Figure 1. Logged levels of narrow Divisia monetary aggregates
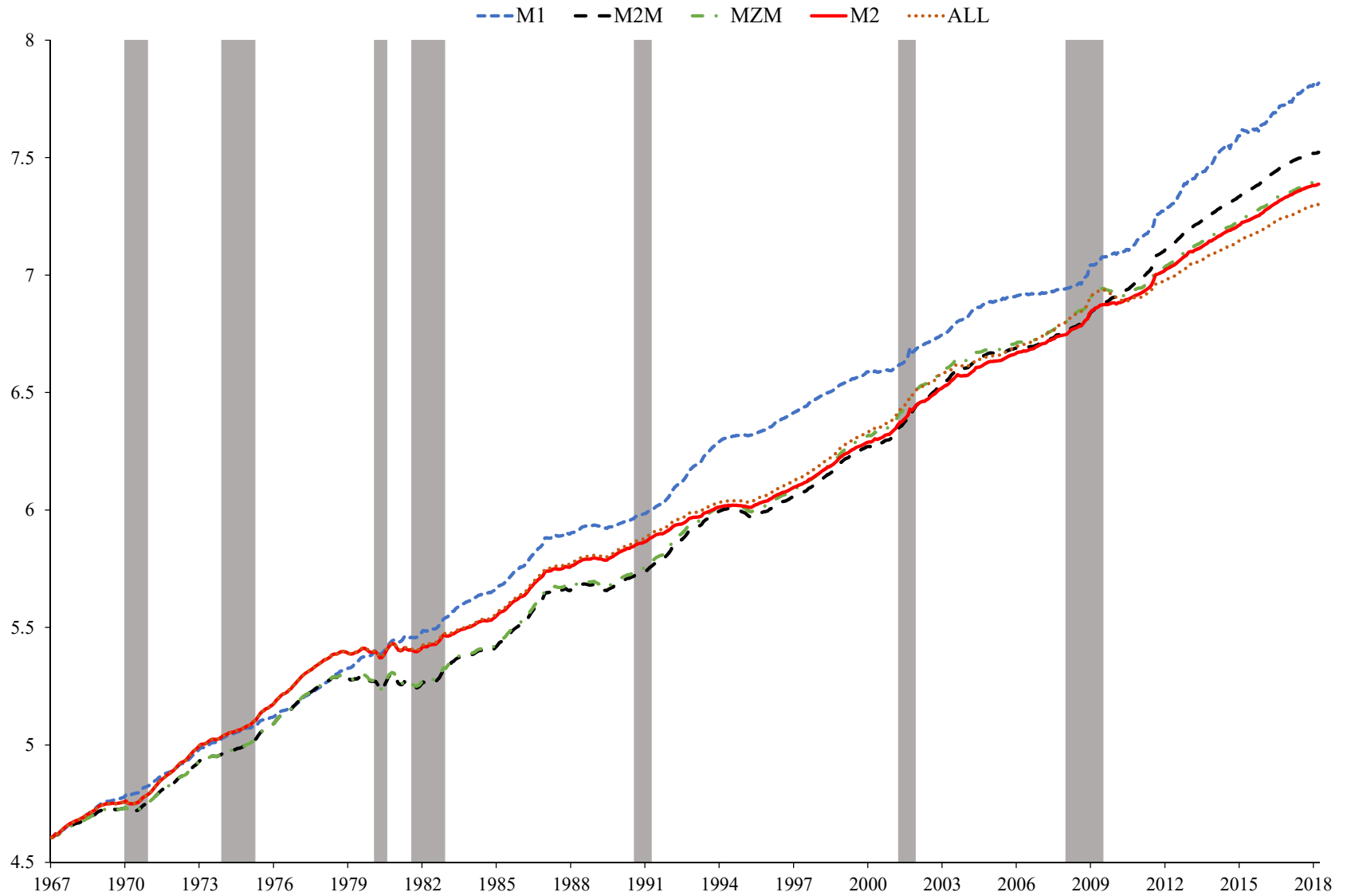
Figure 2. Logged levels of broad Divisia monetary aggregates
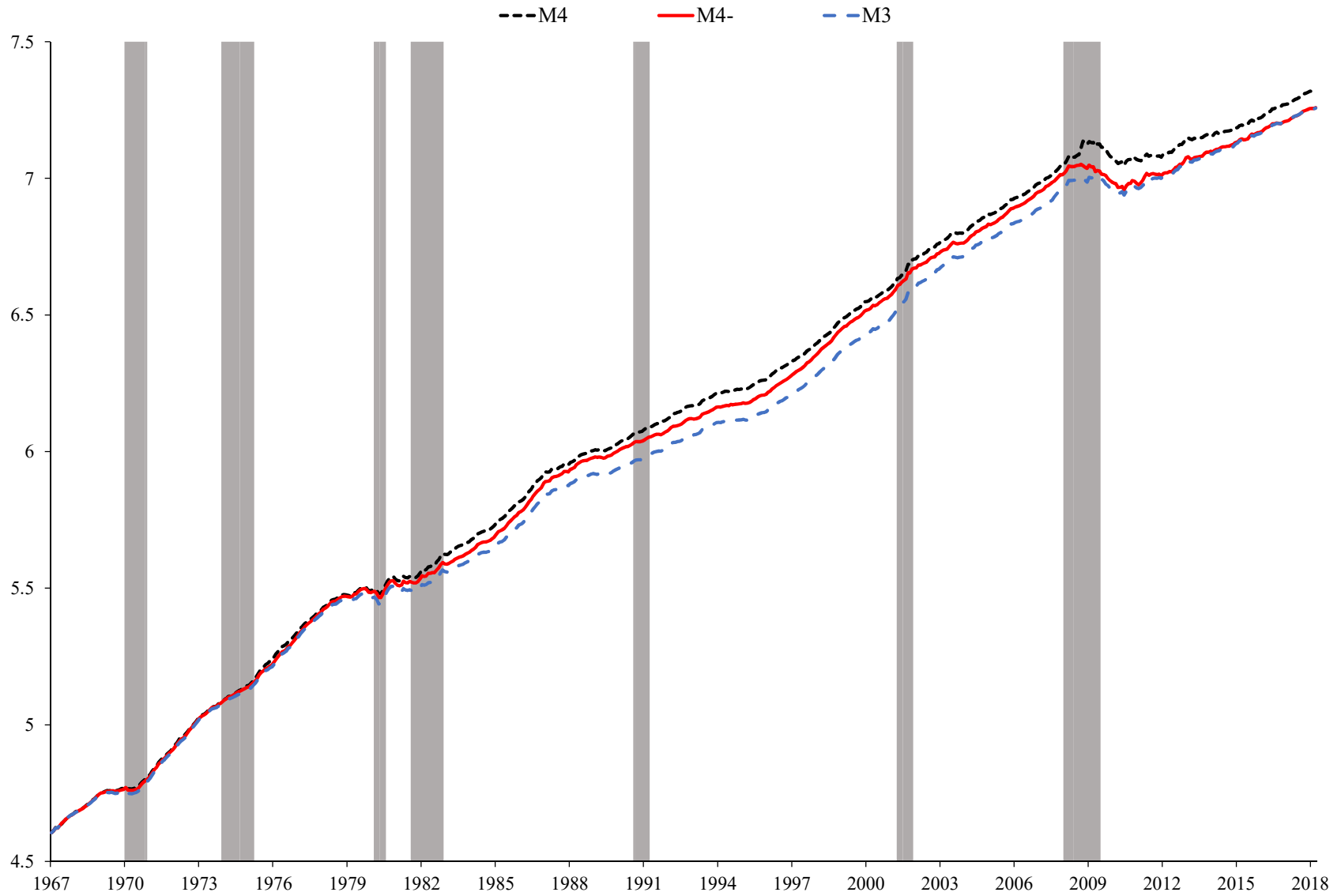
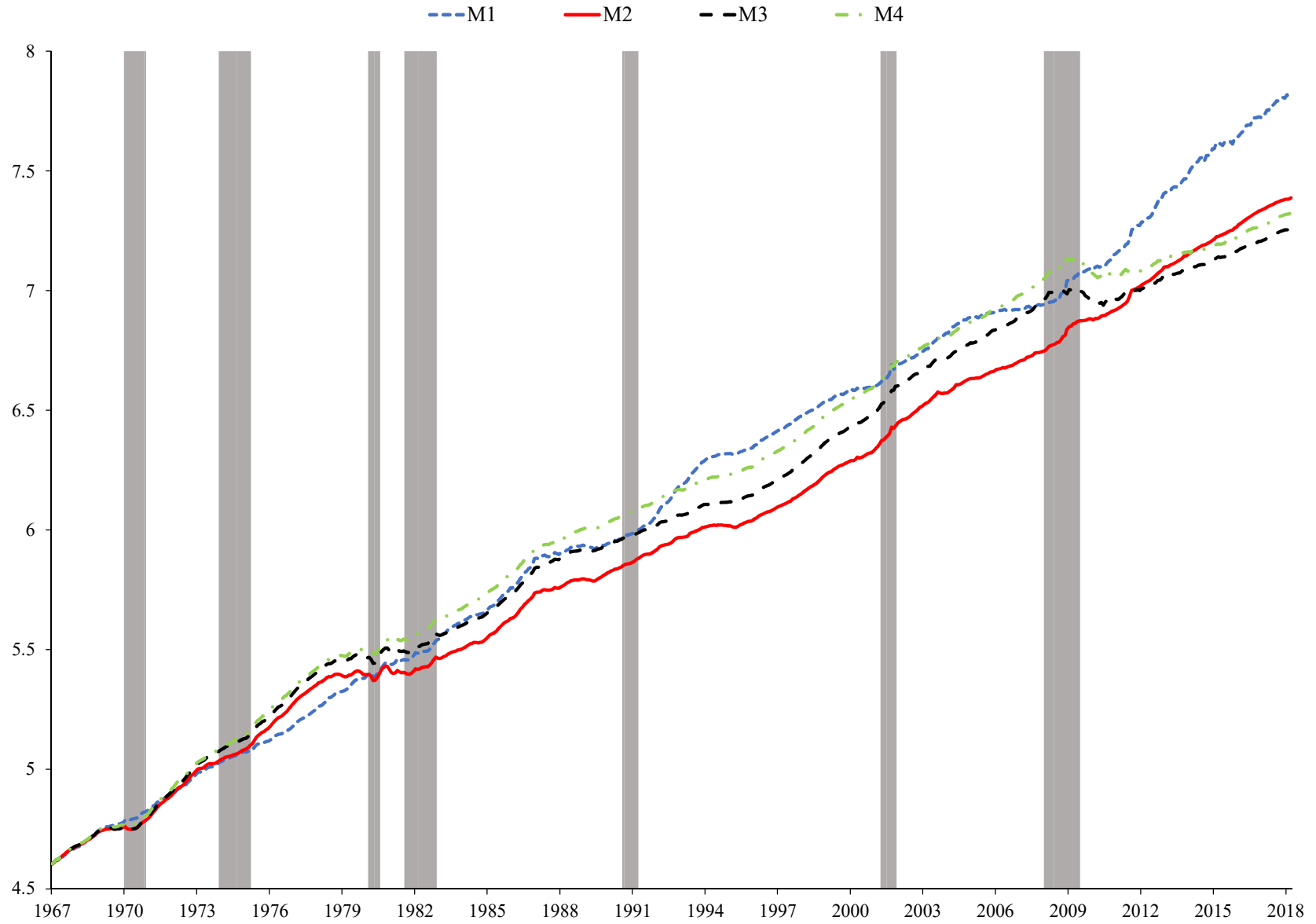# Figure 3. Logged levels of selected narrow and broad Divisia monetary aggregates

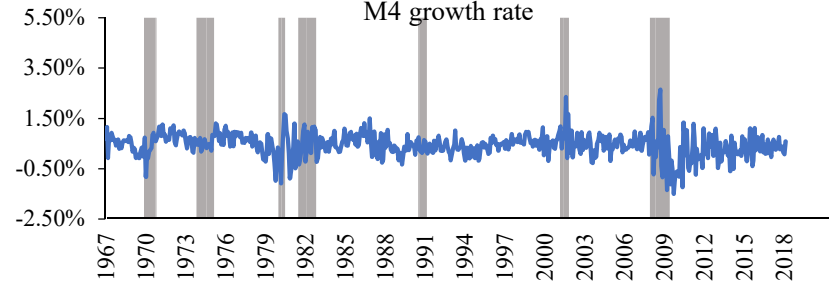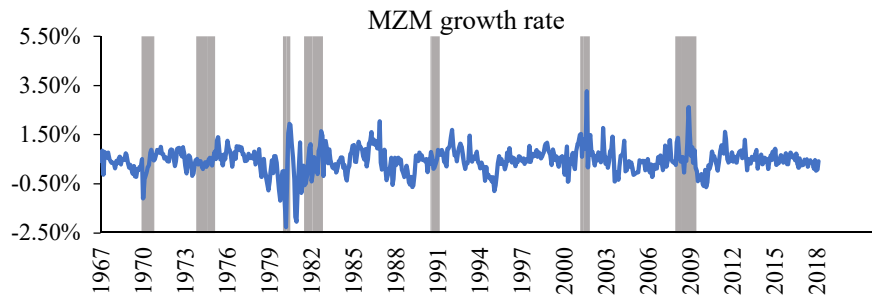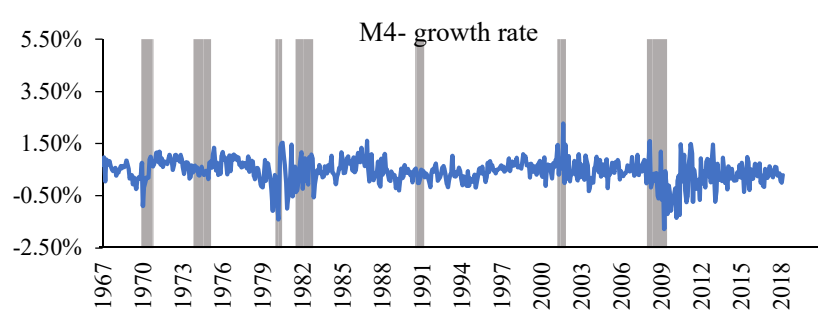# Figure 4. Divisia monetary aggregates monthly growth rates

