GDP, investment and consumption (all experiments)
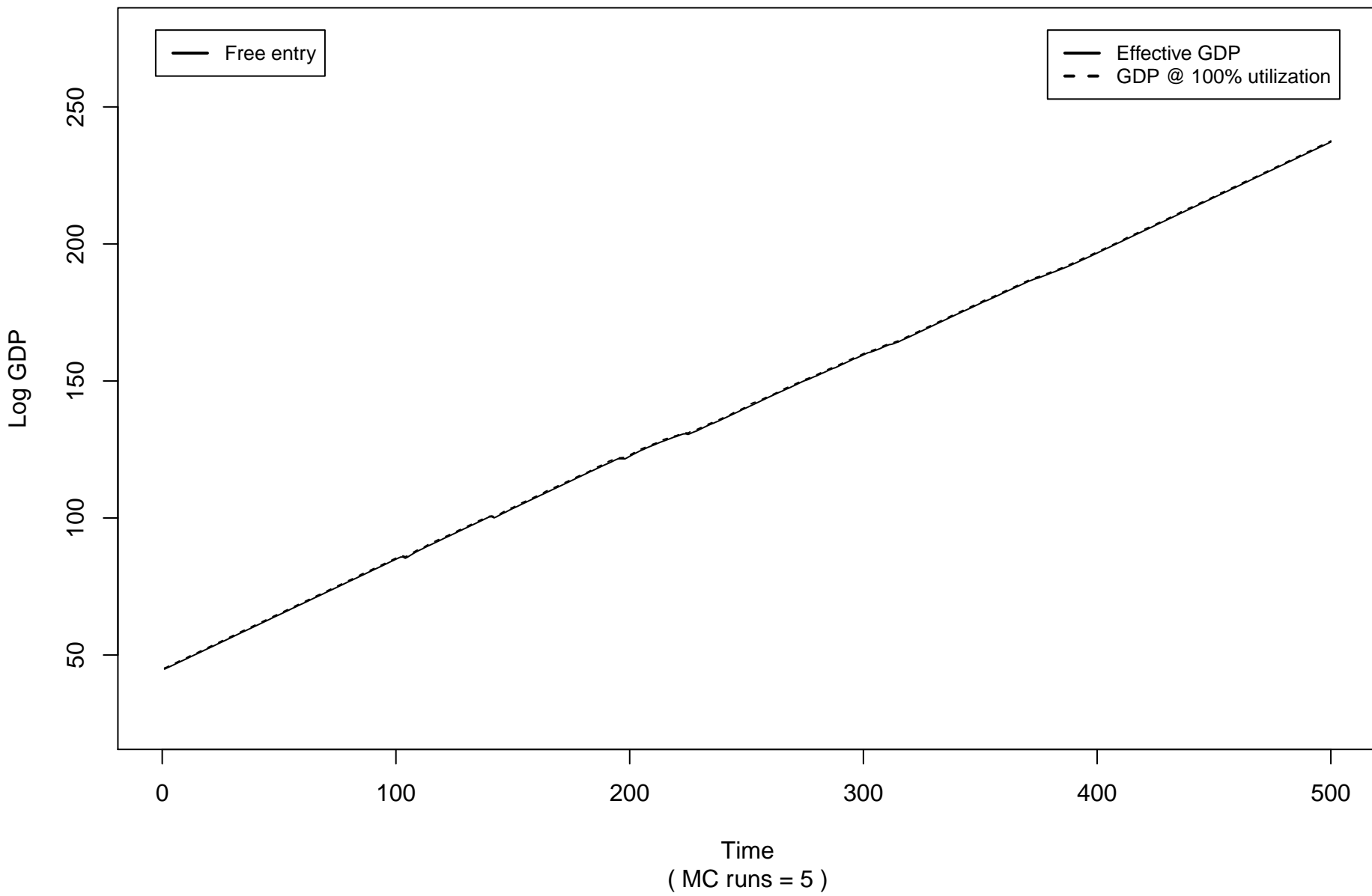

