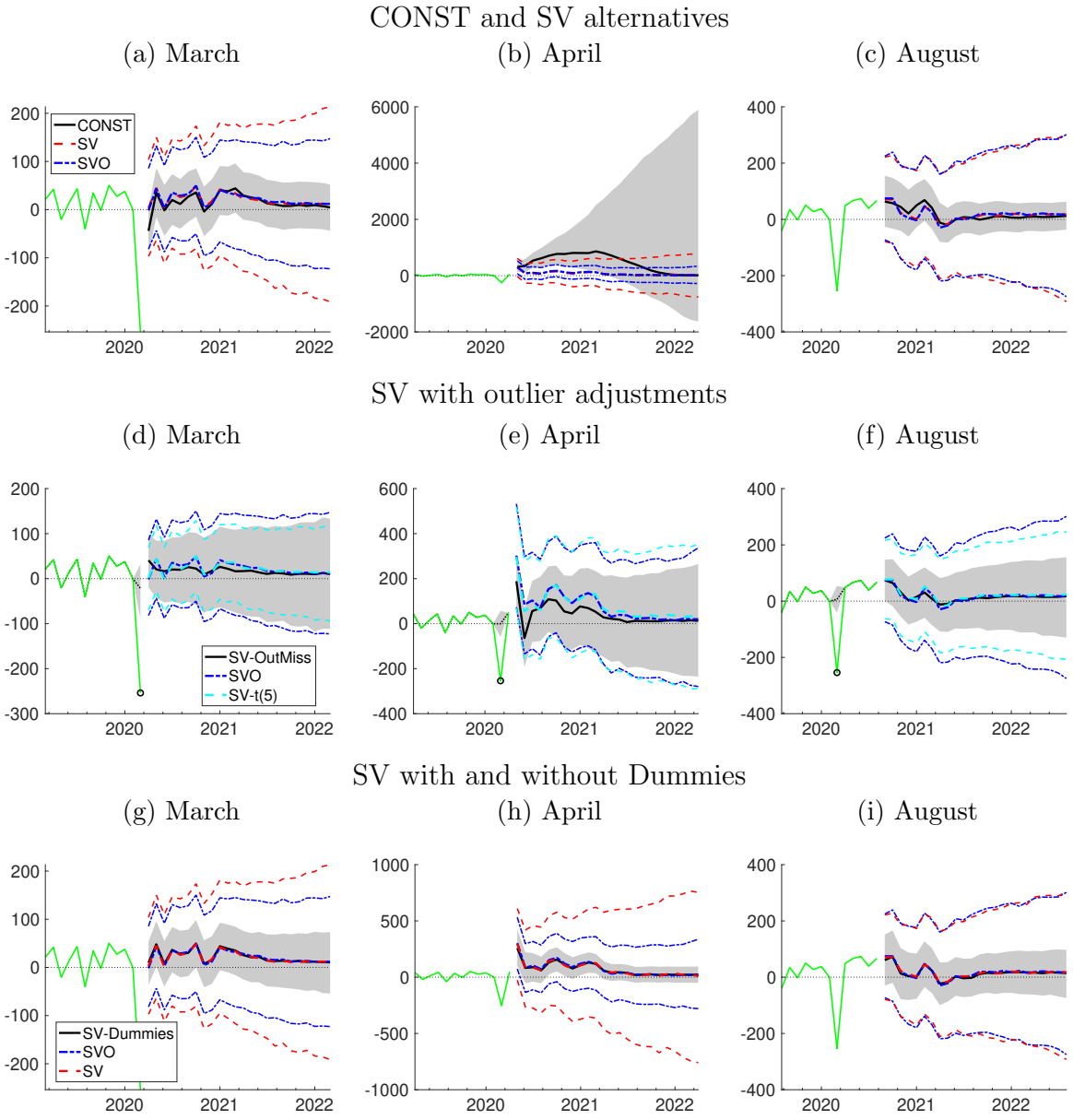
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.44: Predictive densities since March 2020 for Housing Starts



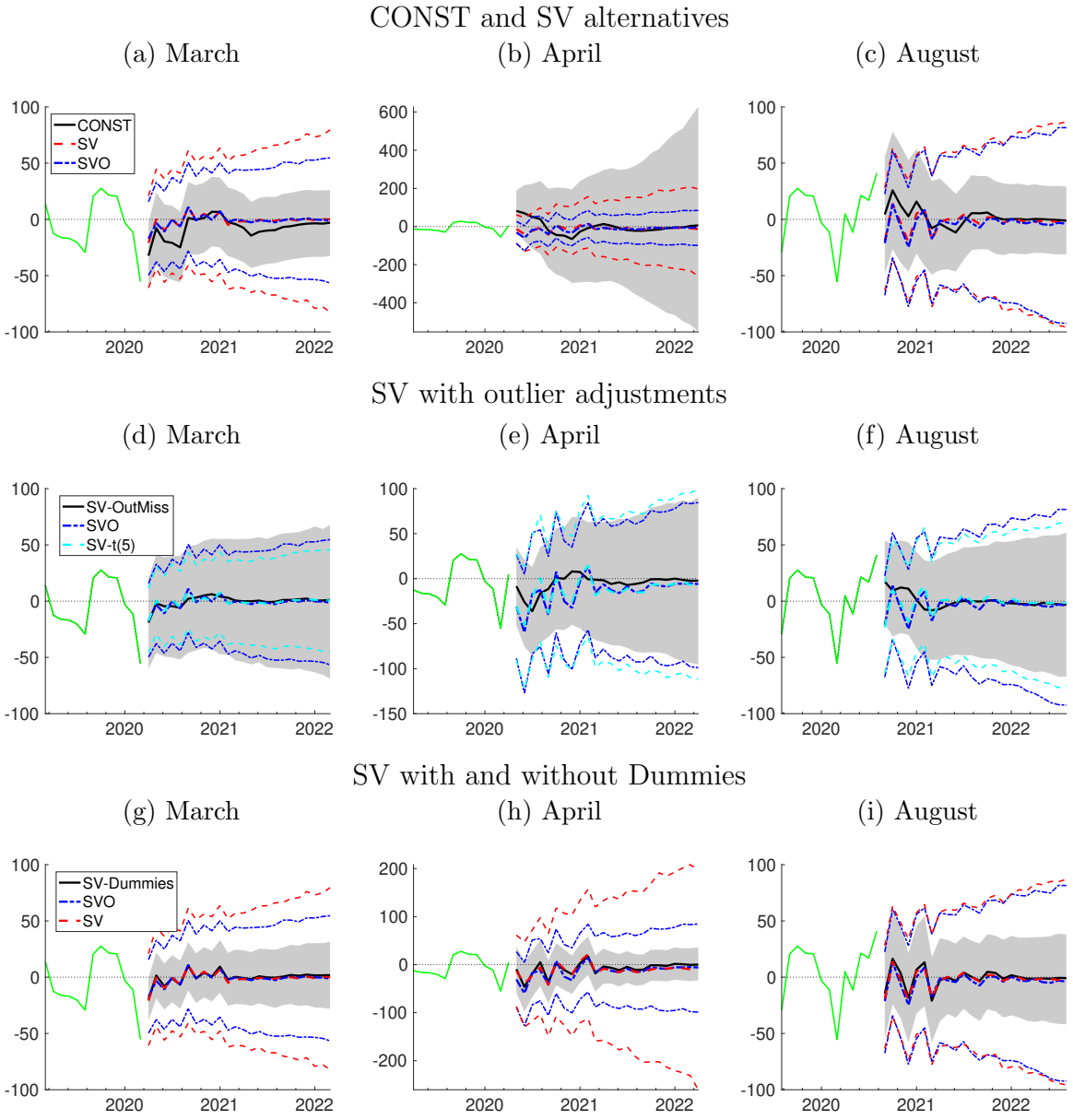
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.45: Predictive densities since March 2020 for S&P 500



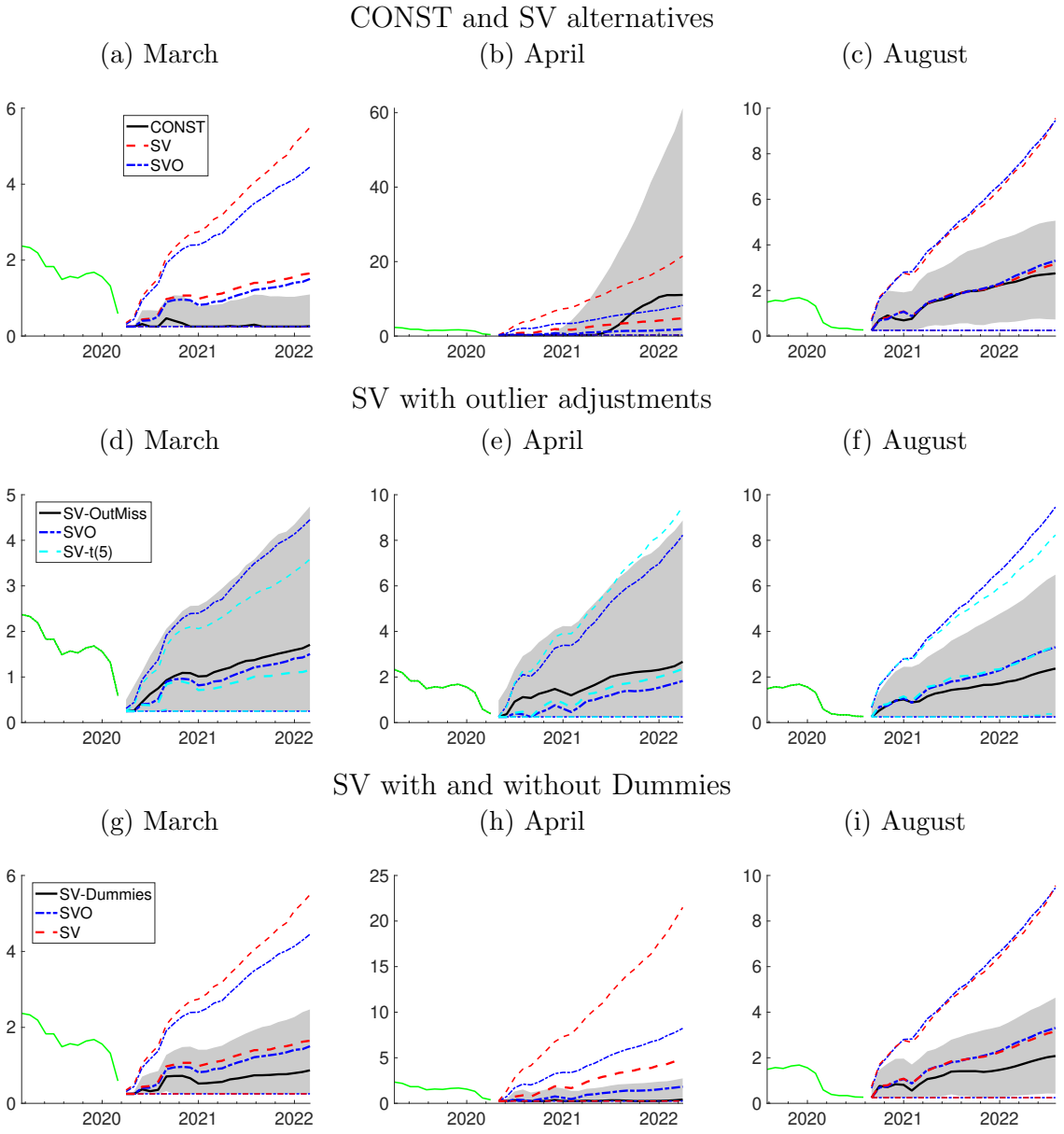
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.46: Predictive densities since March 2020 for USD / GBP FX rate