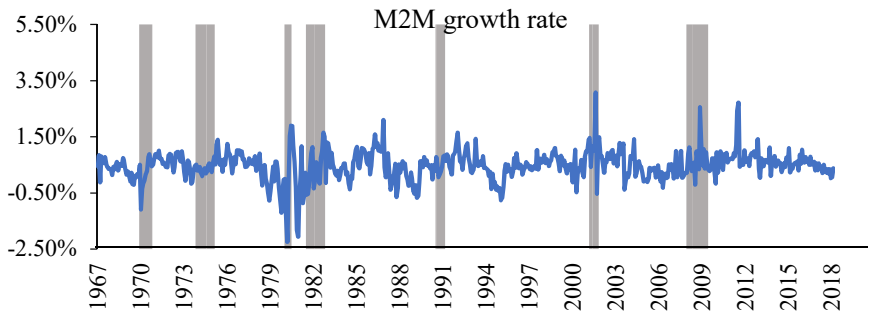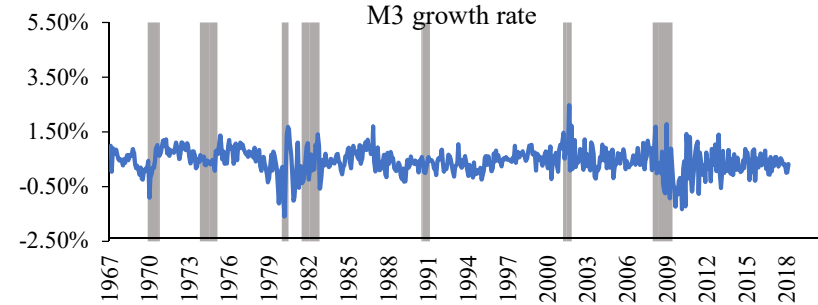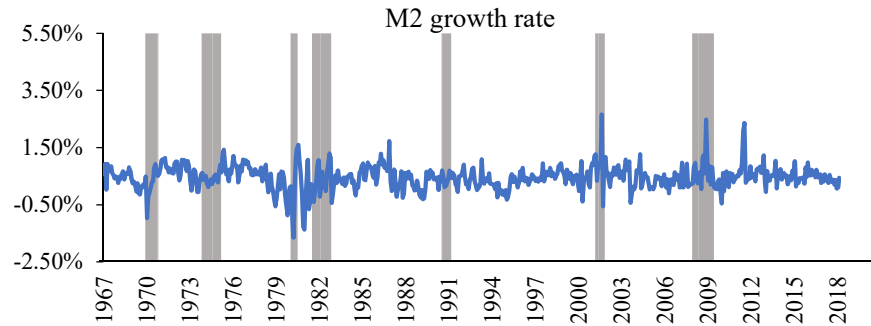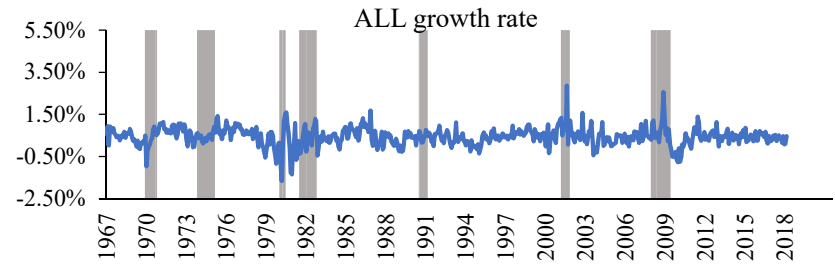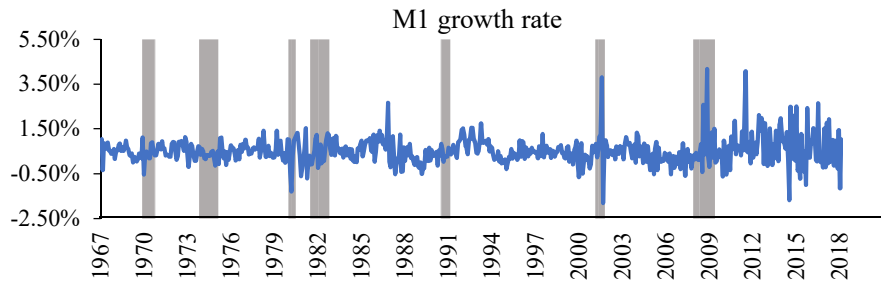## Table 1. Cyclical correlations between logged Divisia monetary aggregates and industrial production

$$\rho(x_t, y_{t+j}),\ j = -24, -18, -12, -9, -6, -3, -2, -1,\ 0,\ 1,\ 2,\ 3,\ 6,\ 9,\ 12,\ 18,\ 24$$

Series	j = -24	j = -18	j = -12	j = -9	j = -6	j = -3	j = -2	j = -1	j = 0	j = 1	j = 2	j = 3	j = 6	j = 9	j = 12	j = 18	j = 24
A. Narrow money measures																	
Divisia M1	0.190	**0.287**	0.282	0.265	0.219	0.150	0.127	0.099	0.069	0.043	0.016	-0.011	-0.058	-0.089	-0.121	-0.187	-0.229
Divisia M2	0.111	0.282	**0.321**	0.309	0.267	0.192	0.160	0.124	0.087	0.054	0.021	-0.009	-0.054	-0.088	-0.120	-0.161	-0.134
Divisia M2M	0.240	0.379	**0.389**	0.356	0.292	0.193	0.152	0.107	0.061	0.019	-0.023	-0.061	-0.128	-0.182	-0.229	-0.272	-0.227
Divisia MZM	0.240	0.379	**0.389**	0.356	0.292	0.193	0.152	0.107	0.061	0.019	-0.023	-0.061	-0.128	-0.182	-0.229	-0.272	-0.227
Divisia ALL	0.035	0.166	**0.194**	0.189	0.167	0.125	0.107	0.086	0.065	0.049	0.033	0.021	0.026	0.036	0.041	0.039	0.060
B. Broad money measures																	
Divisia M3	-0.057	0.109	0.223	0.275	0.311	**0.319**	0.313	0.302	0.286	0.272	0.259	0.250	0.239	0.217	0.176	0.080	0.051
Divisia M4-	-0.092	0.083	0.223	0.294	0.352	0.383	**0.385**	0.381	0.372	0.366	0.357	0.350	0.347	0.323	0.272	0.145	0.077
Divisia M4	-0.057	0.079	0.148	0.177	0.191	**0.193**	0.190	0.186	0.177	0.168	0.161	0.160	0.175	0.188	0.183	0.151	0.139

Notes: Sample period, monthly data: 1969:04 - 2018:03. Cyclical components are obtained using the Hamilton (2018) filter.

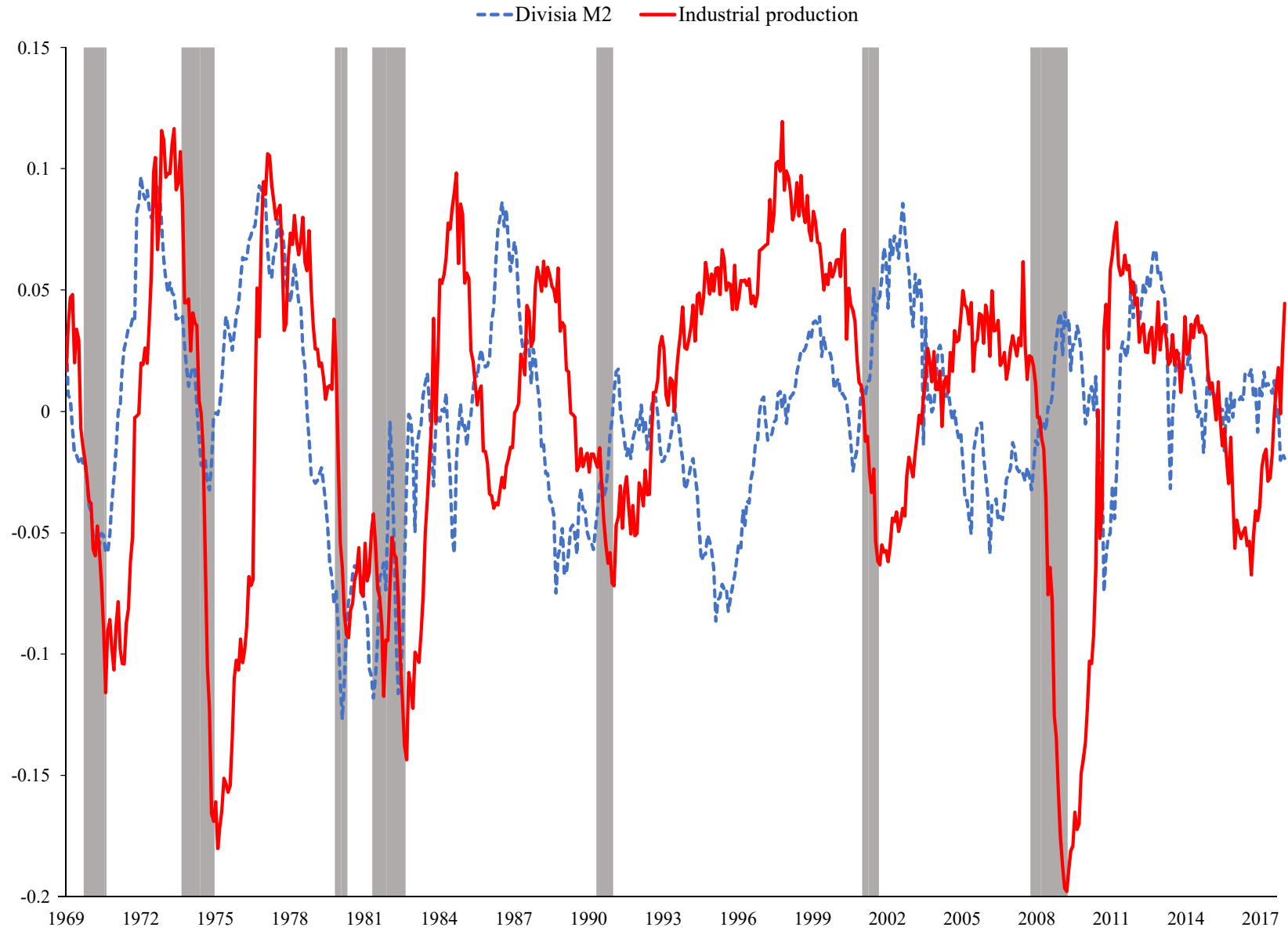# Figure 5. Cyclical components of Divisia M2 and industrial production

- - - Divisia M2 —— Industrial production

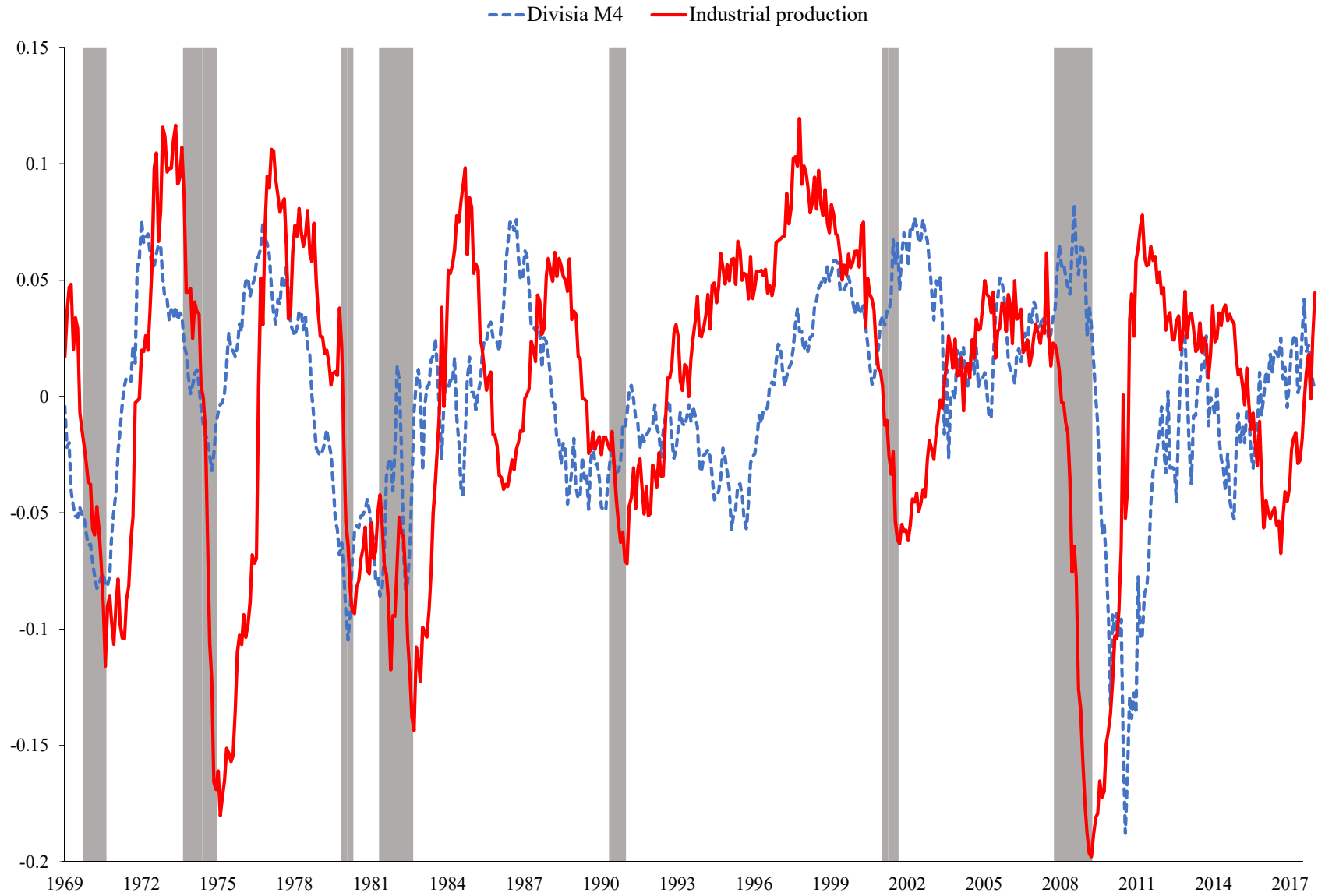Figure 6. Cyclical components of Divisia M4 and industrial production

Table 2. Granger causality test results with data in logged levels

6 lags

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	0.065	0.335	0.206	0.092	0.200	0.434	**0.003**	**0.005**	**0.020**
Capacity utilization	**0.031**	0.444	0.570	0.313	0.462	0.683	**0.031**	**0.040**	0.071
Employment	**0.005**	0.678	0.219	0.109	0.189	0.376	**0.026**	**0.019**	0.246
Unemployment rate	**0.012**	0.683	0.854	0.769	0.655	0.760	0.267	0.226	0.789
Housing starts	0.082	0.173	**0.015**	**0.005**	**0.005**	**0.013**	**0.000**	**0.000**	**0.014**
Personal income per capita	0.454	0.395	0.914	0.859	0.835	0.897	0.060	**0.018**	0.173
Personal income	0.446	0.467	**0.000**	0.910	0.901	0.942	0.106	**0.050**	0.232
Consumption	0.863	0.461	0.051	0.061	**0.023**	**0.018**	**0.001**	**0.000**	0.472
Durable goods orders	0.105	0.082	**0.006**	**0.007**	**0.004**	**0.005**	**0.000**	**0.000**	0.263

12 lags

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	0.263	0.640	0.672	0.575	0.669	0.825	**0.047**	**0.041**	0.104
Capacity utilization	0.094	0.523	0.924	0.833	0.766	0.868	0.143	0.108	0.157
Employment	0.172	0.528	0.086	**0.039**	0.148	0.298	0.051	**0.047**	0.155
Unemployment rate	0.146	0.777	0.629	0.582	0.634	0.697	0.777	0.757	0.986
Housing starts	**0.034**	0.313	**0.039**	**0.010**	**0.006**	**0.021**	**0.000**	**0.000**	**0.026**
Personal income per capita	0.694	0.613	0.885	0.872	0.829	0.839	0.192	**0.049**	0.404
Personal income	0.712	0.693	**0.000**	0.906	0.877	0.881	0.312	0.134	0.532
Consumption	0.982	0.633	0.102	0.084	**0.031**	**0.033**	**0.002**	**0.001**	0.255
Durable goods orders	0.320	0.173	**0.019**	**0.045**	**0.026**	**0.016**	**0.003**	**0.002**	0.141

AIC optimal lags

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.006**	0.366	0.051	**0.026**	0.074	0.161	**0.000**	**0.001**	**0.003**
Capacity utilization	**0.003**	0.227	0.184	0.161	0.147	0.136	**0.008**	**0.010**	**0.009**
Employment	**0.001**	0.076	**0.045**	**0.002**	**0.023**	0.158	**0.005**	**0.006**	0.055
Unemployment rate	**0.007**	0.209	0.433	0.343	0.395	0.508	0.633	0.634	0.690
Housing starts	**0.012**	0.189	**0.003**	**0.000**	**0.000**	**0.003**	**0.000**	**0.000**	**0.000**
Personal income per capita	0.974	0.234	0.485	0.345	0.270	0.436	**0.017**	**0.005**	0.096
Personal income	0.743	0.369	0.910	0.632	0.534	0.918	**0.021**	**0.009**	0.150
Consumption	0.587	0.231	**0.002**	**0.001**	**0.000**	**0.001**	**0.000**	**0.000**	0.191
Durable goods orders	0.089	**0.048**	**0.000**	**0.001**	**0.001**	**0.001**	**0.000**	**0.000**	0.073

Notes: Sample period, monthly data: 1967:01 - 2018:03. Numbers are marginal significance levels. Bold numbers indicate significance at the 5% level.