Free entry

GDP
Investment
Consumption

Logs
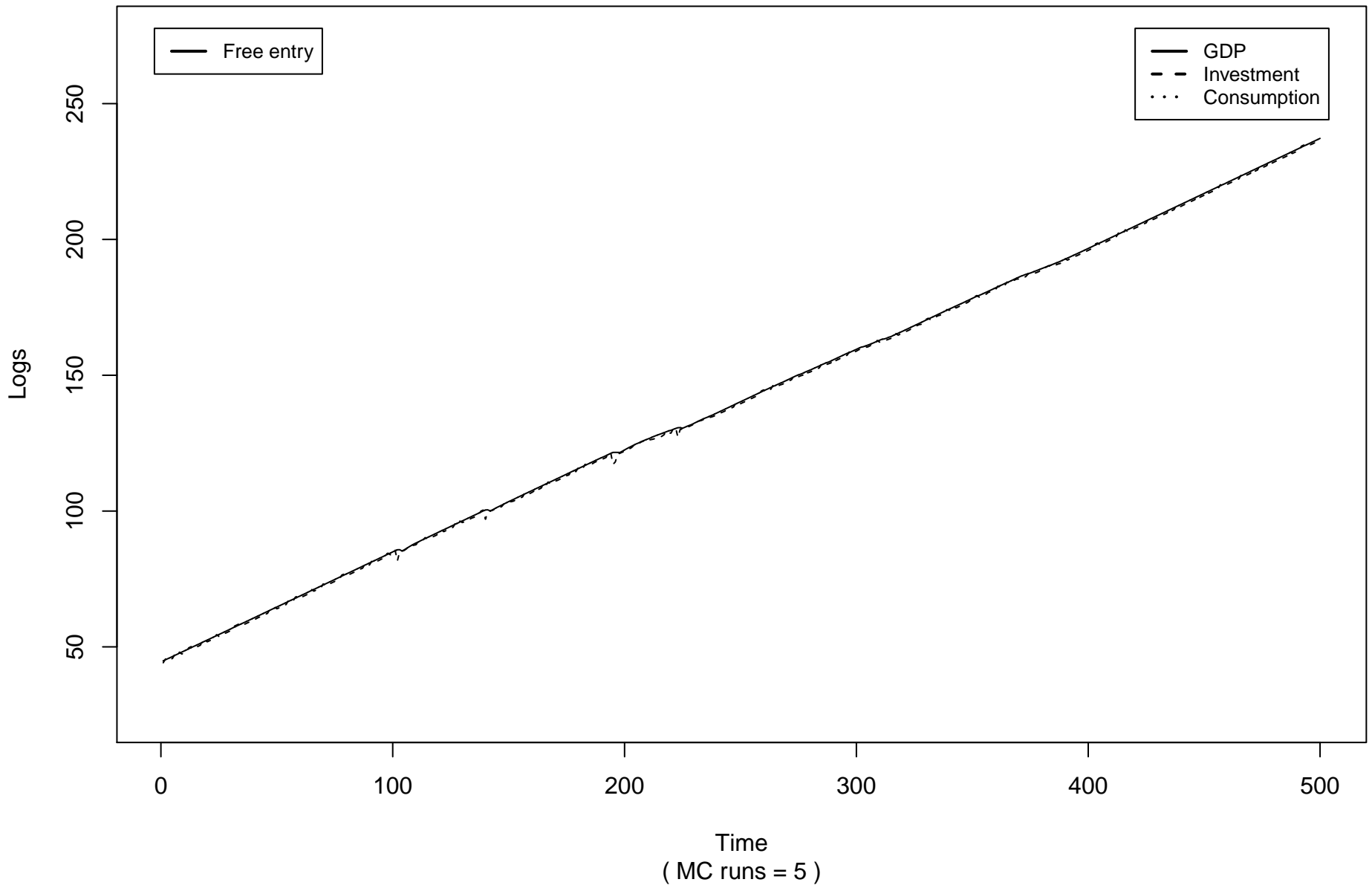
Time
(MC runs = 5)