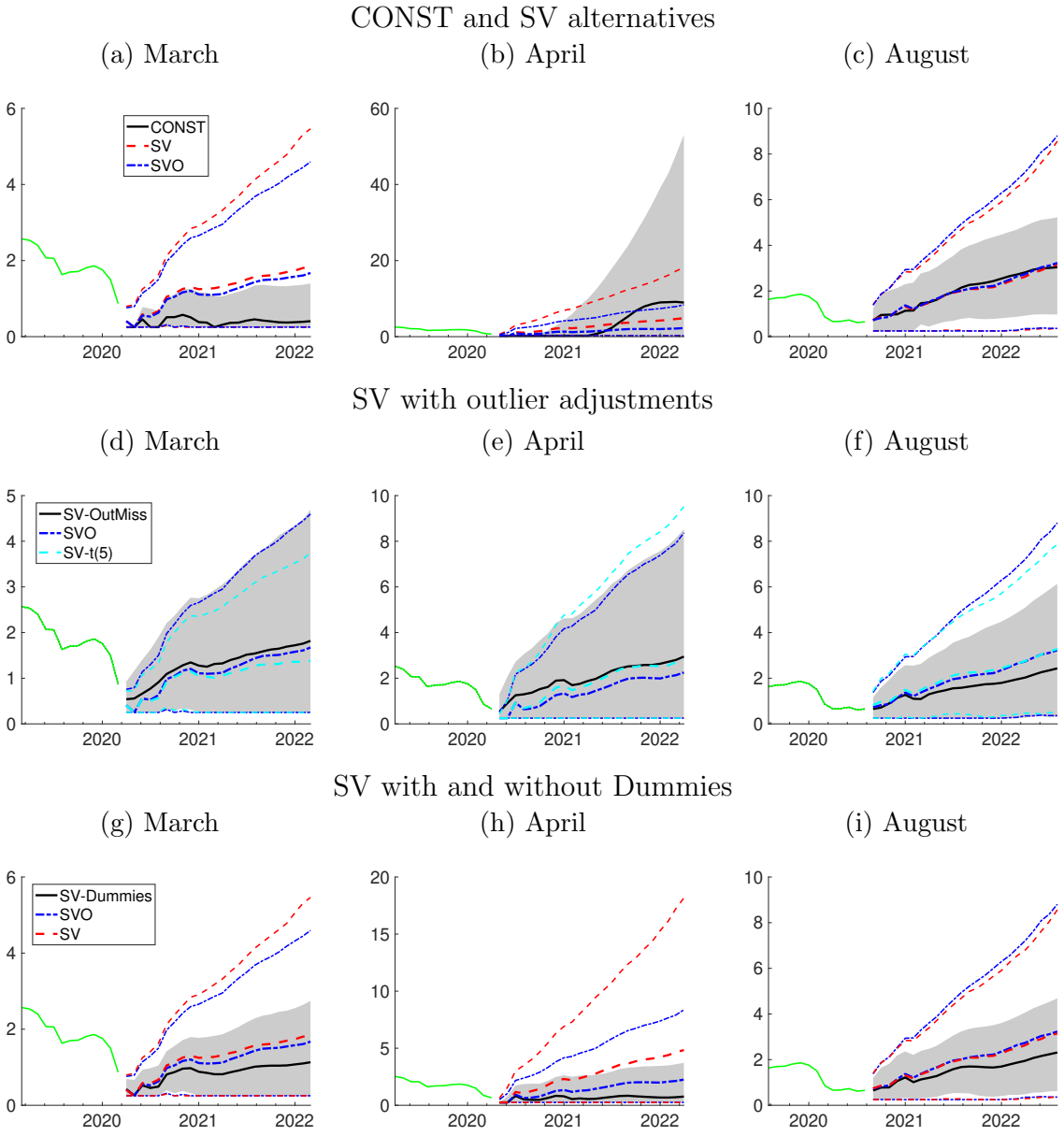
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.47: Predictive densities since March 2020 for 5-Year yield



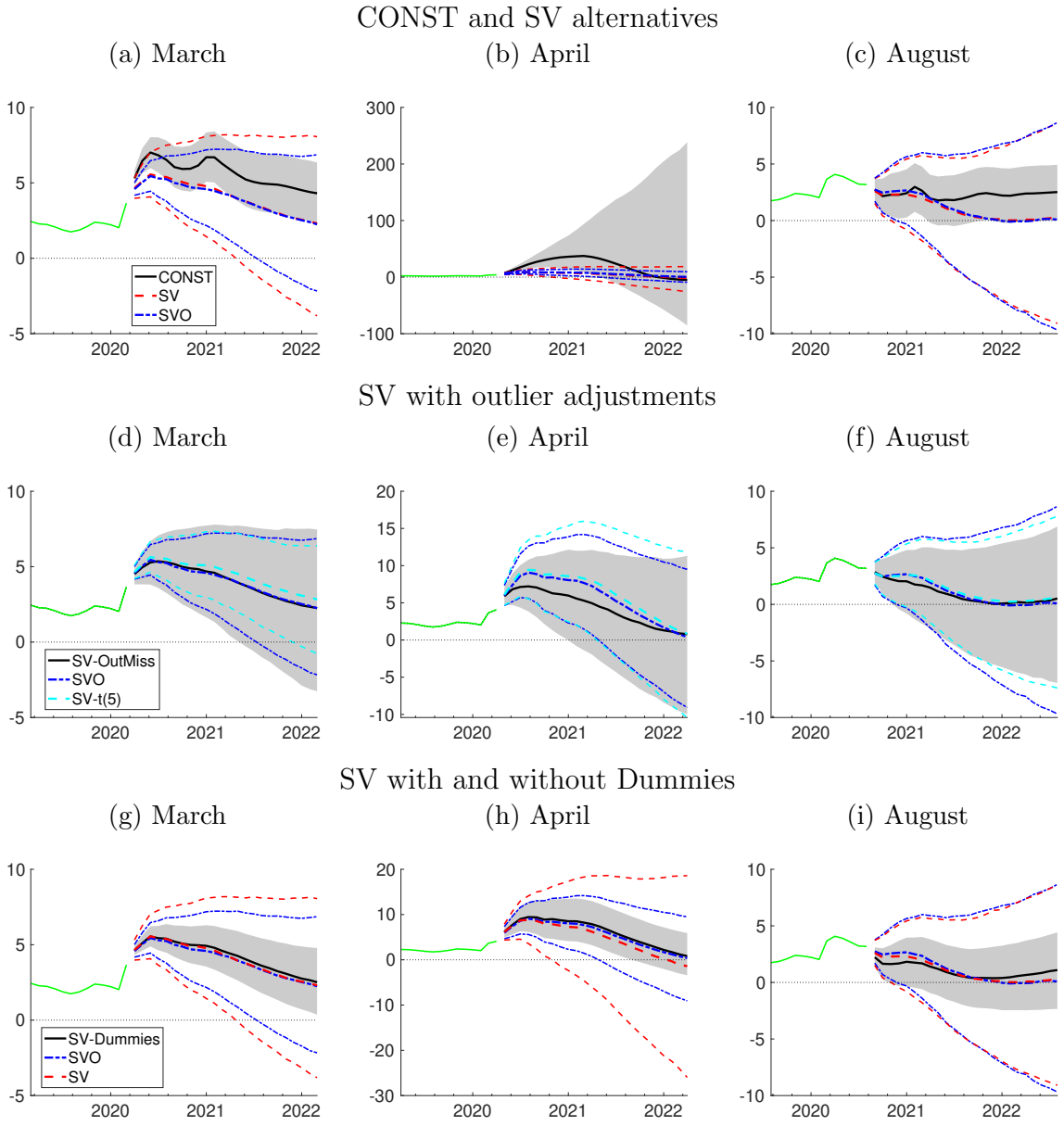
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.48: Predictive densities since March 2020 for 10-Year yield