Table 3. Granger causality test results with montly growth rates

6 lags

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	0.148	0.256	0.130	**0.047**	0.164	0.376	**0.002**	**0.002**	**0.007**
Capacity utilization	0.160	0.241	0.197	**0.039**	0.271	0.627	**0.007**	**0.013**	**0.015**
Employment	**0.046**	0.581	0.091	**0.045**	0.132	0.302	**0.024**	**0.020**	0.211
Unemployment rate	0.155	0.497	0.676	0.406	0.587	0.792	0.434	0.472	0.907
Housing starts	**0.023**	0.079	**0.006**	**0.001**	**0.001**	**0.006**	**0.001**	**0.003**	**0.038**
Personal income per capita	0.587	0.617	0.903	0.885	0.857	0.850	**0.049**	**0.019**	0.118
Personal income	0.621	0.596	0.901	0.876	0.850	0.841	**0.047**	**0.018**	0.109
Consumption	0.838	0.384	**0.013**	**0.018**	**0.003**	**0.002**	**0.000**	**0.000**	0.195
Durable goods orders	0.244	**0.026**	**0.002**	**0.002**	**0.001**	**0.001**	**0.001**	**0.000**	0.108

12 lags

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	0.155	0.338	0.642	0.473	0.519	0.731	**0.040**	**0.024**	0.081
Capacity utilization	0.116	0.310	0.754	0.440	0.668	0.900	0.103	0.072	0.167
Employment	0.309	0.343	**0.020**	**0.006**	**0.037**	0.105	**0.029**	**0.019**	0.066
Unemployment rate	0.448	0.319	0.414	0.295	0.493	0.625	0.689	0.733	0.983
Housing starts	**0.021**	0.272	**0.029**	**0.004**	**0.004**	**0.027**	**0.000**	**0.000**	**0.019**
Personal income per capita	0.665	0.939	0.942	0.951	0.952	0.941	0.239	0.091	0.377
Personal income	0.678	0.936	0.943	0.951	0.952	0.942	0.236	0.090	0.380
Consumption	0.989	0.613	0.110	0.053	**0.033**	0.063	**0.004**	**0.005**	0.307
Durable goods orders	0.314	0.080	**0.008**	**0.011**	**0.009**	**0.009**	**0.004**	**0.005**	0.123

AIC optimal lags

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.002**	**0.045**	**0.012**	**0.002**	**0.008**	**0.047**	**0.000**	**0.000**	**0.001**
Capacity utilization	**0.004**	**0.027**	**0.018**	**0.001**	**0.014**	0.125	**0.002**	**0.007**	**0.003**
Employment	**0.005**	0.114	**0.008**	**0.001**	**0.006**	**0.044**	**0.007**	**0.010**	0.059
Unemployment rate	**0.023**	0.848	0.944	0.057	0.847	0.596	0.360	0.381	0.488
Housing starts	**0.004**	**0.039**	**0.002**	**0.000**	**0.000**	**0.005**	**0.000**	**0.000**	**0.009**
Personal income per capita	0.275	0.278	0.724	0.485	0.633	0.882	**0.006**	**0.002**	**0.024**
Personal income	0.486	0.266	0.706	0.472	0.662	0.912	**0.005**	**0.002**	**0.021**
Consumption	0.659	0.051	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.049**
Durable goods orders	0.232	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.006**

Notes: Sample period, monthly data: 1967:02 - 2018:03. Numbers are marginal significance levels. Bold numbers indicate significance at the 5% level.

Table 4. Granger causality test results with annual growth rates

6 lags

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.010**	**0.009**	**0.001**	**0.000**	**0.002**	**0.009**	**0.000**	**0.000**	**0.001**
Capacity utilization	**0.005**	**0.004**	**0.001**	**0.000**	**0.003**	**0.017**	**0.000**	**0.002**	**0.003**
Employment	**0.022**	0.162	**0.027**	**0.005**	**0.033**	0.147	**0.017**	**0.016**	0.200
Unemployment rate	0.086	0.125	0.460	0.274	0.449	0.649	0.245	0.256	0.385
Housing starts	**0.008**	**0.008**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**	**0.001**
Personal income per capita	**0.014**	0.562	0.389	0.345	0.407	0.505	0.063	**0.037**	0.163
Personal income	**0.017**	0.573	0.491	0.370	0.416	0.503	0.065	**0.038**	0.161
Consumption	0.736	0.145	**0.014**	**0.007**	**0.003**	**0.006**	**0.002**	**0.001**	0.427
Durable goods orders	**0.011**	**0.033**	**0.002**	**0.000**	**0.000**	**0.001**	**0.004**	**0.007**	0.725

12 lags

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.014**	0.085	0.076	**0.045**	0.177	0.311	**0.001**	**0.010**	**0.013**
Capacity utilization	**0.008**	**0.039**	0.098	**0.034**	0.254	0.503	**0.005**	**0.042**	**0.031**
Employment	0.126	0.122	**0.002**	**0.001**	**0.003**	**0.009**	**0.004**	**0.002**	**0.011**
Unemployment rate	**0.011**	0.181	0.242	0.162	0.210	0.236	0.616	0.641	0.722
Housing starts	**0.039**	**0.001**	**0.001**	**0.000**	**0.000**	**0.002**	**0.000**	**0.000**	**0.005**
Personal income per capita	0.058	0.419	0.188	0.330	0.546	0.366	**0.001**	**0.000**	**0.004**
Personal income	0.068	0.427	0.332	0.341	0.552	0.401	**0.002**	**0.000**	**0.005**
Consumption	0.784	0.231	**0.004**	**0.002**	**0.001**	**0.001**	**0.000**	**0.000**	**0.010**
Durable goods orders	0.074	0.078	**0.004**	**0.009**	**0.005**	**0.003**	**0.002**	**0.005**	0.064

AIC optimal lags

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.001**	**0.005**	**0.000**	**0.000**	**0.007**	**0.010**	**0.000**	**0.000**	**0.000**
Capacity utilization	**0.001**	**0.003**	**0.001**	**0.001**	**0.019**	**0.042**	**0.000**	**0.002**	**0.001**
Employment	**0.027**	0.063	**0.001**	**0.001**	**0.001**	**0.003**	**0.000**	**0.000**	**0.007**
Unemployment rate	**0.002**	**0.026**	0.137	0.073	0.169	0.319	0.112	0.088	0.374
Housing starts	**0.008**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Personal income per capita	**0.034**	0.077	0.428	0.938	0.628	0.231	**0.001**	**0.000**	**0.004**
Personal income	**0.043**	0.065	0.552	0.882	0.598	0.257	**0.002**	**0.000**	**0.004**
Consumption	0.954	0.076	**0.006**	**0.004**	**0.001**	**0.001**	**0.000**	**0.000**	**0.008**
Durable goods orders	**0.044**	**0.010**	**0.000**	**0.001**	**0.000**	**0.000**	**0.001**	**0.001**	0.117

Notes: Sample period, monthly data: 1968:01 - 2018:03. Numbers are marginal significance levels. Bold numbers indicate significance at the 5% level.

Table 5. Granger causality test results with log levels and controlling for the interest rate

6 lags

Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	0.315	0.096	0.051	0.166	0.329	**0.003**	**0.007**	**0.035**
Capacity utilization	0.178	0.177	0.095	0.179	0.304	**0.015**	**0.026**	0.081
Employment	0.654	0.056	0.036	**0.042**	0.066	**0.007**	**0.004**	0.093
Unemployment rate	0.874	0.784	0.830	0.661	0.619	0.085	0.052	0.497
Housing starts	0.277	**0.018**	**0.011**	**0.005**	**0.009**	**0.000**	**0.000**	**0.004**
Personal income per capita	0.508	0.916	0.896	0.786	0.821	0.090	**0.027**	0.165
Personal income	0.595	**0.000**	0.961	0.901	0.937	0.194	0.093	0.298
Consumption	0.419	**0.007**	**0.006**	**0.002**	**0.002**	**0.000**	**0.000**	0.266
Durable goods orders	**0.035**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.027**

12 lags

Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	0.693	0.556	0.476	0.689	0.836	0.057	0.052	0.105
Capacity utilization	0.418	0.782	0.692	0.734	0.830	0.196	0.202	0.227
Employment	0.419	**0.007**	**0.004**	**0.018**	**0.039**	**0.005**	**0.007**	**0.029**
Unemployment rate	0.597	0.422	0.453	0.450	0.443	0.563	0.491	0.853
Housing starts	0.687	0.172	0.089	0.056	0.115	**0.000**	**0.000**	**0.023**
Personal income per capita	0.746	0.883	0.925	0.816	0.747	0.320	0.098	0.470
Personal income	0.804	**0.000**	0.946	0.876	0.821	0.513	0.258	0.685
Consumption	0.610	**0.047**	**0.034**	**0.014**	**0.015**	**0.001**	**0.000**	0.236
Durable goods orders	0.108	**0.001**	**0.006**	**0.007**	**0.003**	**0.000**	**0.000**	0.075

AIC optimal lags

Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	0.187	**0.026**	**0.013**	**0.029**	0.064	**0.001**	**0.001**	**0.004**
Capacity utilization	0.134	0.123	0.085	0.119	0.274	**0.016**	**0.024**	**0.016**
Employment	0.182	**0.008**	**0.001**	**0.005**	**0.020**	**0.001**	**0.001**	**0.029**
Unemployment rate	0.290	0.772	0.552	0.584	0.830	0.075	0.058	0.936
Housing starts	0.380	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Personal income per capita	0.140	0.323	0.174	0.108	0.264	**0.017**	**0.005**	0.065
Personal income	0.228	0.691	0.369	0.269	0.700	**0.022**	**0.010**	0.083
Consumption	0.278	**0.002**	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	0.196
Durable goods orders	**0.013**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.018**

Notes: Sample period, montly data: 1967:01 - 2018:03. Numbers are marginal significance levels. Bold numbers indicate significance at the 5% level.

Table 6. Granger causality test results with monthly growth rates and controlling for the interest rate

				6 lags				
Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	0.183	0.073	**0.024**	0.109	0.299	**0.003**	**0.004**	**0.009**
Capacity utilization	0.165	0.138	**0.018**	0.237	0.653	**0.015**	**0.026**	**0.024**
Employment	0.302	**0.011**	**0.008**	**0.010**	**0.026**	**0.005**	**0.003**	0.059
Unemployment rate	0.420	0.546	0.288	0.483	0.779	0.330	0.349	0.830
Housing starts	0.277	0.052	**0.013**	**0.012**	**0.046**	**0.002**	**0.010**	**0.044**
Personal income per capita	0.606	0.922	0.940	0.917	0.843	**0.100**	**0.041**	0.155
Personal income	0.586	0.923	0.933	0.850	0.837	0.096	**0.038**	0.146
Consumption	0.359	**0.011**	**0.015**	**0.002**	**0.002**	**0.000**	**0.000**	0.200
Durable goods orders	**0.015**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.045**

				12 lags				
Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	0.421	0.610	0.479	0.509	0.698	**0.021**	**0.013**	**0.035**
Capacity utilization	0.429	0.764	0.475	0.700	0.905	0.056	**0.041**	0.083
Employment	0.266	**0.004**	**0.002**	**0.006**	**0.019**	**0.006**	**0.004**	**0.012**
Unemployment rate	0.269	0.338	0.236	0.357	0.500	0.653	0.644	0.949
Housing starts	0.600	0.179	0.056	**0.049**	0.168	**0.000**	**0.001**	**0.044**
Personal income per capita	0.858	0.894	0.940	0.905	0.816	0.407	0.176	0.512
Personal income	0.849	0.897	0.937	0.903	0.818	0.407	0.174	0.517
Consumption	0.561	0.093	**0.038**	**0.018**	**0.041**	**0.002**	**0.002**	0.343
Durable goods orders	0.077	**0.004**	**0.008**	**0.006**	**0.004**	**0.001**	**0.001**	0.097

				AIC optimal lags				
Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.043**	**0.010**	**0.001**	**0.003**	**0.019**	**0.001**	**0.001**	**0.002**
Capacity utilization	**0.034**	**0.017**	**0.001**	**0.007**	0.131	**0.005**	**0.015**	**0.006**
Employment	**0.036**	**0.001**	**0.000**	**0.001**	**0.005**	**0.001**	**0.002**	**0.015**
Unemployment rate	0.573	0.451	**0.044**	0.463	0.691	0.225	0.234	0.367
Housing starts	0.100	**0.011**	**0.001**	**0.001**	**0.011**	**0.000**	**0.000**	**0.019**
Personal income per capita	0.294	0.796	0.535	0.745	0.667	**0.007**	**0.001**	**0.018**
Personal income	0.280	0.769	0.515	0.763	0.658	**0.006**	**0.002**	**0.016**
Consumption	0.053	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	0.051
Durable goods orders	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.003**

Notes: Sample period, monthly data: 1967:02 - 2018:03. Numbers are marginal significance levels. Bold numbers indicate significance at the 5% level.