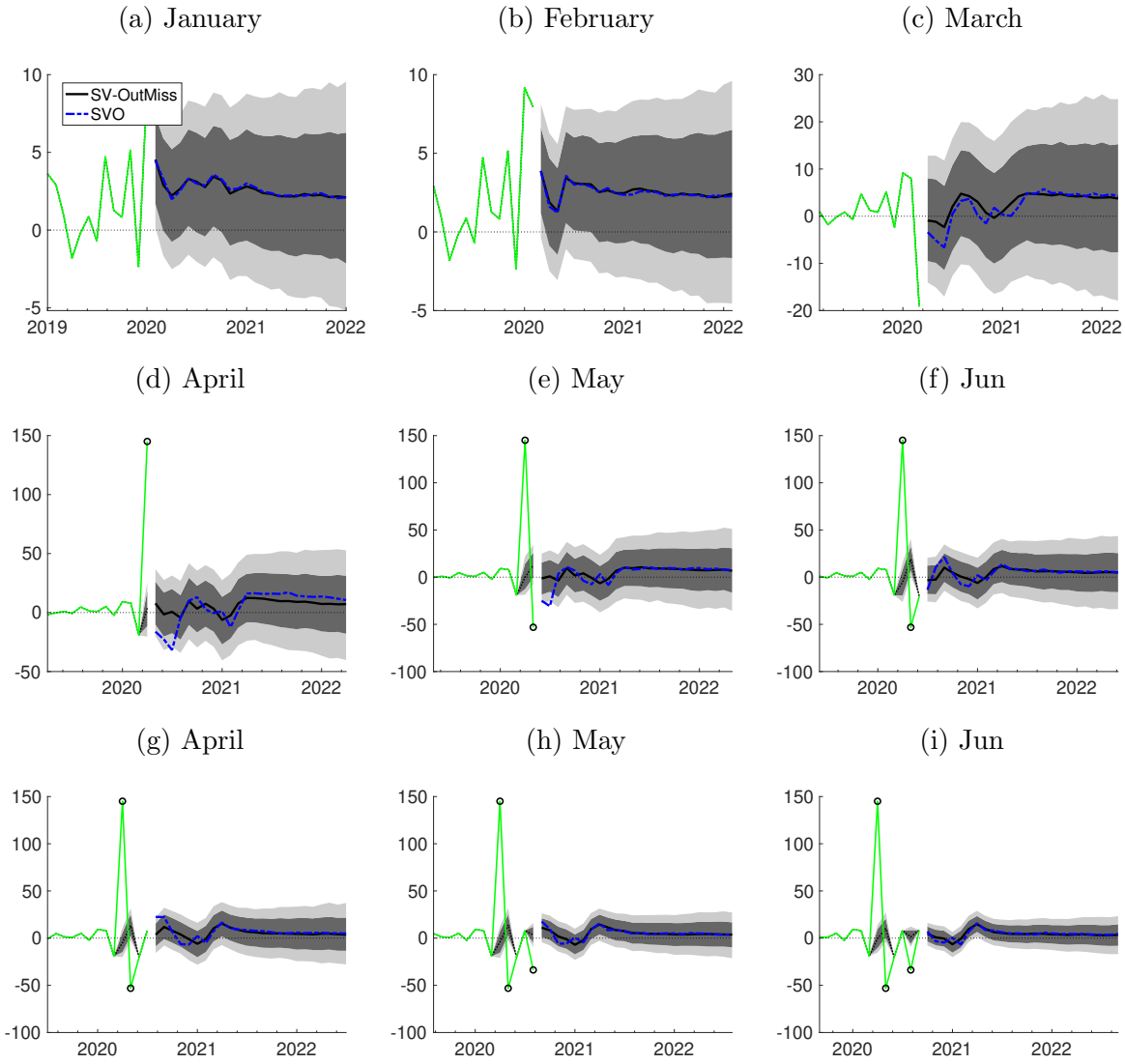
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.49: Predictive densities since March 2020 for Baa spread



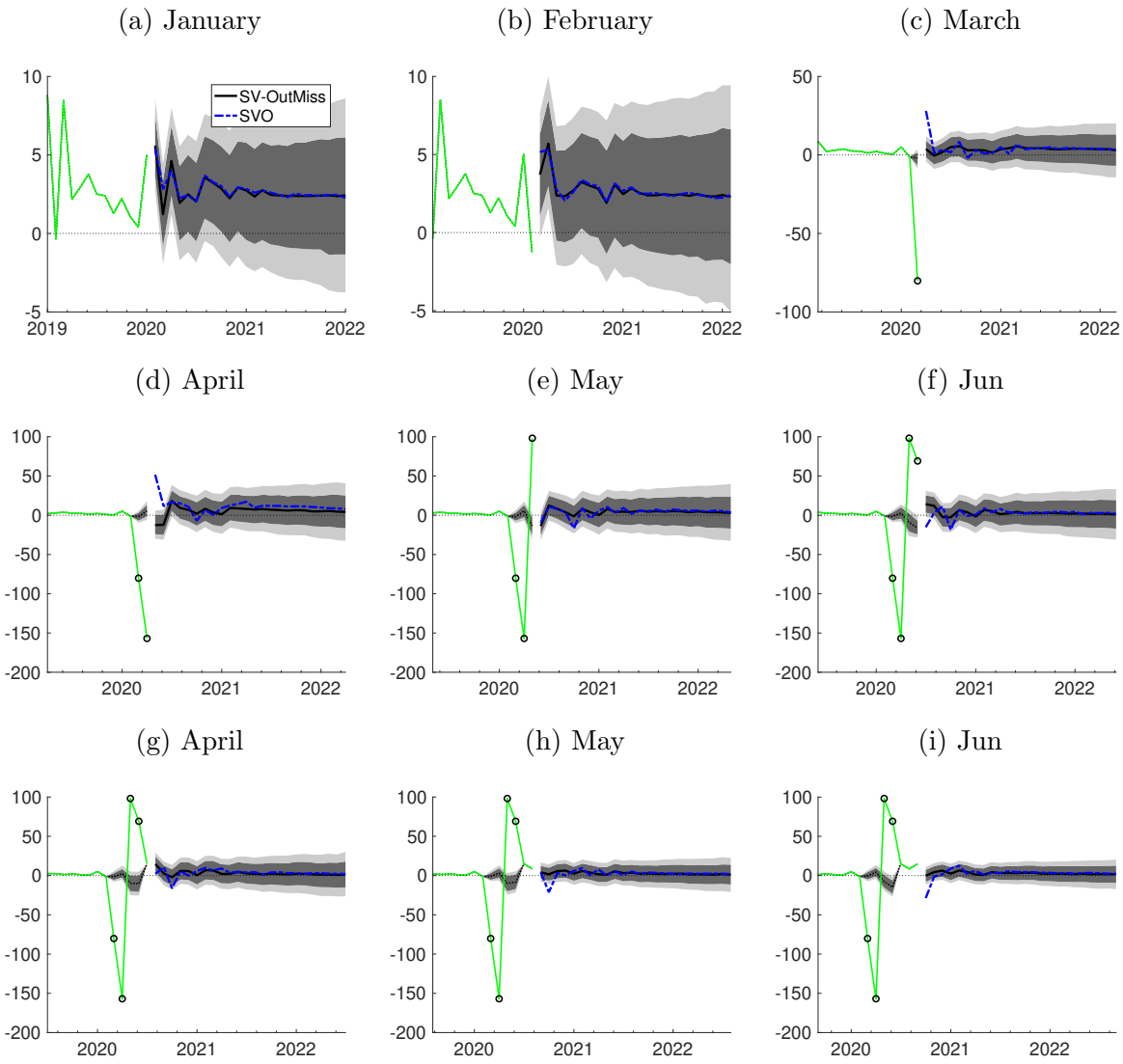
Note: Medians and 68% uncertainty bands of predictive densities, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. In panels (d) – (f), observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.50: Comparison SVO vs SV-OutMiss in 2020 for Real Income



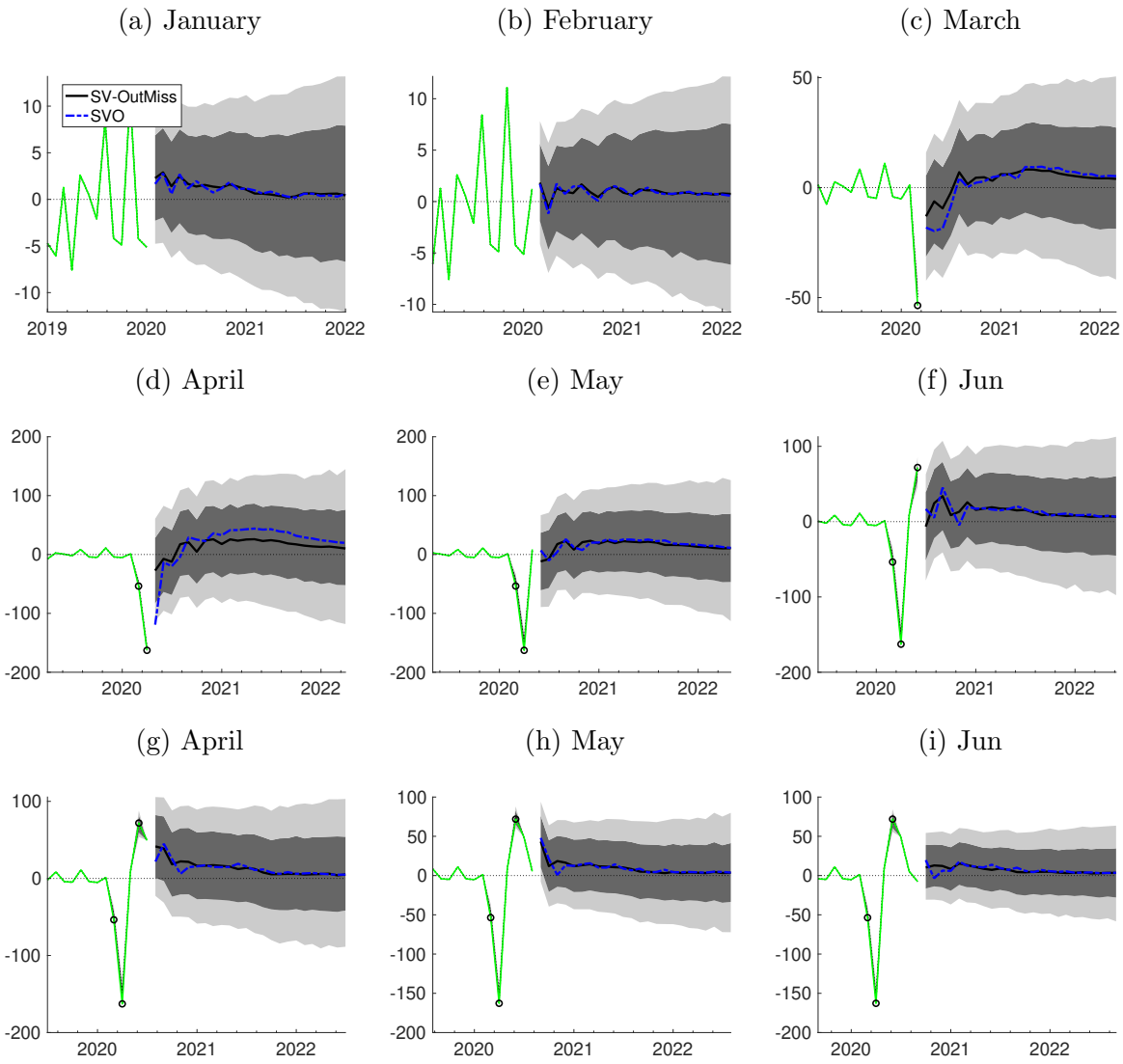
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.51: Comparison SVO vs SV-OutMiss in 2020 for Real Consumption