Table 7. Granger causality test results with annual growth rates and controlling for the interest rate

6 lags

Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.013**	**0.001**	**0.000**	**0.001**	**0.003**	**0.000**	**0.000**	**0.001**
Capacity utilization	**0.008**	**0.001**	**0.000**	**0.002**	**0.008**	**0.000**	**0.002**	**0.003**
Employment	0.446	**0.013**	**0.003**	**0.004**	**0.023**	**0.002**	**0.001**	**0.043**
Unemployment rate	0.201	0.294	0.168	0.174	0.290	0.115	0.088	0.246
Housing starts	0.096	**0.002**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**	**0.002**
Personal income per capita	0.640	0.799	0.801	0.938	0.954	0.119	0.052	0.186
Personal income	0.623	0.796	0.812	0.416	0.955	0.125	0.054	0.187
Consumption	0.129	**0.010**	**0.003**	**0.001**	**0.003**	**0.000**	**0.000**	0.353
Durable goods orders	**0.031**	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	0.241

12 lags

Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.039**	**0.020**	**0.011**	**0.038**	0.065	**0.002**	**0.014**	**0.021**
Capacity utilization	**0.021**	**0.028**	**0.009**	0.058	0.116	**0.005**	**0.044**	**0.047**
Employment	0.089	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Unemployment rate	0.099	0.083	**0.029**	**0.048**	0.085	0.444	0.431	0.573
Housing starts	**0.019**	**0.009**	**0.000**	**0.001**	**0.008**	**0.000**	**0.000**	**0.007**
Personal income per capita	0.169	0.221	0.435	0.538	0.287	**0.004**	**0.000**	**0.006**
Personal income	0.160	0.438	0.459	0.567	0.353	**0.006**	**0.000**	**0.008**
Consumption	0.144	**0.002**	**0.001**	**0.000**	**0.001**	**0.000**	**0.000**	**0.020**
Durable goods orders	0.059	**0.001**	**0.002**	**0.002**	**0.001**	**0.000**	**0.001**	0.056

AIC optimal lags

Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Capacity utilization	**0.003**	**0.001**	**0.000**	**0.001**	**0.002**	**0.000**	**0.001**	**0.001**
Employment	**0.043**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Unemployment rate	**0.011**	0.092	**0.017**	**0.023**	**0.038**	0.076	0.051	0.248
Housing starts	**0.004**	**0.002**	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Personal income per capita	0.080	0.235	0.892	0.292	0.052	**0.001**	**0.000**	**0.002**
Personal income	0.060	0.404	0.949	0.343	0.088	**0.002**	**0.000**	**0.005**
Consumption	0.076	**0.004**	**0.002**	**0.000**	**0.001**	**0.000**	**0.000**	**0.008**
Durable goods orders	**0.002**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.004**

Notes: Sample period, monthly data: 1968:01 - 2018:03. Numbers are marginal significance levels. Bold numbers indicate significance at the 5%

Table 8: Granger causality test results with AIC optimal lags and restricted sample (1980:01 - 2018:03)

A: Logged levels

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.010**	0.219	0.562	0.250	0.221	0.542	0.211	0.641	**0.020**
Capacity utilization	**0.005**	0.258	0.523	0.714	0.204	0.159	0.149	0.156	**0.012**
Employment	**0.002**	**0.020**	0.388	**0.027**	0.222	0.698	0.142	0.052	0.148
Unemployment rate	**0.003**	0.074	**0.002**	**0.004**	**0.002**	**0.000**	0.098	0.166	0.165
Housing starts	**0.002**	0.151	0.100	**0.018**	**0.022**	0.087	**0.003**	**0.013**	0.094
Personal income per capita	0.506	0.351	0.874	0.638	0.593	0.919	**0.010**	**0.004**	**0.026**
Personal income	0.378	0.502	0.720	0.963	0.965	0.580	**0.012**	**0.007**	**0.018**
Consumption	0.516	0.084	0.195	0.127	0.135	0.236	0.087	0.079	0.931
Durable goods orders	**0.027**	**0.002**	0.165	**0.008**	**0.013**	0.089	**0.018**	**0.016**	0.936

B: Monthly growth rates

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.008**	**0.031**	0.697	0.074	0.089	0.165	0.051	0.061	**0.014**
Capacity utilization	**0.019**	**0.037**	0.632	0.123	0.114	0.085	0.058	0.052	**0.008**
Employment	**0.003**	0.095	0.693	**0.015**	0.797	0.881	0.087	0.077	0.104
Unemployment rate	**0.002**	**0.002**	**0.001**	**0.000**	**0.000**	**0.000**	**0.018**	**0.039**	**0.037**
Housing starts	**0.002**	**0.023**	0.052	**0.008**	**0.015**	0.067	**0.005**	**0.028**	0.521
Personal income per capita	0.245	0.412	0.372	0.353	0.506	0.765	**0.006**	**0.002**	**0.017**
Personal income	0.548	0.622	0.583	0.351	0.822	0.818	**0.005**	**0.002**	**0.014**
Consumption	0.629	0.484	0.547	0.194	**0.033**	0.189	**0.011**	**0.009**	0.535
Durable goods orders	0.088	**0.015**	0.091	**0.042**	**0.027**	0.060	**0.028**	**0.021**	0.727

C: Annual growth rates

Forecasted variable	Fed funds rate	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.005**	**0.008**	**0.013**	**0.010**	**0.033**	0.829	**0.000**	**0.011**	**0.000**
Capacity utilization	**0.001**	**0.002**	**0.016**	**0.005**	**0.027**	0.591	**0.000**	**0.008**	**0.000**
Employment	**0.043**	0.134	**0.040**	**0.011**	**0.004**	**0.012**	0.059	**0.046**	**0.013**
Unemployment rate	**0.000**	**0.001**	**0.000**	**0.001**	**0.000**	**0.000**	**0.035**	**0.042**	**0.016**
Housing starts	**0.000**	**0.001**	0.122	0.066	0.069	0.090	**0.004**	**0.007**	**0.048**
Personal income per capita	**0.003**	0.133	0.904	0.322	0.374	0.722	**0.001**	**0.000**	**0.004**
Personal income	**0.004**	0.127	0.772	0.333	0.250	0.706	**0.001**	**0.000**	**0.004**
Consumption	0.303	0.124	0.475	0.246	0.125	**0.039**	0.098	**0.038**	**0.019**
Durable goods orders	0.131	**0.215**	0.294	0.267	0.135	0.141	0.085	0.221	0.450

Notes: Numbers are marginal significance levels. Bold numbers indicate significance at the 5% level.

Table 9. Granger causality test results with AIC optimal lags for restricted sample (1980:01-2018:03) and controlling for the interest rate

A: Logged levels

Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	0.103	0.439	0.183	0.745	0.519	0.677	0.769	0.101
Capacity utilization	0.098	0.149	0.215	0.110	0.065	0.091	0.097	**0.029**
Employment	0.054	0.342	**0.013**	0.244	0.197	**0.016**	**0.015**	**0.045**
Unemployment rate	0.182	**0.002**	**0.002**	**0.003**	**0.001**	0.123	0.201	0.137
Housing starts	0.131	0.089	**0.001**	**0.001**	**0.005**	**0.001**	**0.001**	0.057
Personal income per capita	0.162	0.434	0.244	0.194	0.446	**0.010**	**0.005**	**0.042**
Personal income	0.232	0.776	0.427	0.392	0.938	**0.016**	**0.010**	**0.023**
Consumption	0.103	0.235	0.131	0.133	0.291	**0.000**	**0.000**	0.844
Durable goods orders	**0.005**	**0.018**	**0.003**	**0.001**	**0.006**	**0.001**	**0.002**	0.806

B: Monthly growth rates

Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.022**	0.926	0.065	**0.048**	0.500	0.052	0.059	**0.039**
Capacity utilization	**0.023**	0.735	**0.012**	0.145	0.192	0.734	0.074	**0.021**
Employment	**0.036**	0.199	**0.011**	0.121	0.222	**0.014**	**0.011**	0.085
Unemployment rate	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.012**	**0.031**	**0.031**
Housing starts	**0.014**	0.052	**0.008**	**0.013**	0.097	**0.008**	0.055	0.568
Personal income per capita	0.429	0.422	0.391	0.614	0.996	**0.006**	**0.002**	**0.011**
Personal income	0.634	0.399	0.384	0.921	0.933	**0.006**	**0.002**	**0.010**
Consumption	0.494	0.584	0.212	**0.010**	0.114	**0.012**	**0.009**	0.528
Durable goods orders	**0.003**	**0.025**	**0.008**	**0.003**	**0.011**	**0.011**	**0.009**	0.613

C: Annual growth rates

Forecasted variable	Divisia M1	Divisia M2	Divisia M2M	Divisia MZM	Divisia ALL	Divisia M3	Divisia M4-	Divisia M4
Industrial production	**0.008**	**0.001**	**0.000**	**0.002**	**0.006**	**0.000**	**0.020**	**0.000**
Capacity utilization	**0.002**	**0.001**	**0.000**	**0.003**	**0.002**	**0.000**	**0.023**	**0.001**
Employment	**0.032**	**0.008**	**0.001**	**0.000**	**0.001**	**0.004**	**0.002**	**0.001**
Unemployment rate	**0.000**	**0.002**	**0.003**	**0.000**	**0.000**	**0.009**	**0.012**	**0.004**
Housing starts	**0.001**	**0.030**	**0.004**	**0.032**	**0.027**	**0.007**	**0.007**	0.120
Personal income per capita	0.205	0.534	0.913	0.283	0.107	**0.001**	**0.000**	**0.002**
Personal income	0.176	0.761	1.000	0.272	0.139	**0.001**	**0.000**	**0.002**
Consumption	0.495	0.771	0.310	0.157	**0.045**	0.110	**0.041**	**0.012**
Durable goods orders	0.065	0.123	0.094	0.098	0.100	**0.021**	0.116	0.623

Notes: Numbers are marginal significance levels. Bold numbers indicate significance at the 5% level.

Table 10. Parameter estimates of the SVAR-GARCH with money defined by Divisia M4

A. Conditional mean equation

$$
\mathbf{B} = \begin{bmatrix}
1.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 \\
-0.0311\ (0.825) & 1.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 \\
2.6093\ (0.000) & 0.4184\ (0.003) & 1.0000 & 0.5372\ (0.009) & 0.3516\ (0.111) & -2.7277\ (0.400) \\
0.0818\ (0.182) & 0.0728\ (0.000) & 0.0000 & 1.0000 & -0.0052\ (0.895) & 0.0000 \\
-1.0000 & 0.0487\ (0.095) & 0.000 & -0.0892\ (0.085) & 1.0000 & 2.6697\ (0.023) \\
-0.0001\ (0.974) & 0.0019\ (0.097) & 0.0000 & 0.0196\ (0.000) & 0.0001\ (0.974) & 1.0000
\end{bmatrix}
$$

B. Conditional variance equation

$$
\delta = \begin{bmatrix}
0.0163\ (0.000) \\
0.1844\ (0.002) \\
0.3489\ (0.172) \\
0.0083\ (0.000) \\
0.0177\ (0.019) \\
0.0001\ (0.003)
\end{bmatrix}
;\ \alpha = \begin{bmatrix}
0.1993\ (0.000) \\
0.0914\ (0.002) \\
0.0585\ (0.023) \\
0.2379\ (0.000) \\
0.1287\ (0.001) \\
0.2603\ (0.000)
\end{bmatrix}
;\ \beta = \begin{bmatrix}
0.3149\ (0.001) \\
0.3151\ (0.117) \\
0.8502\ (0.000) \\
0.7073\ (0.000) \\
0.7462\ (0.000) \\
0.5217\ (0.000)
\end{bmatrix}
$$

Note: Numbers in parentheses are p-values.

Table 11. Parameter estimates of the SVAR-GARCH with money defined by Divisia M2

A. Conditional mean equation

$$\mathbf{B} = \begin{bmatrix}
1.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 \\
-0.0561\ (0.678) & 1.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 \\
2.6271\ (0.000) & 0.3215\ (0.022) & 1.0000 & 0.5264\ (0.016) & 0.1021\ (0.704) & -0.6305\ (0.874) \\
0.0318\ (0.613) & 0.0648\ (0.001) & 0.0000 & 1.0000 & 0.0762\ (0.149) & 0.0000 \\
-1.0000 & 0.0407\ (0.149) & 0.0000 & -0.1540\ (0.004) & 1.00000 & 3.3881\ (0.002) \\
0.0029\ (0.395) & -0.0038\ (0.000) & 0.0000 & 0.0227\ (0.000) & -0.0029\ (0.395) & 1.0000
\end{bmatrix}$$

B. Conditional variance equation

$$\delta = \begin{bmatrix}
0.0107\ (0.001) \\
0.1860\ (0.000) \\
0.4695\ (0.125) \\
0.0081\ (0.000) \\
0.0645\ (0.003) \\
0.0001\ (0.001)
\end{bmatrix} ; \ \alpha = \begin{bmatrix}
0.1733\ (0.000) \\
0.1051\ (0.002) \\
0.0511\ (0.038) \\
0.2594\ (0.000) \\
0.1176\ (0.010) \\
0.273\ (0.000)
\end{bmatrix} ; \ \beta = \begin{bmatrix}
0.5235\ (0.000) \\
0.3024\ (0.001) \\
0.8279\ (0.000) \\
0.6976\ (0.000) \\
0.2270\ (0.332) \\
0.4220\ (0.000)
\end{bmatrix}$$

Note: Numbers in parentheses are p-values.