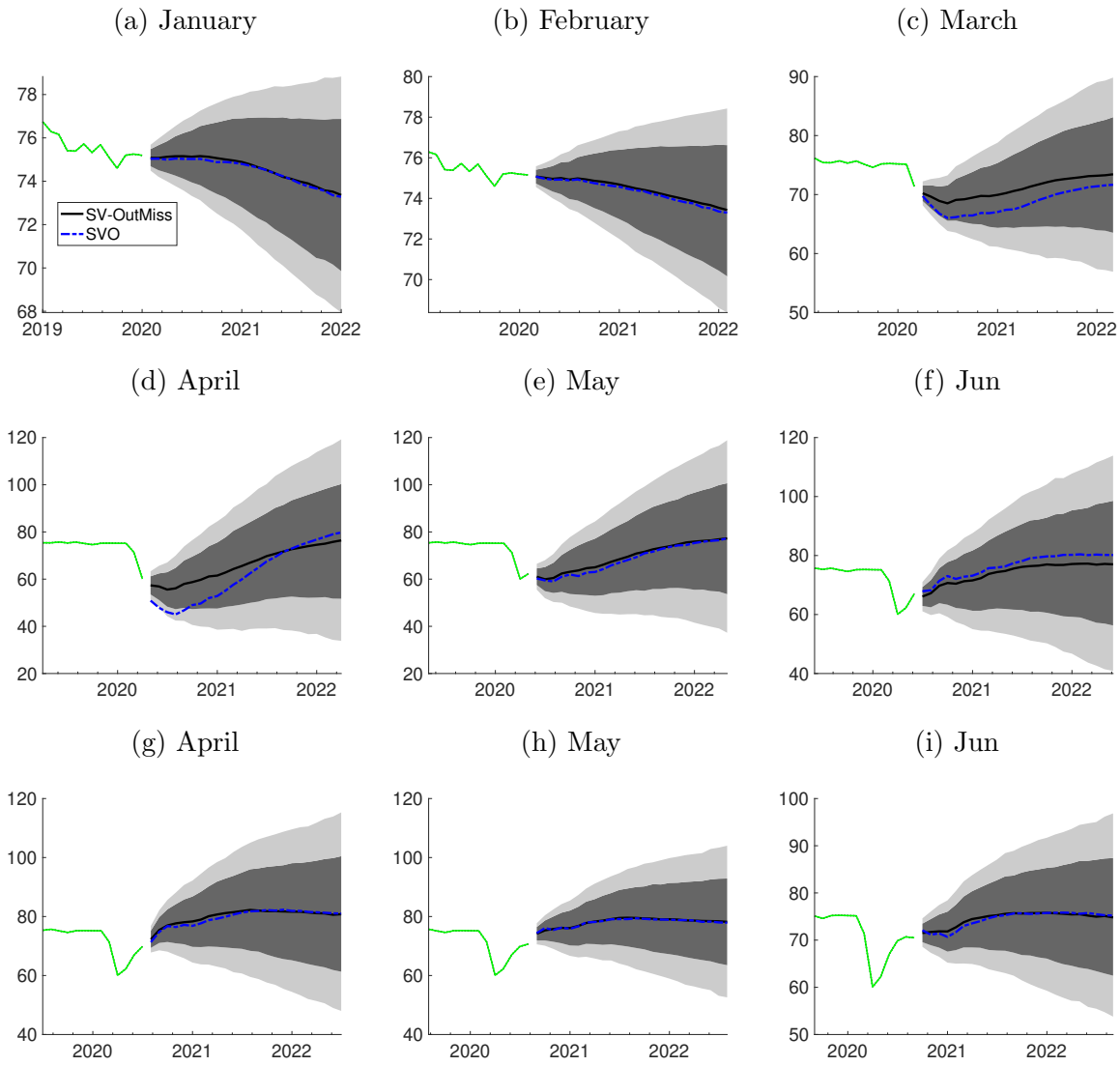
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.52: Comparison SVO vs SV-OutMiss in 2020 for IP



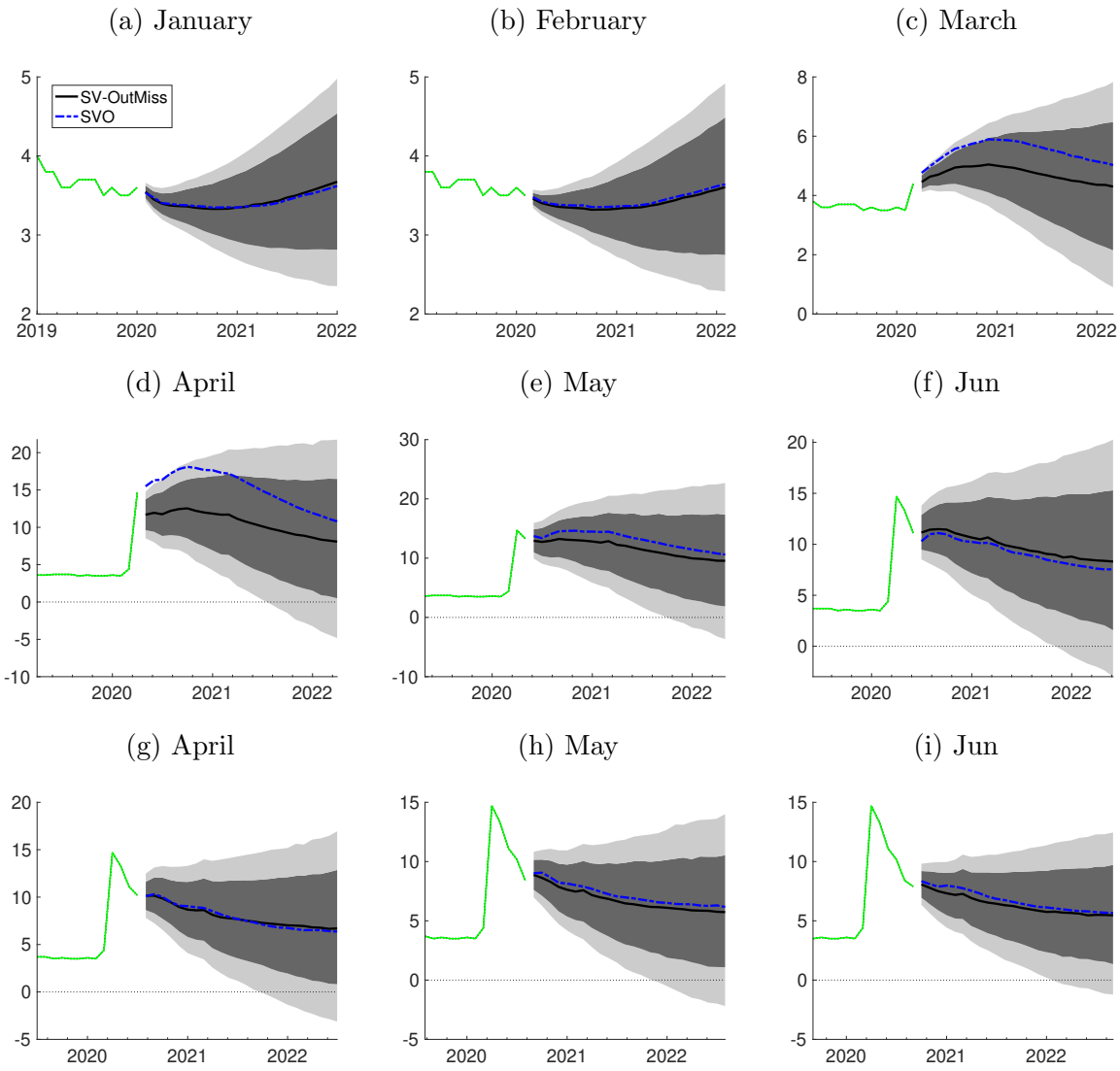
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.53: Comparison SVO vs SV-OutMiss in 2020 for Capacity Utilization



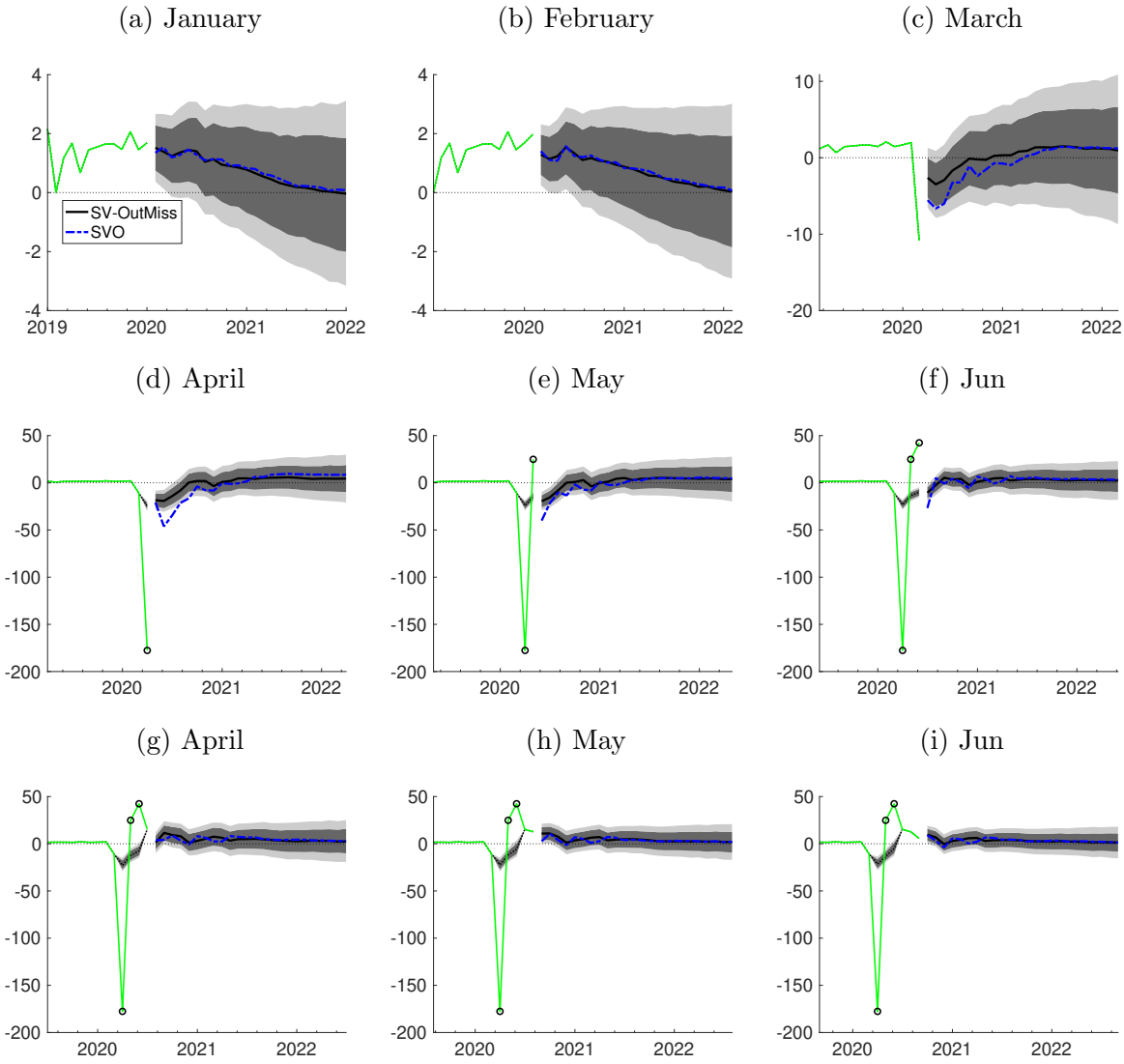
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.54: Comparison SVO vs SV-OutMiss in 2020 for Unemployment