Figure 7. Impulse responses to shocks with money defined by Divisia M2
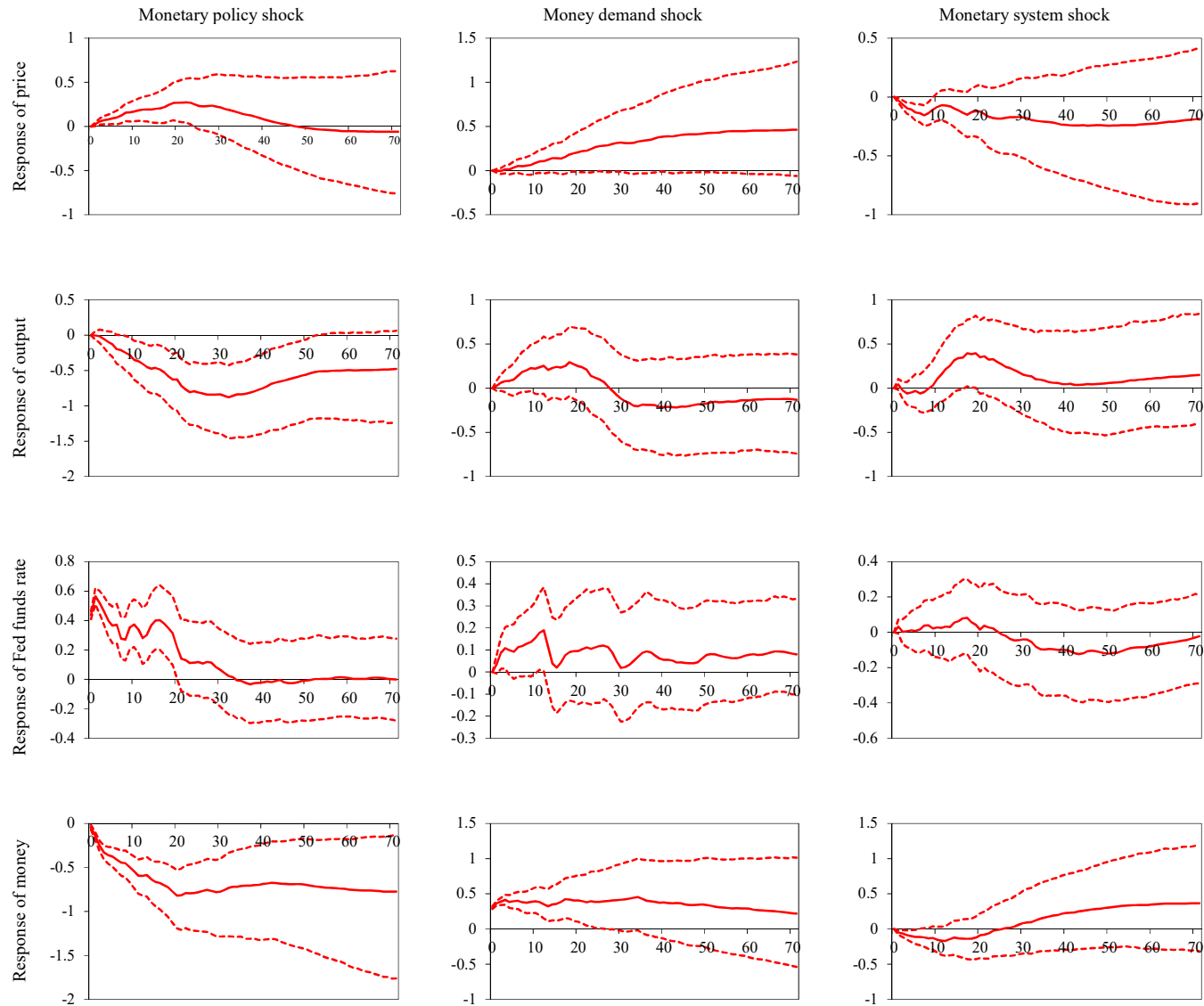
Notes: These are responses to a contractionary monetary policy shock, expansionary money demand shock, and contractionary monetary system shock. Dash lines are the 95% confidence interval.

Figure 8. Impulse responses to shocks with money defined by Divisia M4
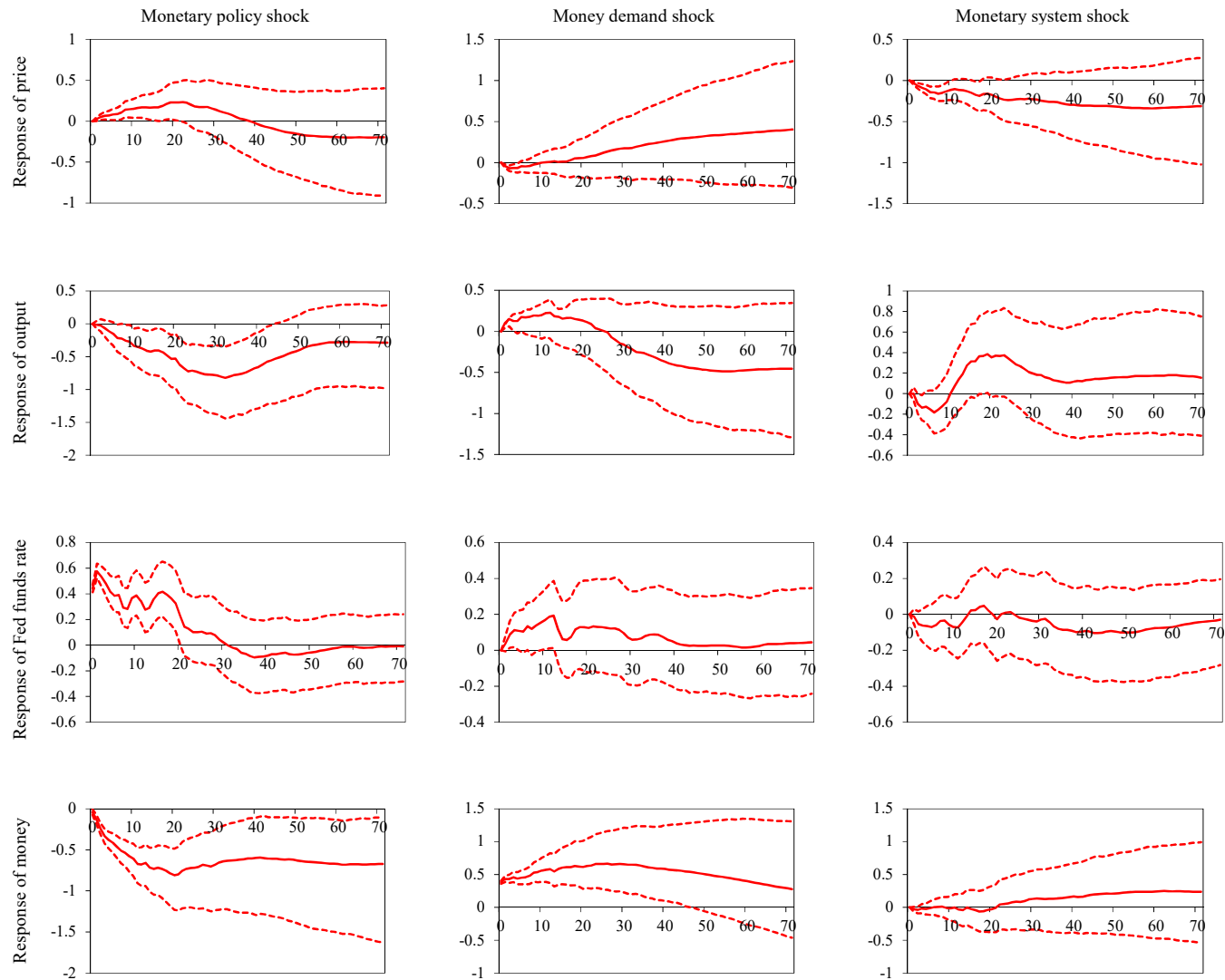
Notes: These are responses to a contractionary monetary policy shock, expansionary money demand shock, and contractionary monetary system shock. Dash lines are the 95% confidence interval.

Figure 9. Output responses to a monetary policy shock with Divisia M2 and M4

M4 95% CI

M4

M2 95% CI

M2
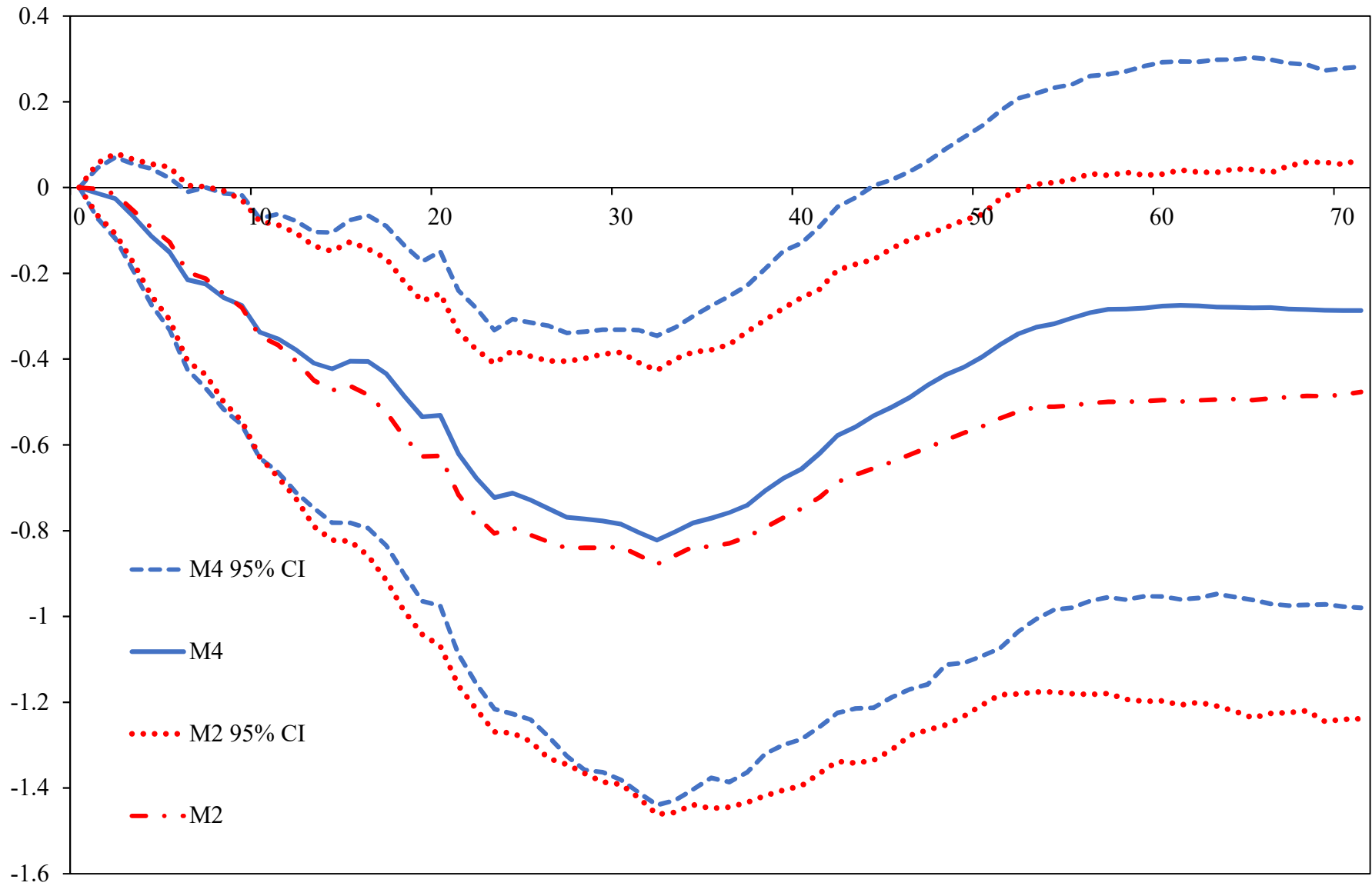
Figure 10. Price response to a monetary policy shock with Divisia M2 and M4

Figure 11. Output responses to a monetary policy shock under different definitions of Divisia money