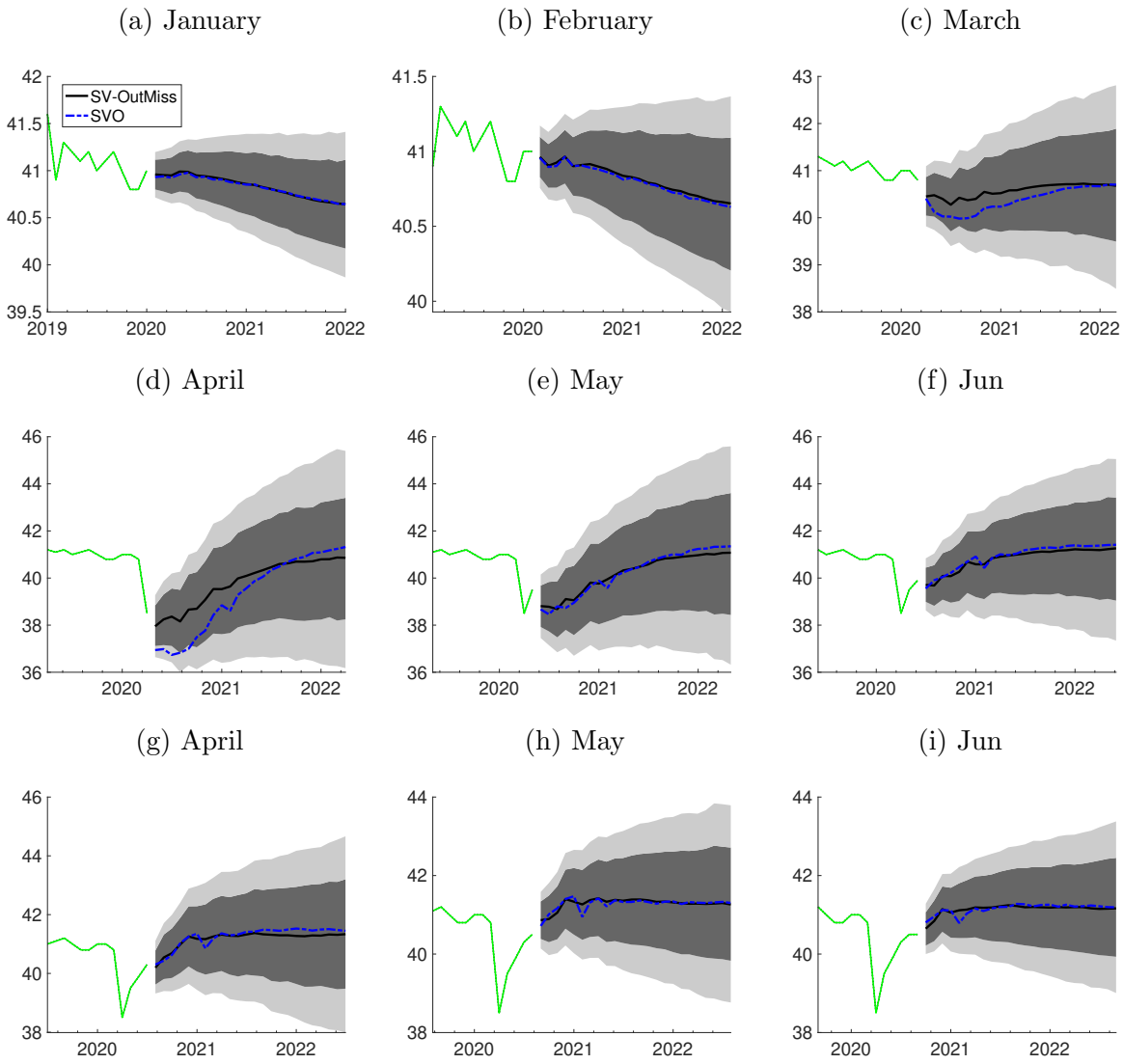
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.55: Comparison SVO vs SV-OutMiss in 2020 for Nonfarm Payrolls



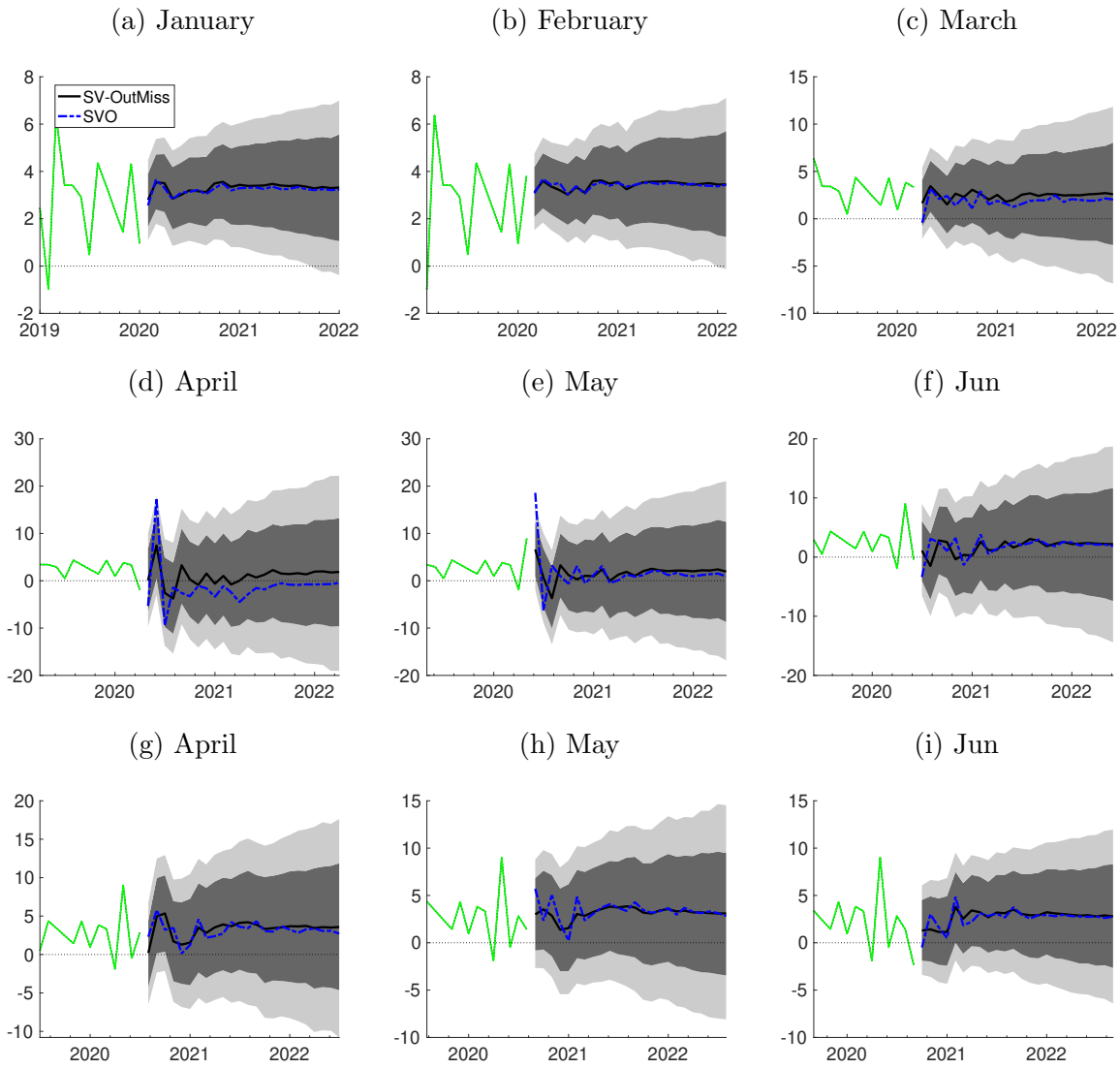
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.56: Comparison SVO vs SV-OutMiss in 2020 for Hours



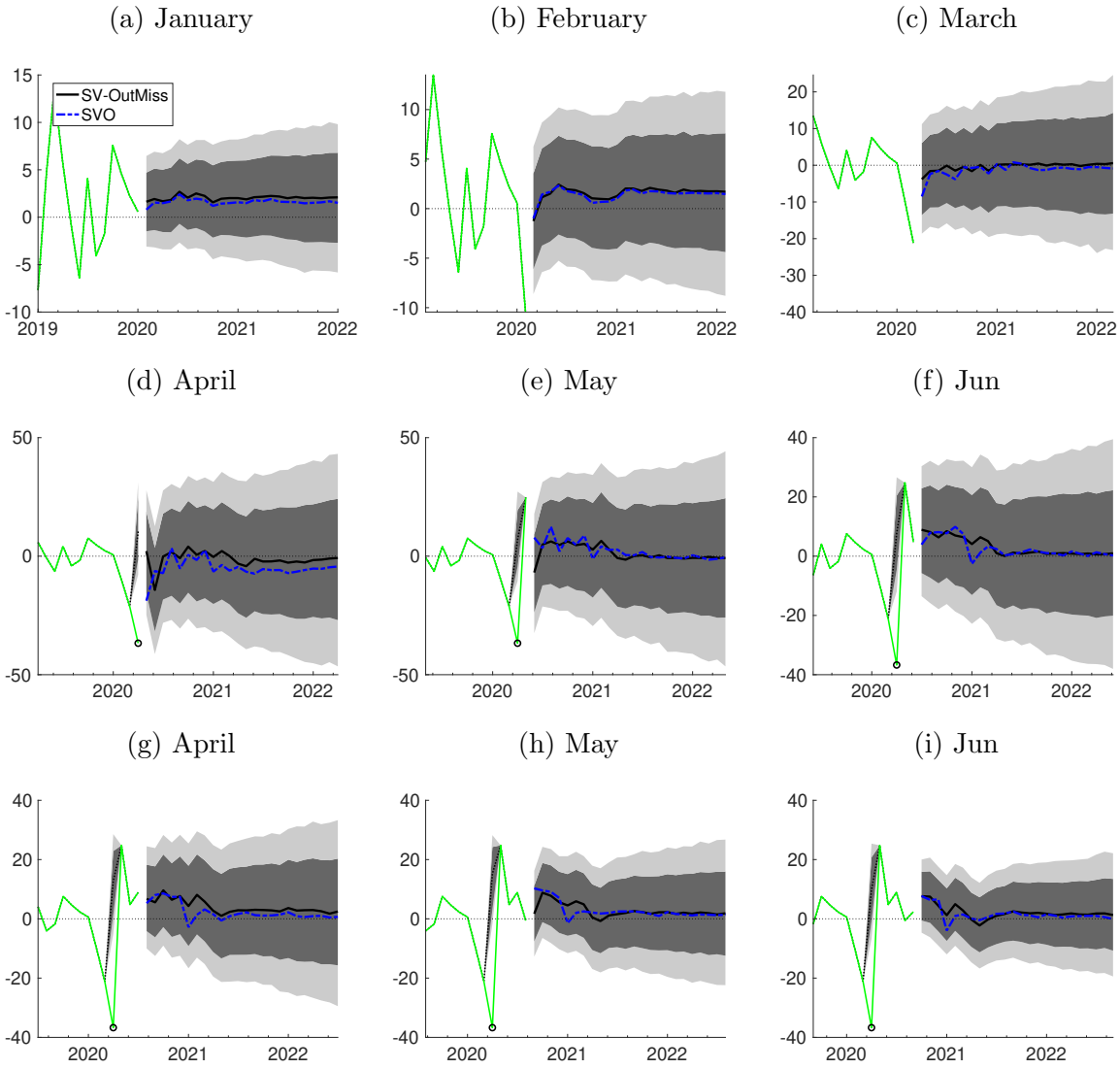
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.57: Comparison SVO vs SV-OutMiss in 2020 for Hourly Earnings



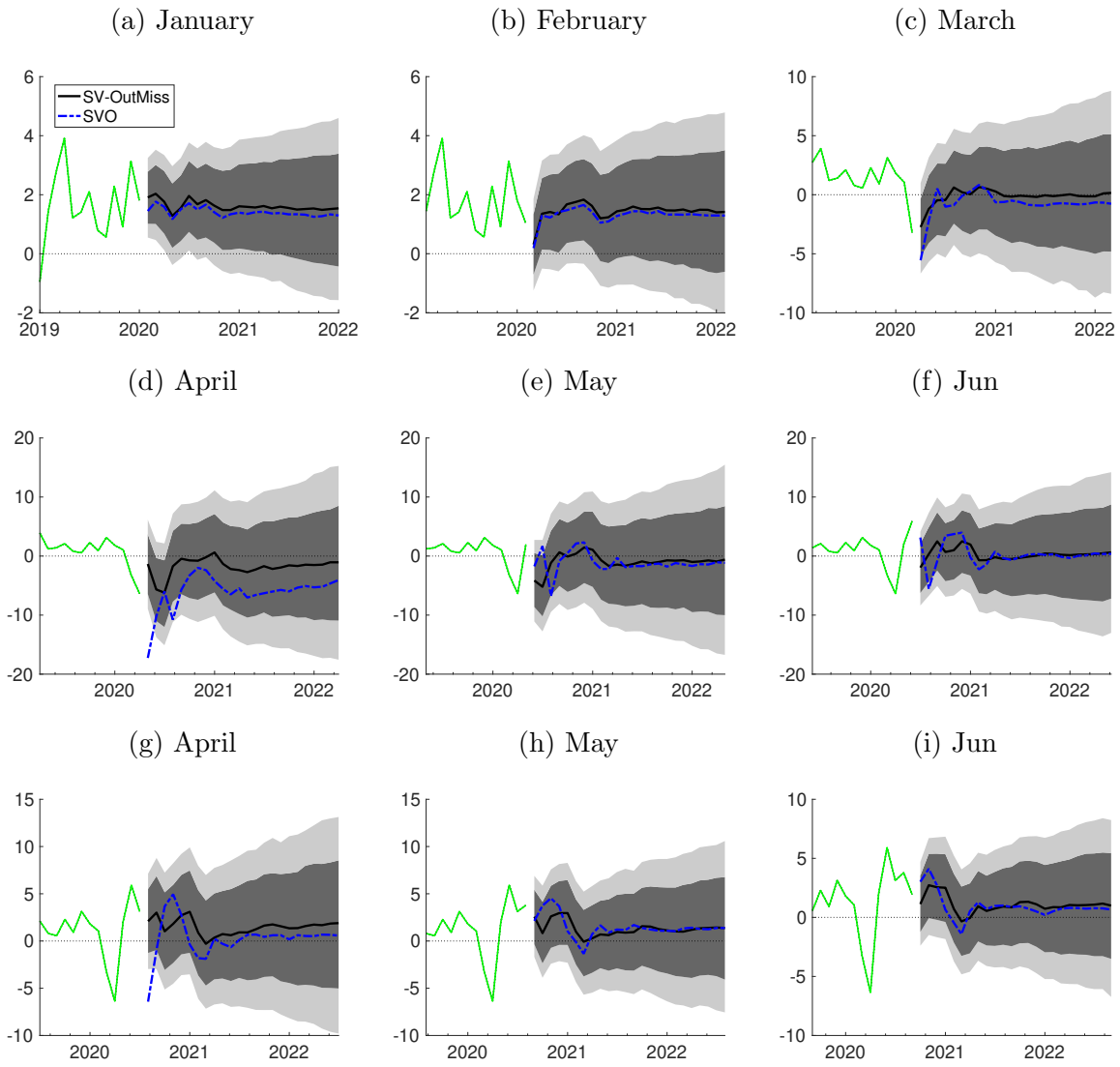
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.58: Comparison SVO vs SV-OutMiss in 2020 for PPI (fin. goods)



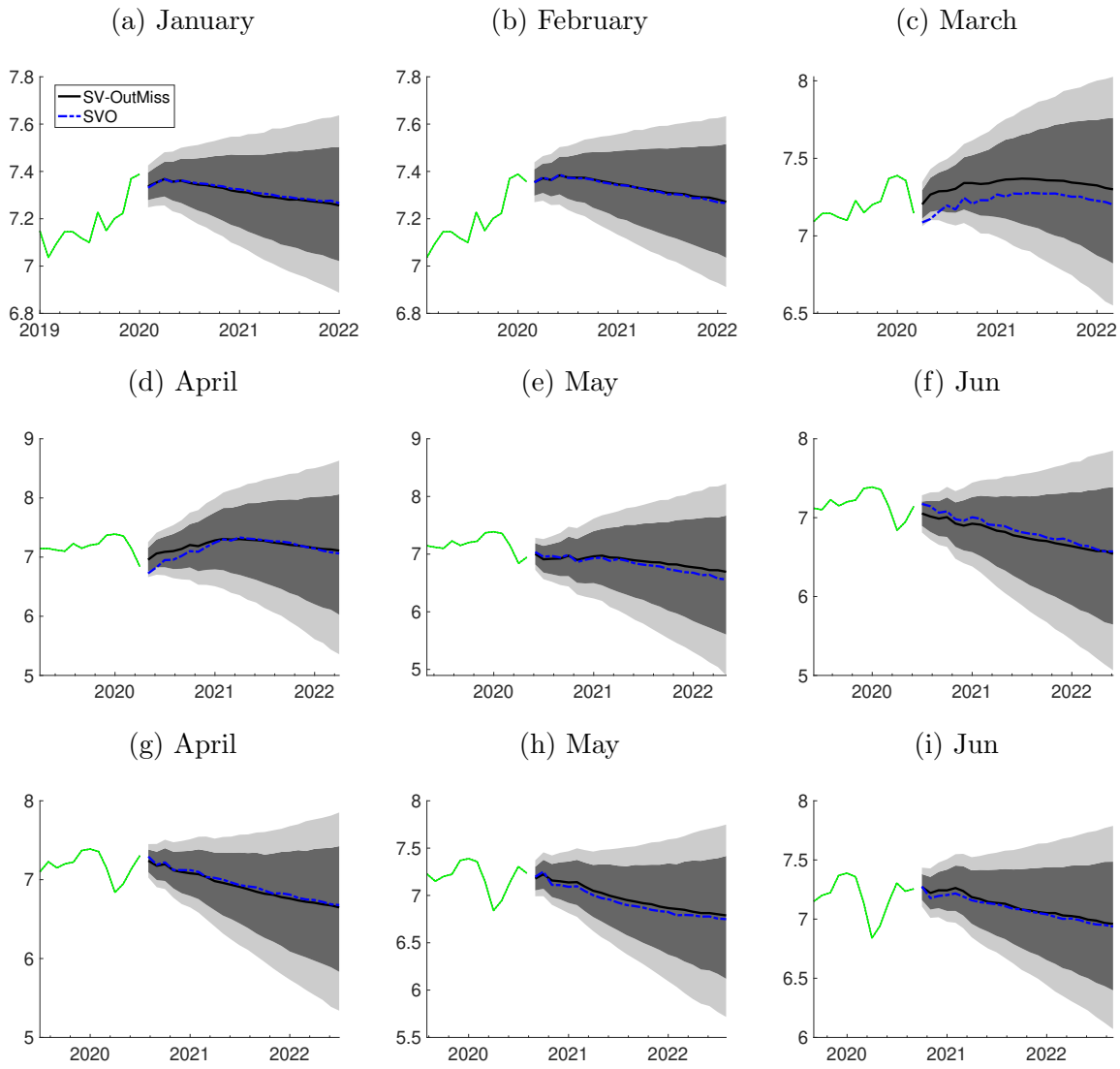
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.59: Comparison SVO vs SV-OutMiss in 2020 for PCE prices