Legend:
- M4
- M4-
- M3
- ALL
- MZM
- M2M
- M2
- M1
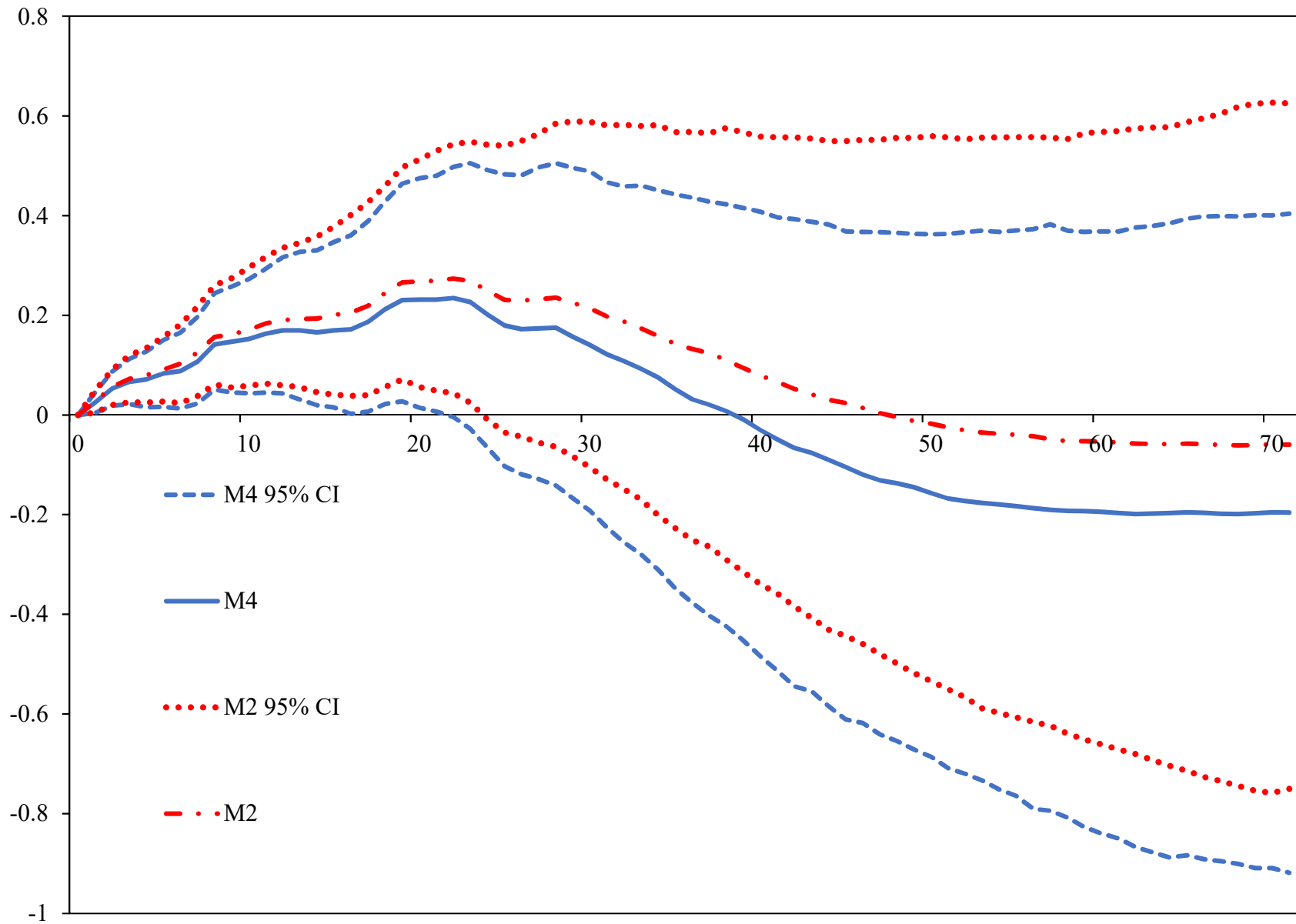
Figure 12. Price responses to a monetary policy shock under different definitions of Divisia money
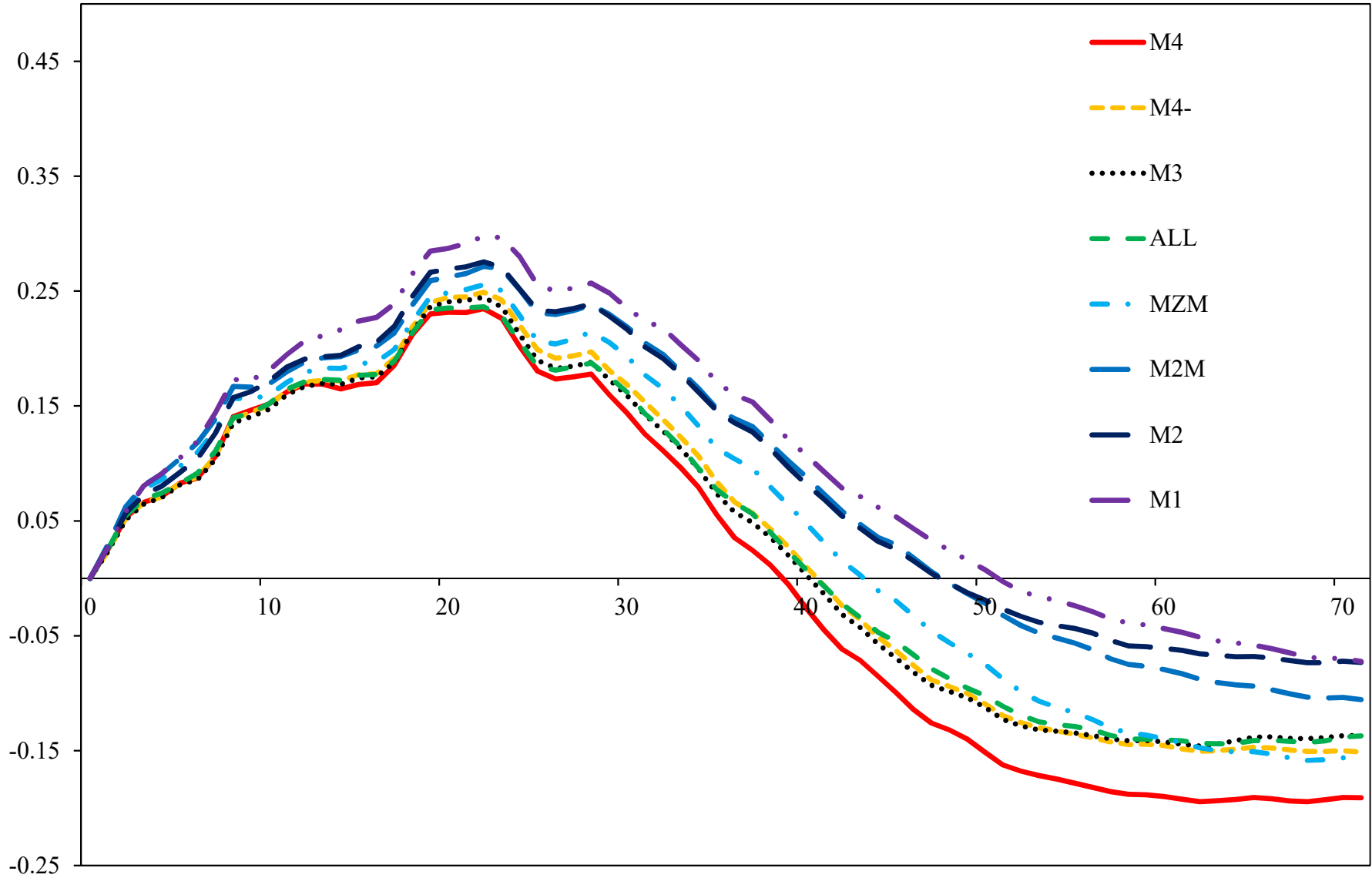
Figure 13. Output variance decompositions with Divisia M2
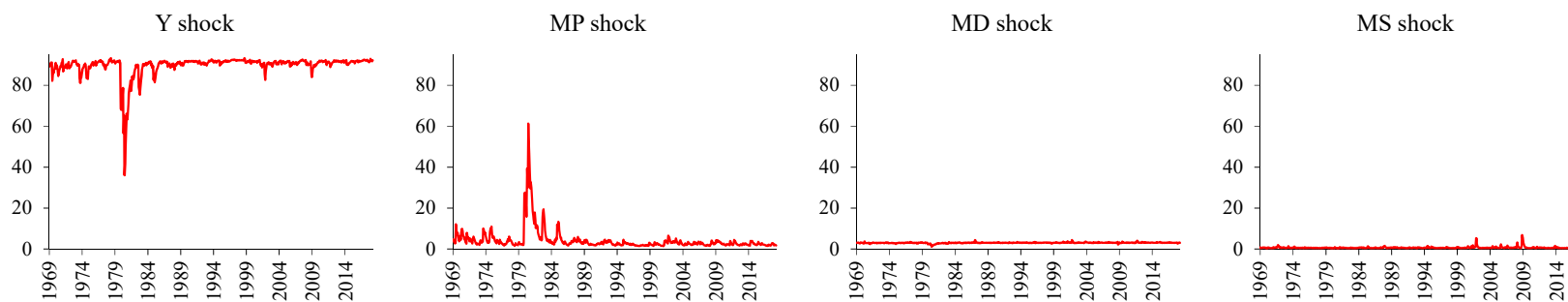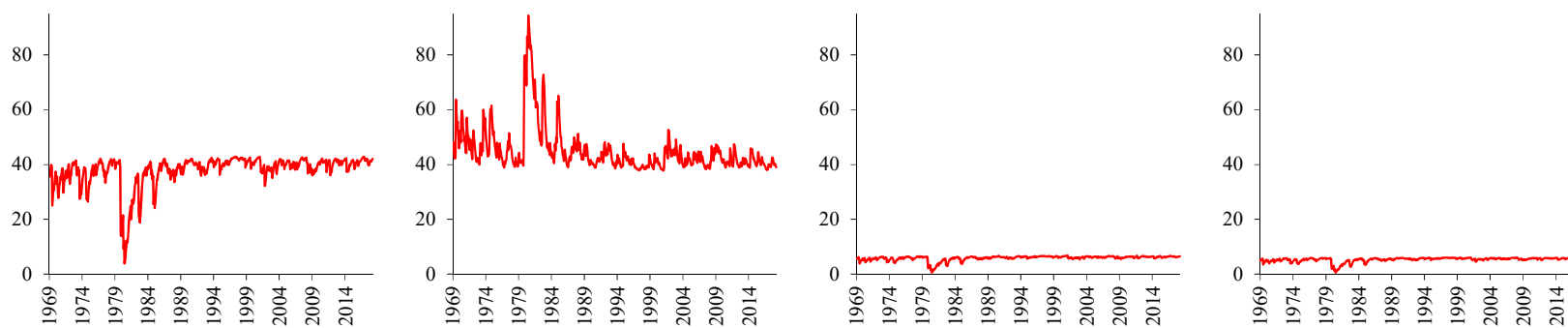
A. 12 steps
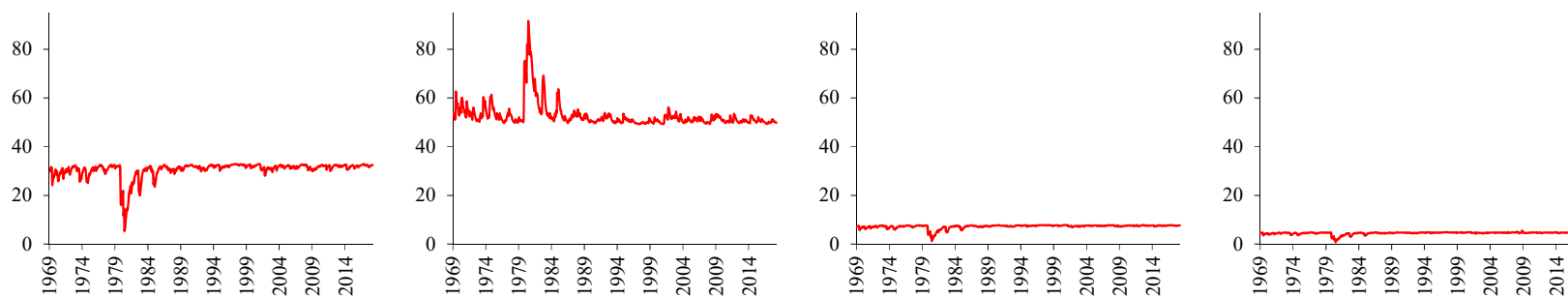
B. 48 steps

C. 72 steps

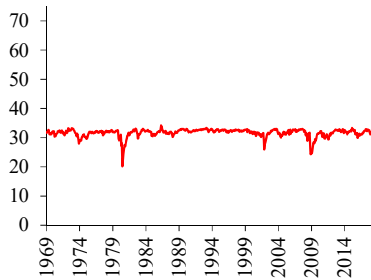# Figure 14. Output variance decompositions with Divisia M4
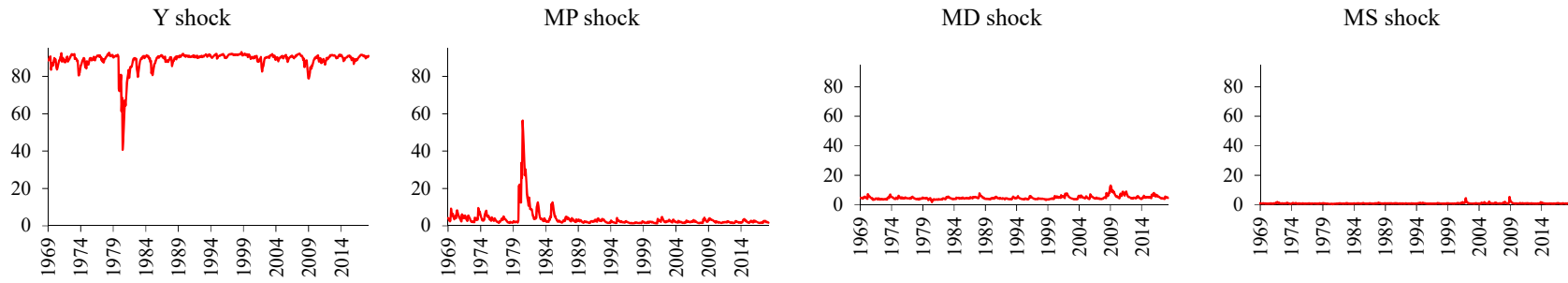
A. 12 steps

B. 48 steps
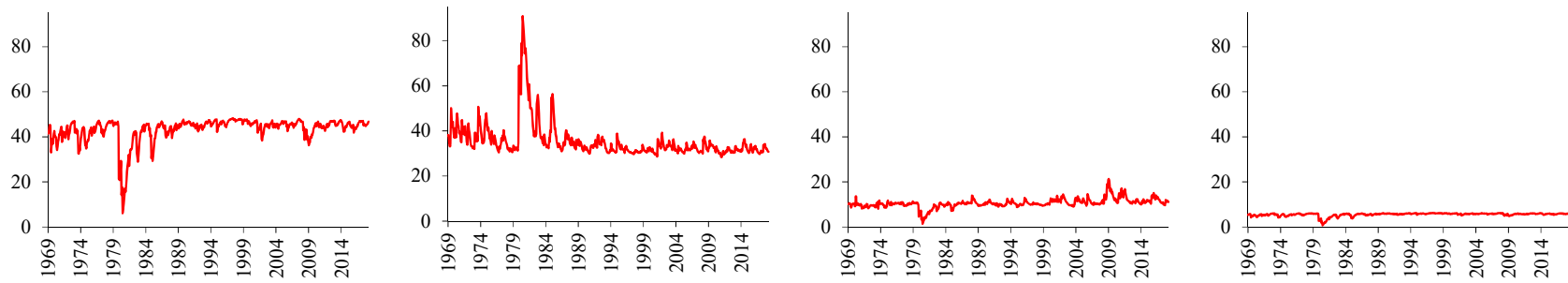
C. 72 steps
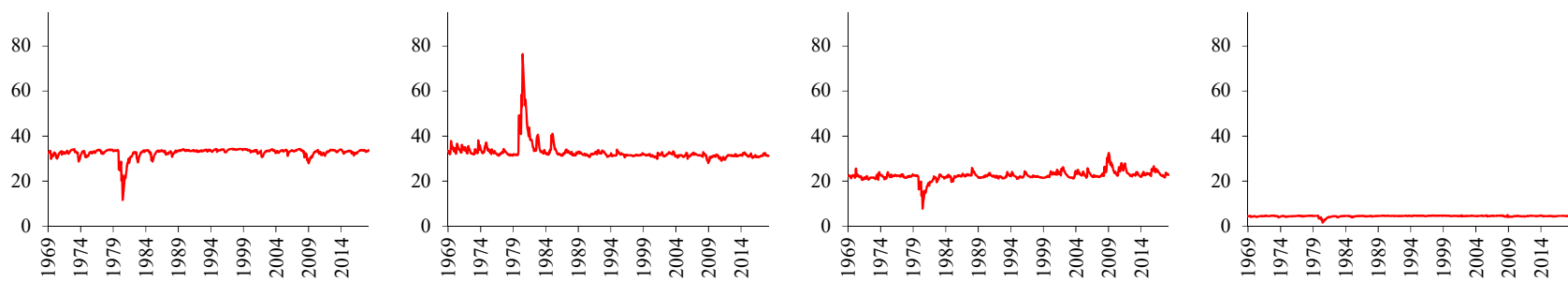
Figure 15. Proportion of ouput variance explained by MPS with broad Divisia money

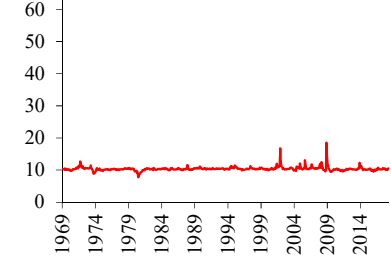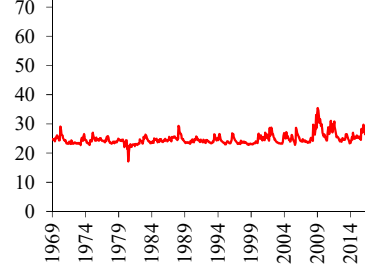### A. 12 steps