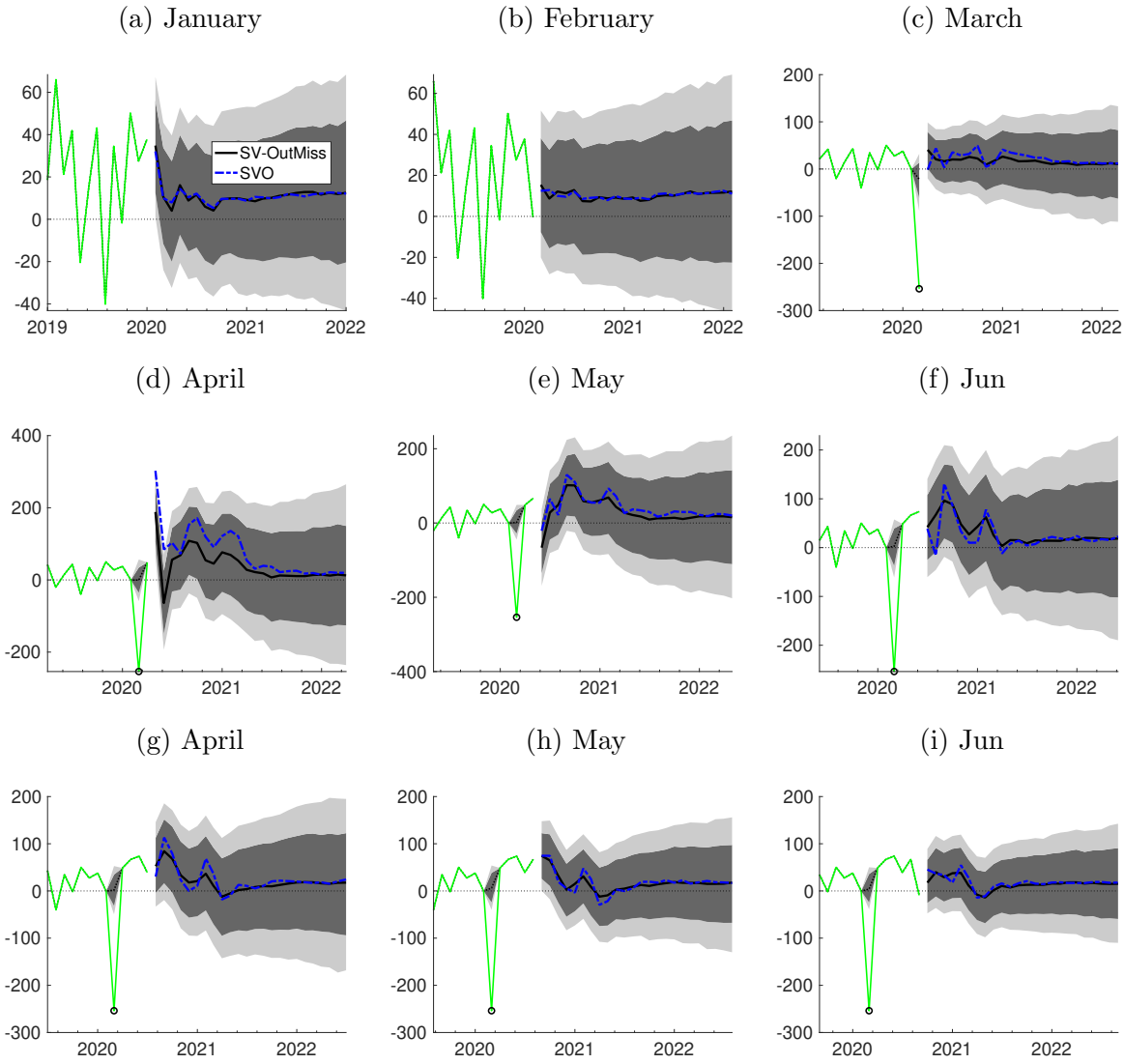
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.60: Comparison SVO vs SV-OutMiss in 2020 for Housing Starts



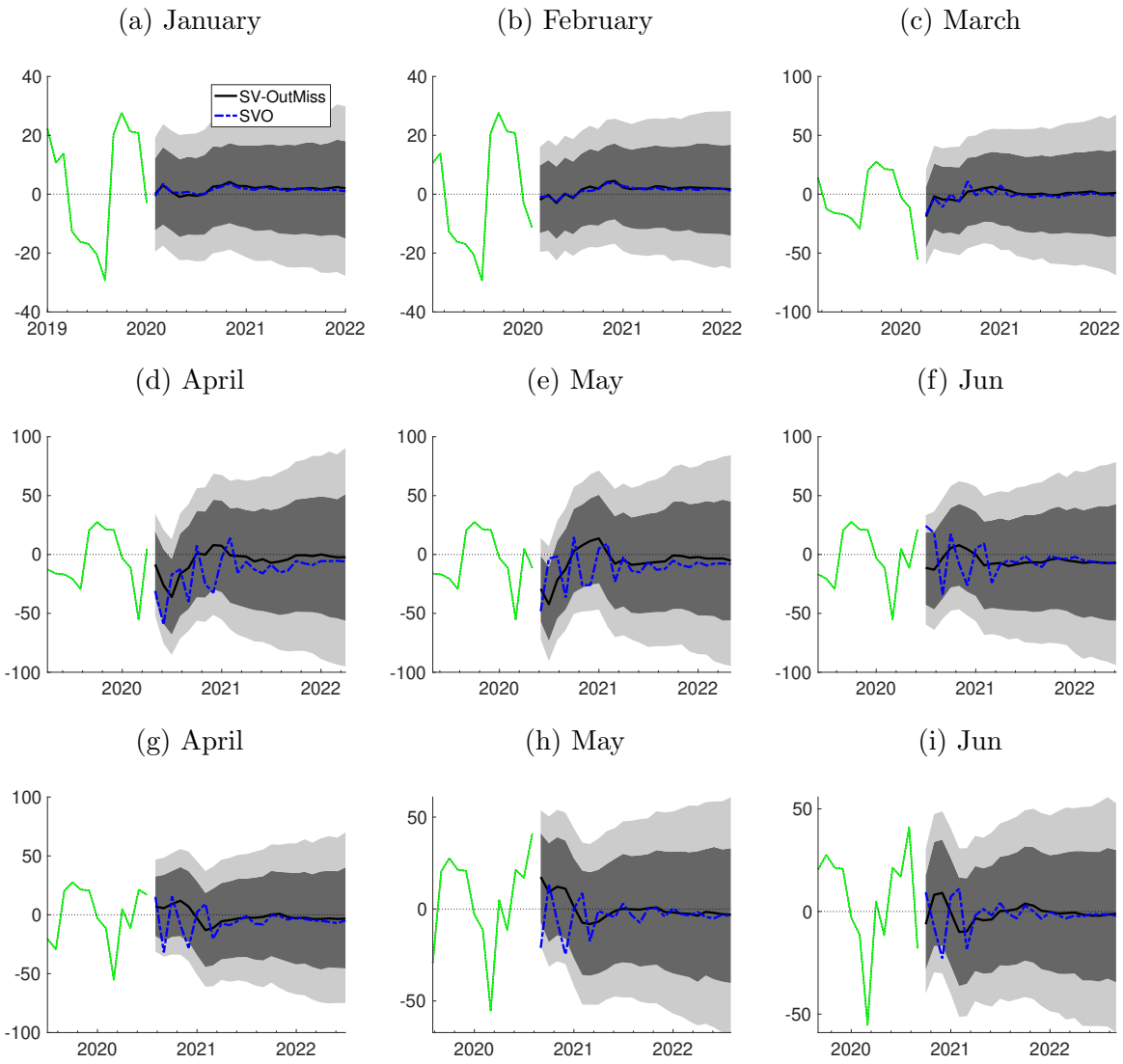
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.61: Comparison SVO vs SV-OutMiss in 2020 for S&P 500