B. 48 steps

C. 72 steps
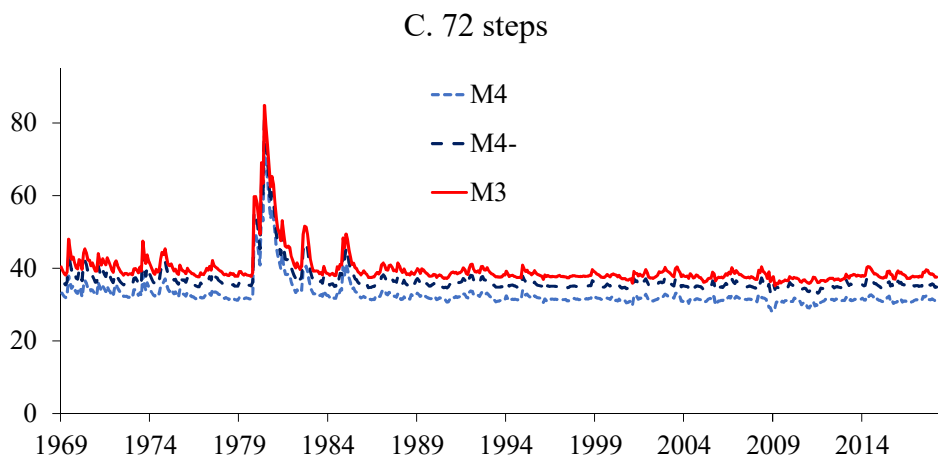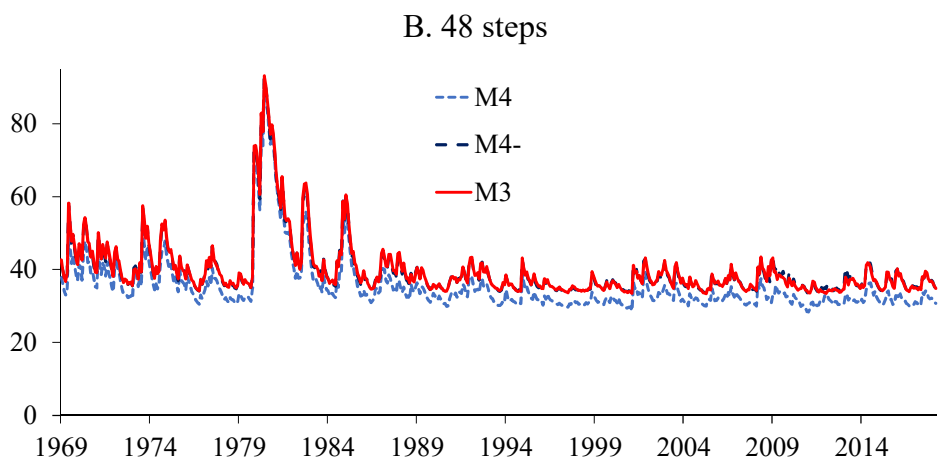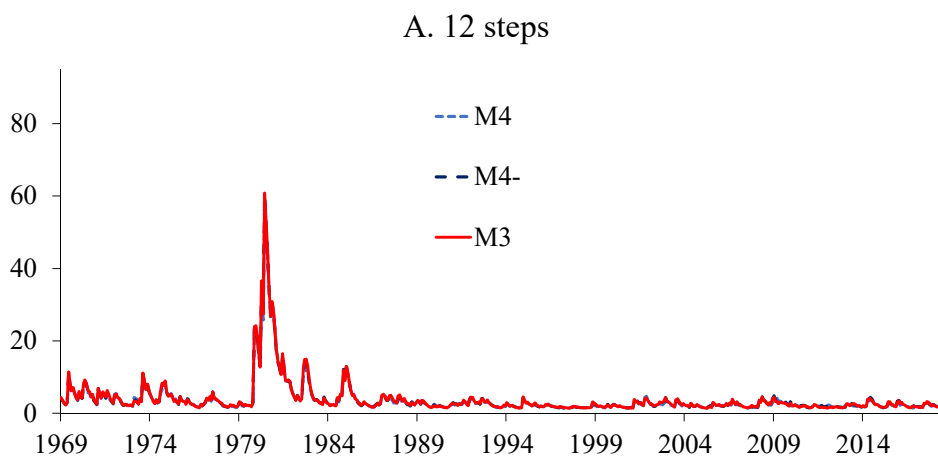
Figure 16. Proportion of ouput variance explained by MPS with narrow Divisia money

A. 12 steps

B. 48 steps

C. 72 steps
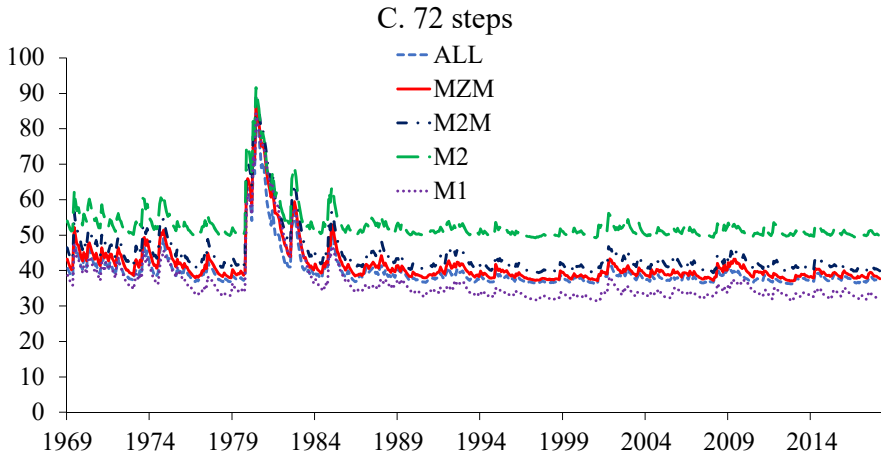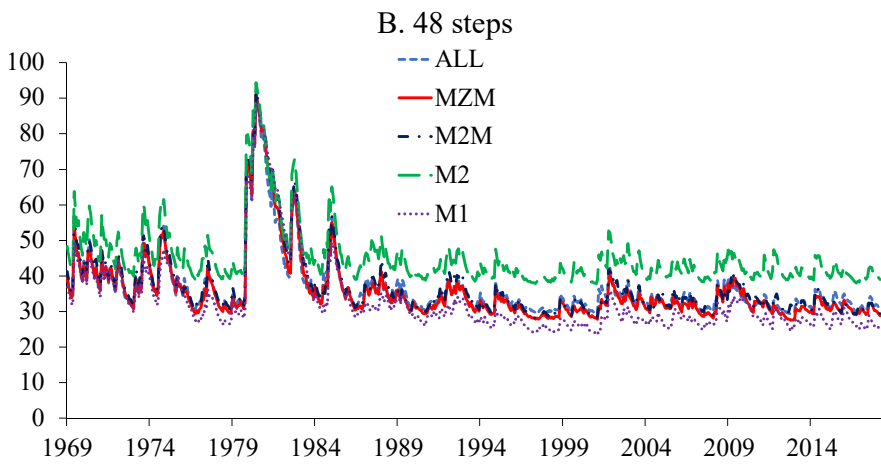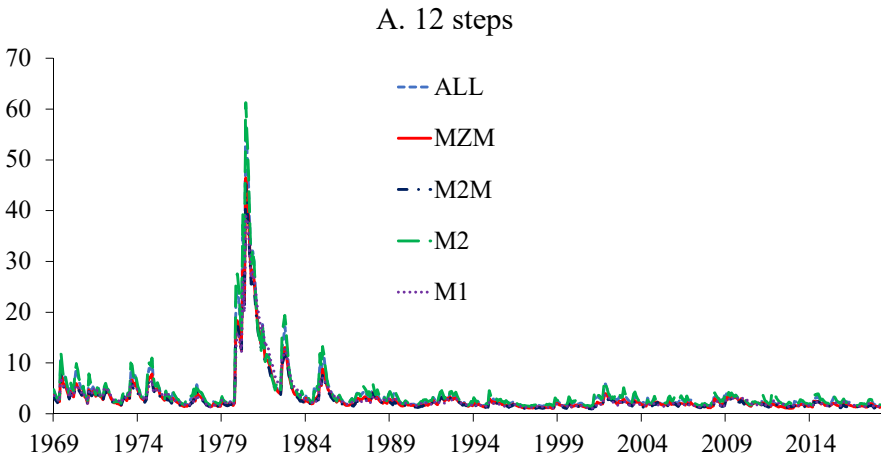
Figure 17. Comparison of proportion of ouput variance explained by MPS with narrow and broad Divisia money

A. 12 steps
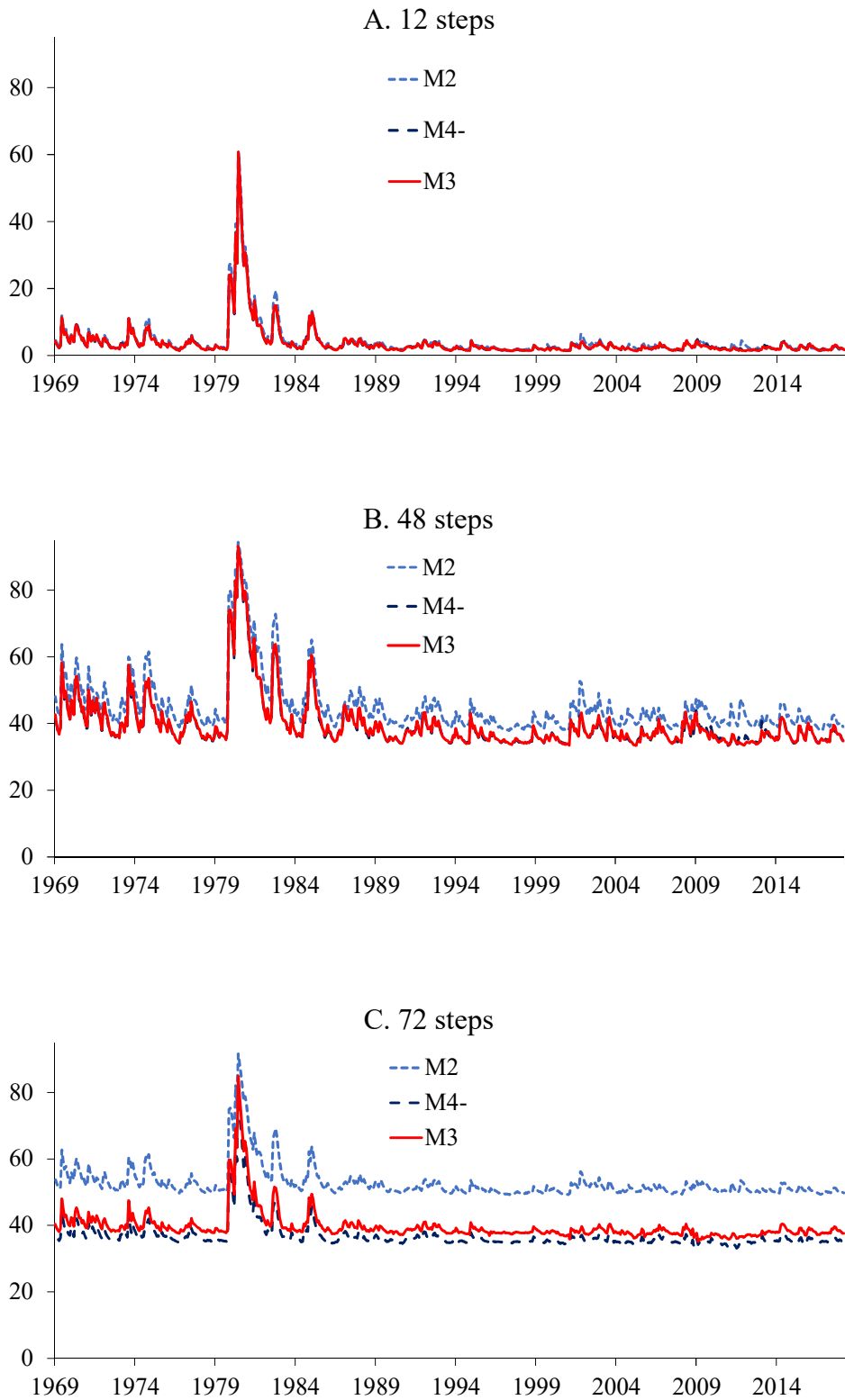
B. 48 steps

C. 72 steps

Figure 18. Comparison of proportion of ouput variance explained by MDS with narrow and broad Divisia money
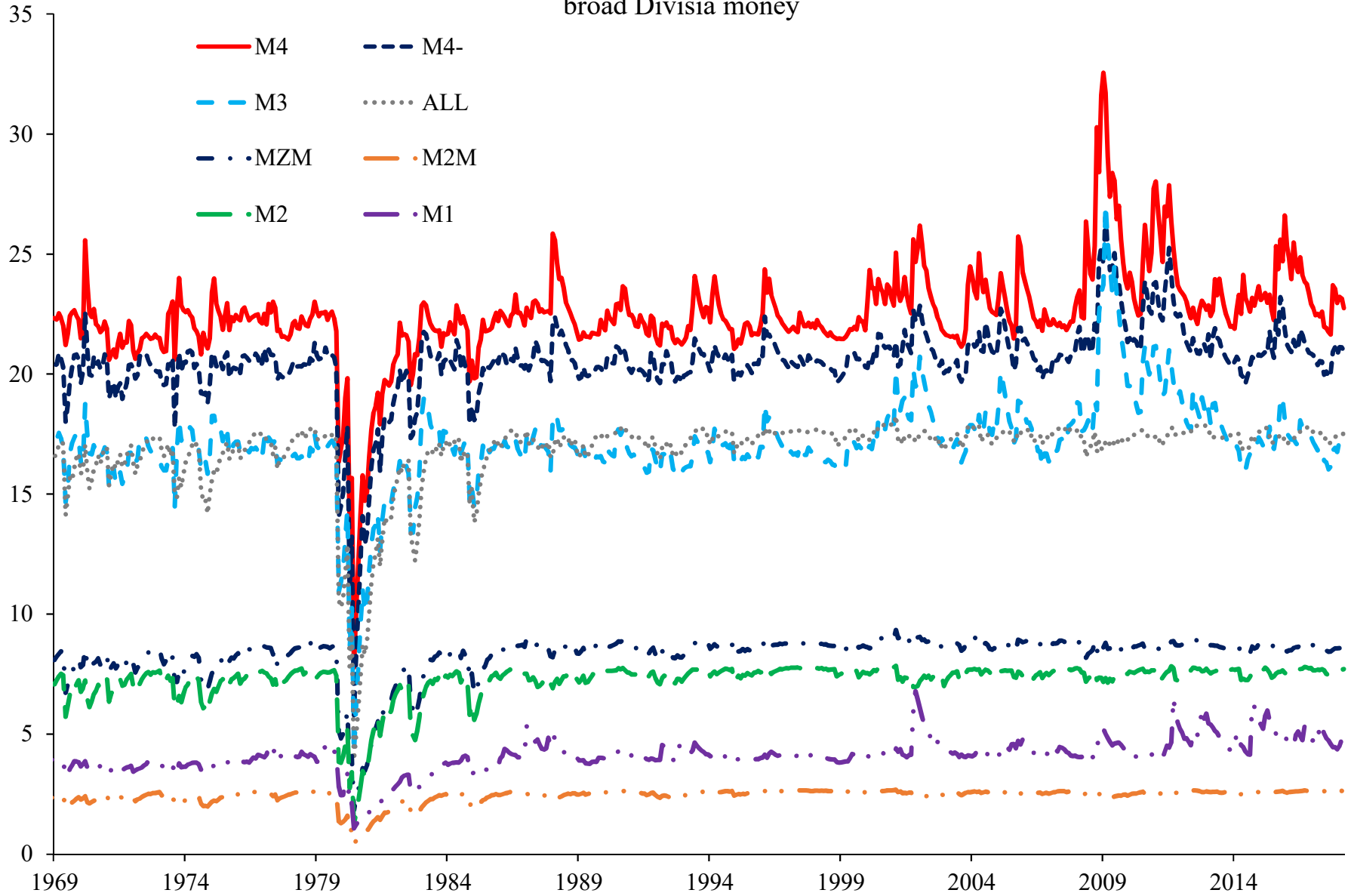
Figure 19. Price variance decompositions with Divisia M2
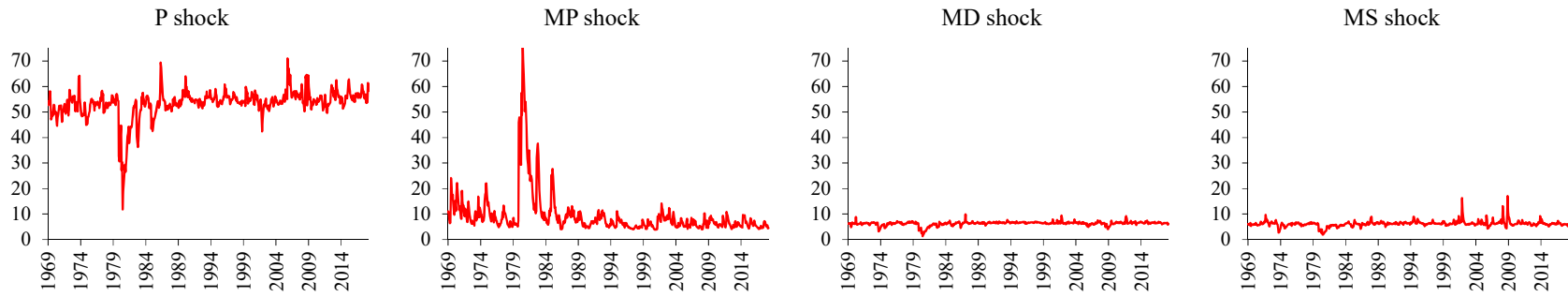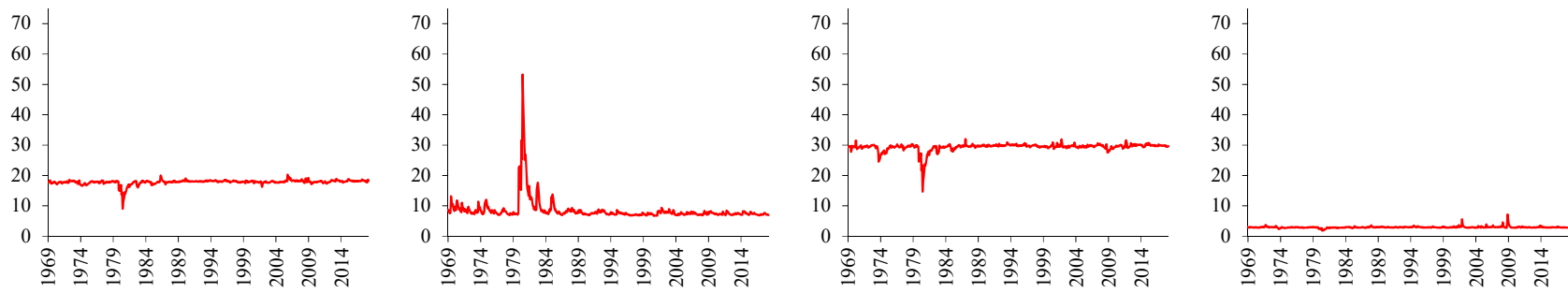
A. 12 steps
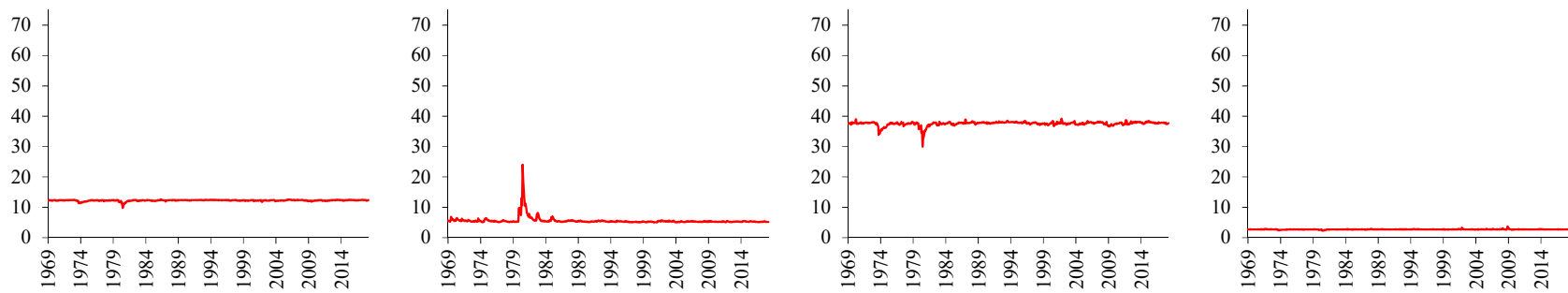
B. 48 steps

C. 72 steps

Figure 20. Price variance decompositions with Divisia M4

A. 12 steps

P shock

MP shock

MD shock

MS shock
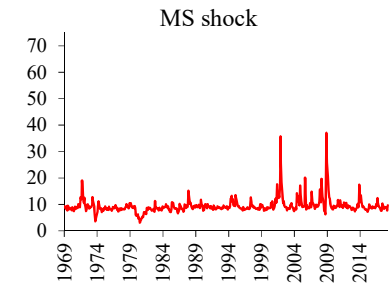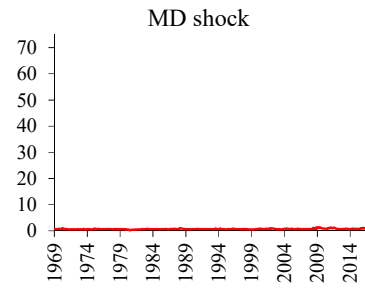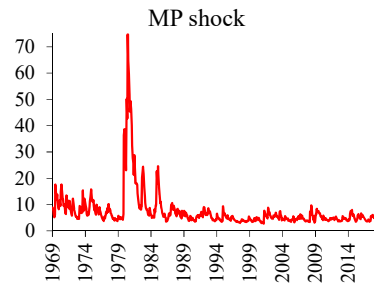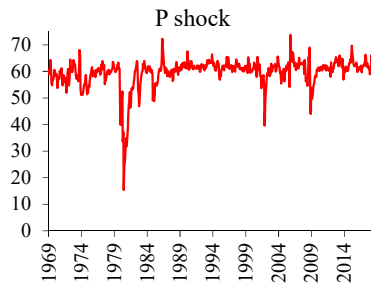
B. 48 steps

C. 72 steps

Figure 21. Proportion of price variance explained by MDS with narrow Divisia money
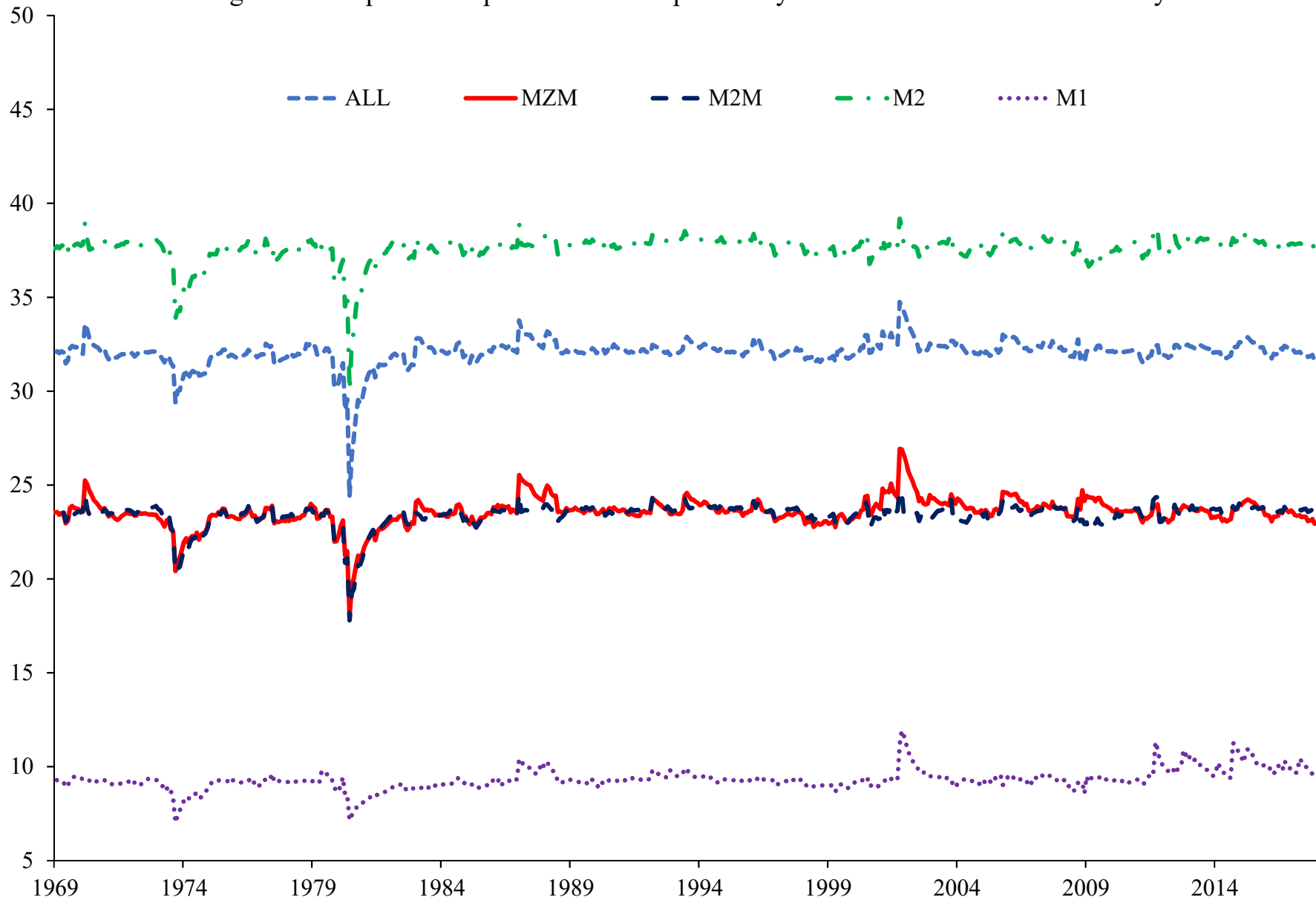
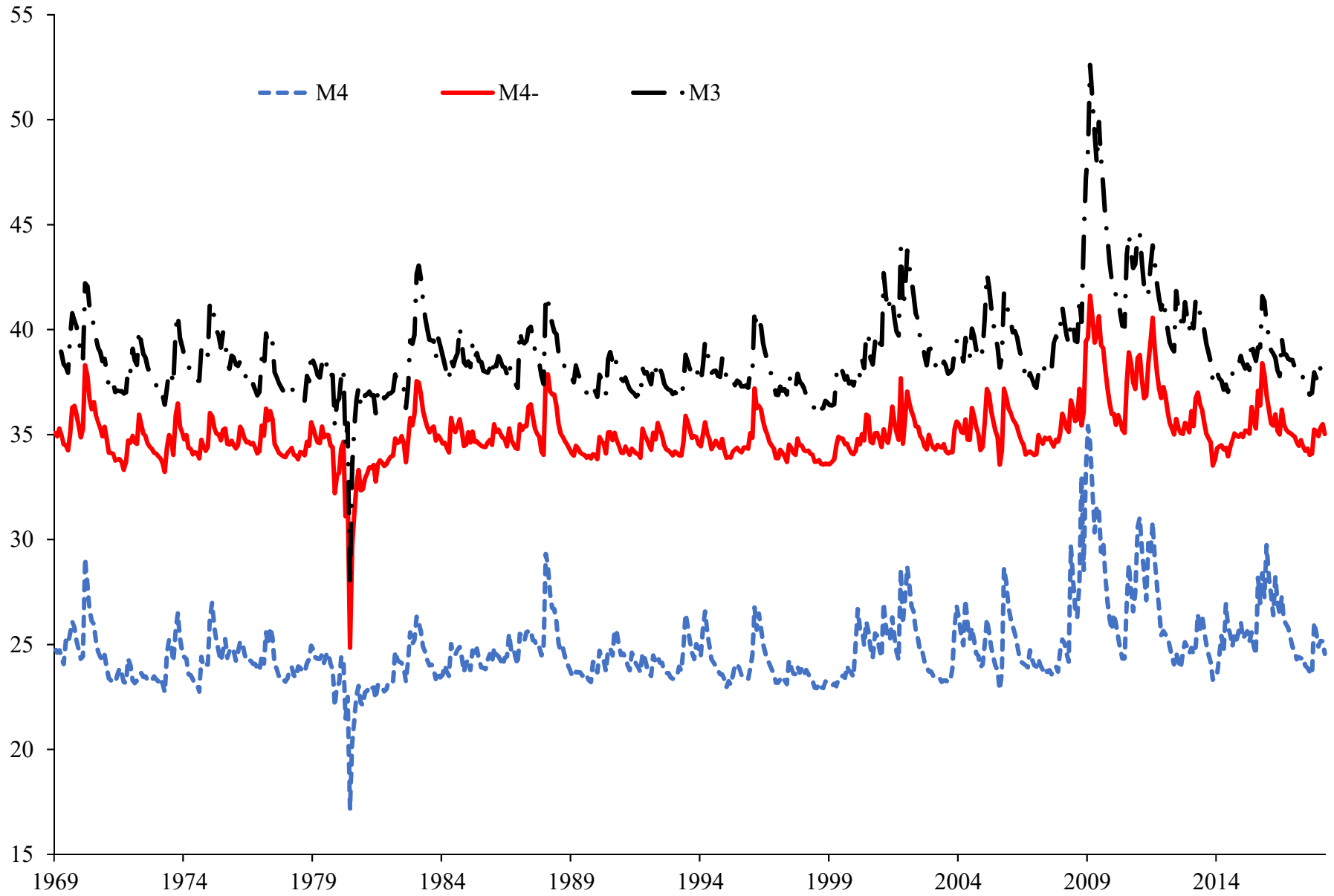Figure 22. Proportion of price variance explained by MDS with broad Divisia money

Figure 23. Comparison of proportion of price variance explained by MDS with narrow and broad Divisia money