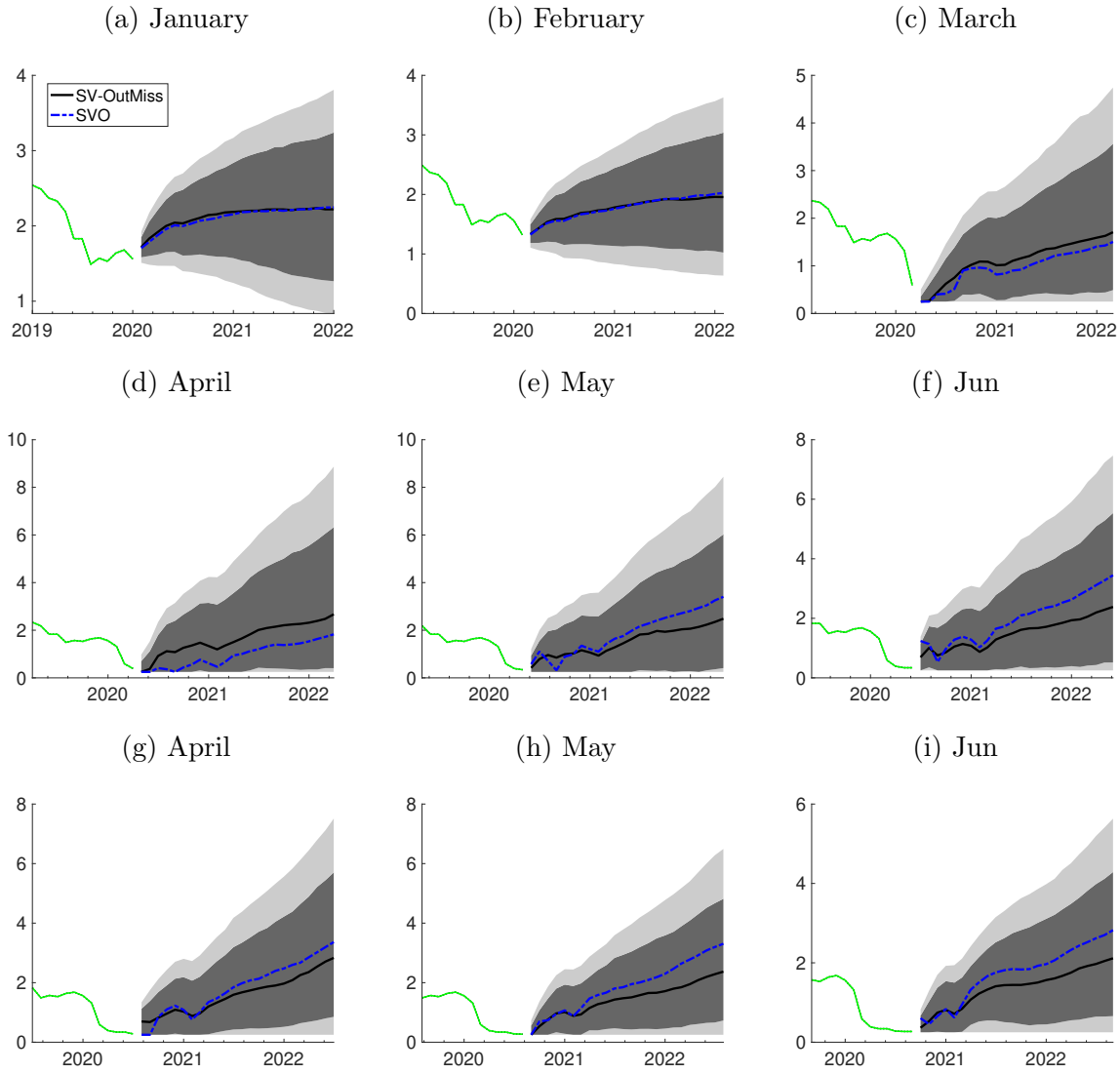
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.62: Comparison SVO vs SV-OutMiss in 2020 for USD / GBP FX rate



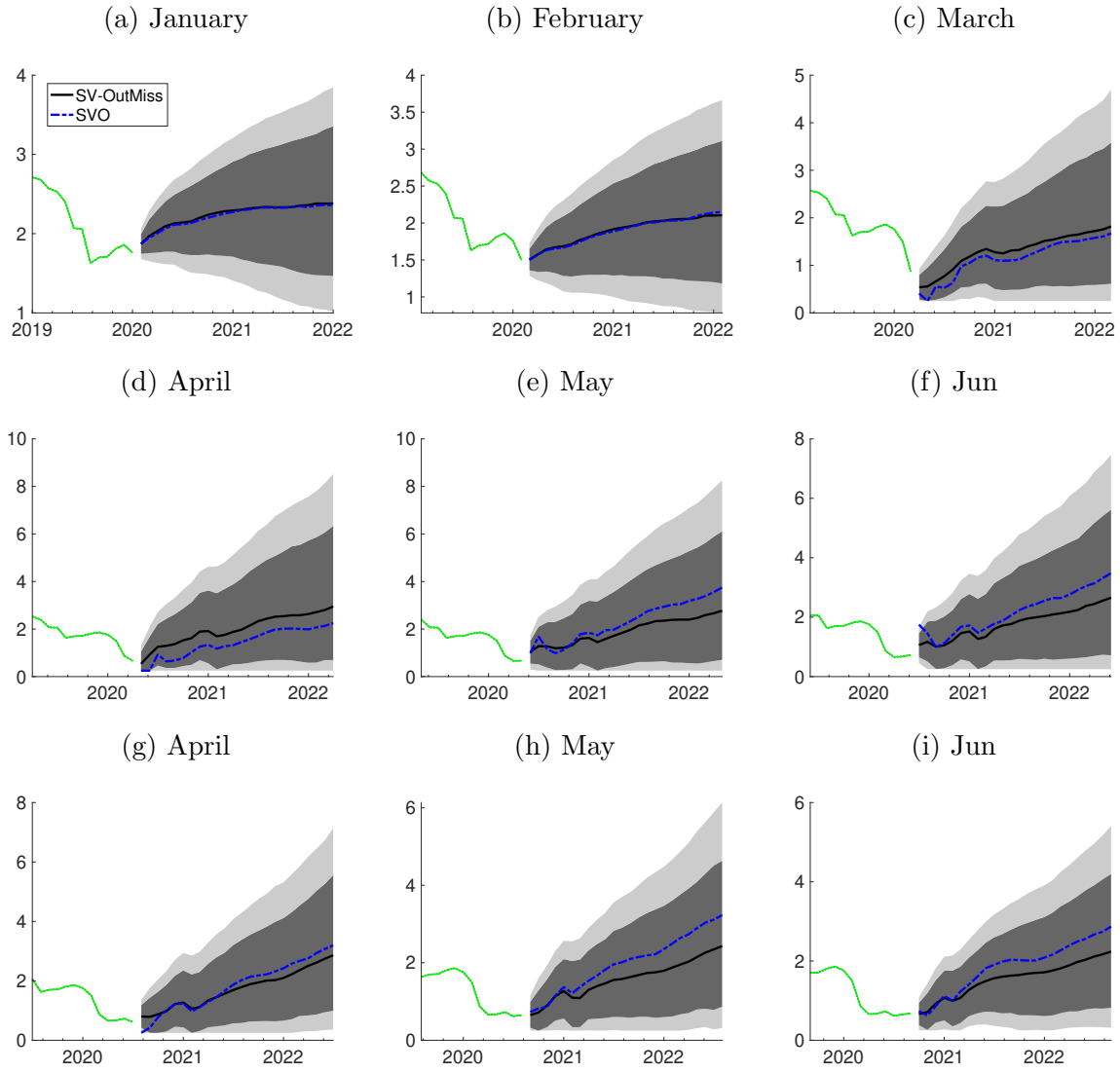
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.63: Comparison SVO vs SV-OutMiss in 2020 for 5-Year yield



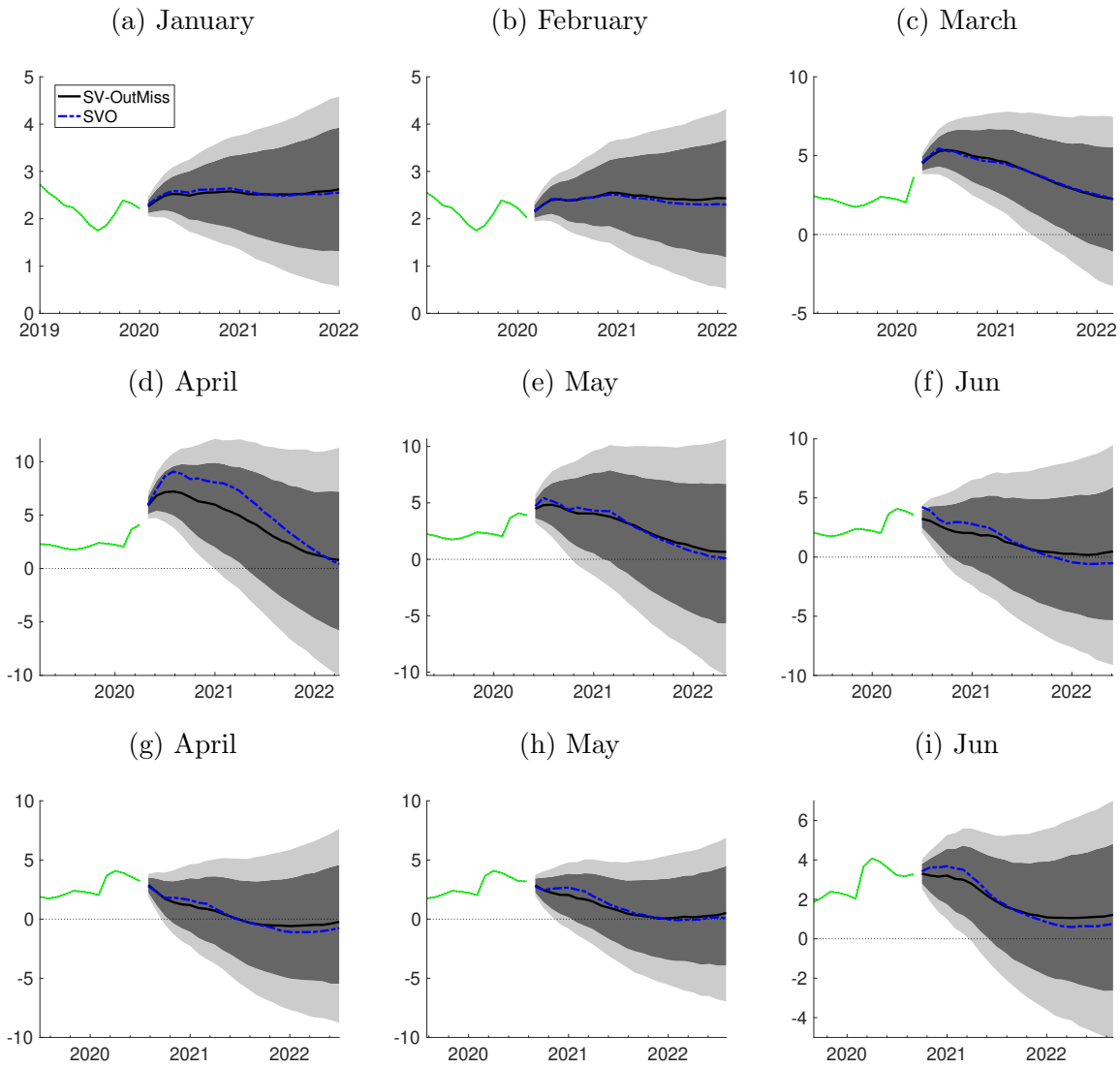
Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.64: Comparison SVO vs SV-OutMiss in 2020 for 10-Year yield



Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.

Figure S.65: Comparison SVO vs SV-OutMiss in 2020 for Baa spread



Note: Medians of predictive densities for models SVO and SV-Outmiss as well as 68% and 50% uncertainty bands for SV-OutMiss, simluated out-of-sample at various forecast origins as indicated in each panel. The solid green line denotes realized data prior to the forecast origin. Observations identified ex-ante as outliers, based on being more than 5 times the inter-quartile range away from the median, are indicated with a circle, and the corresponding backcast densities from the SV-OutMiss model are superimposed.