GDP, investment and consumption (Free entry)
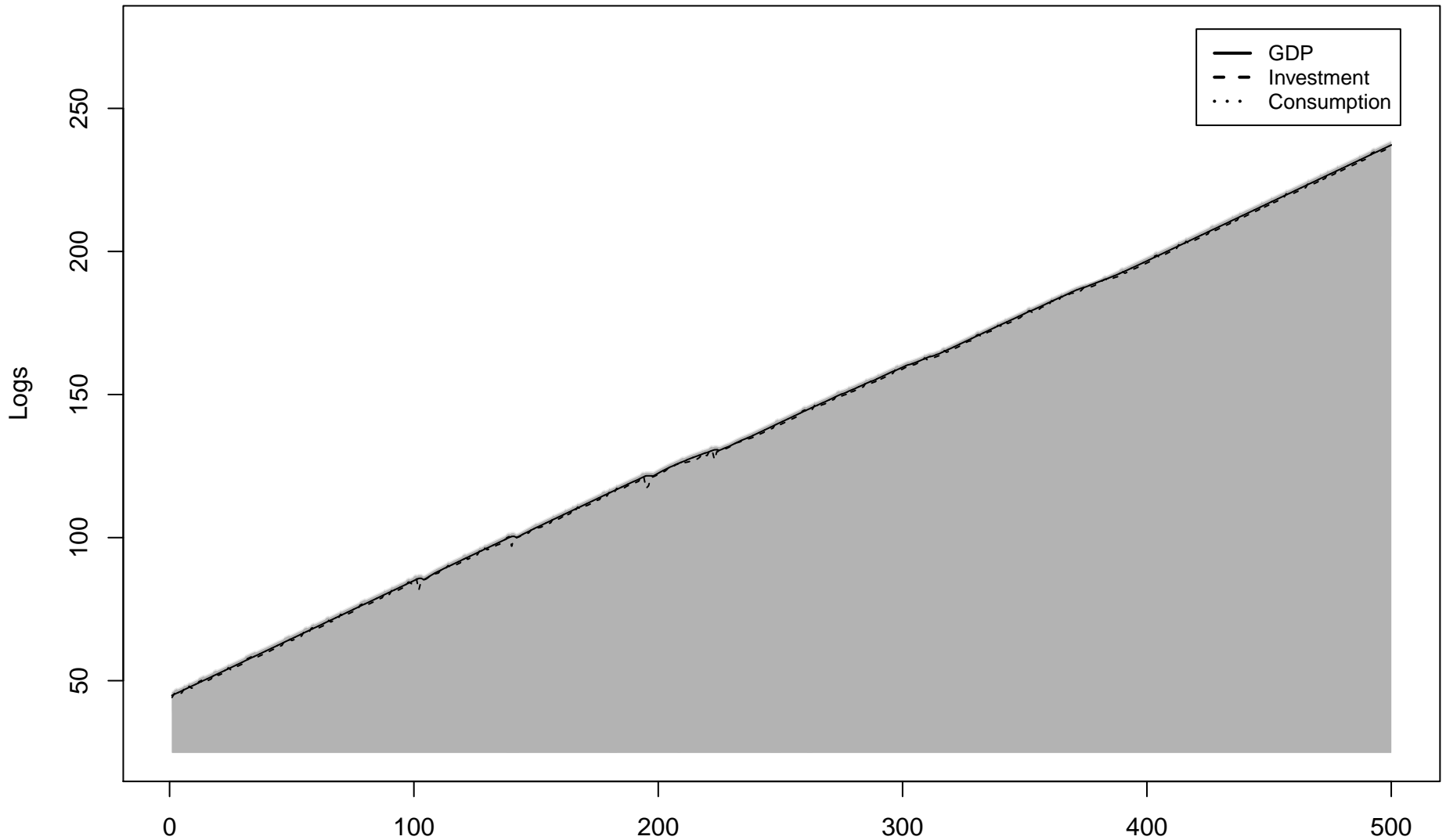
Logs

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 5)

——	GDP
– –	Investment
· · ·	Consumption
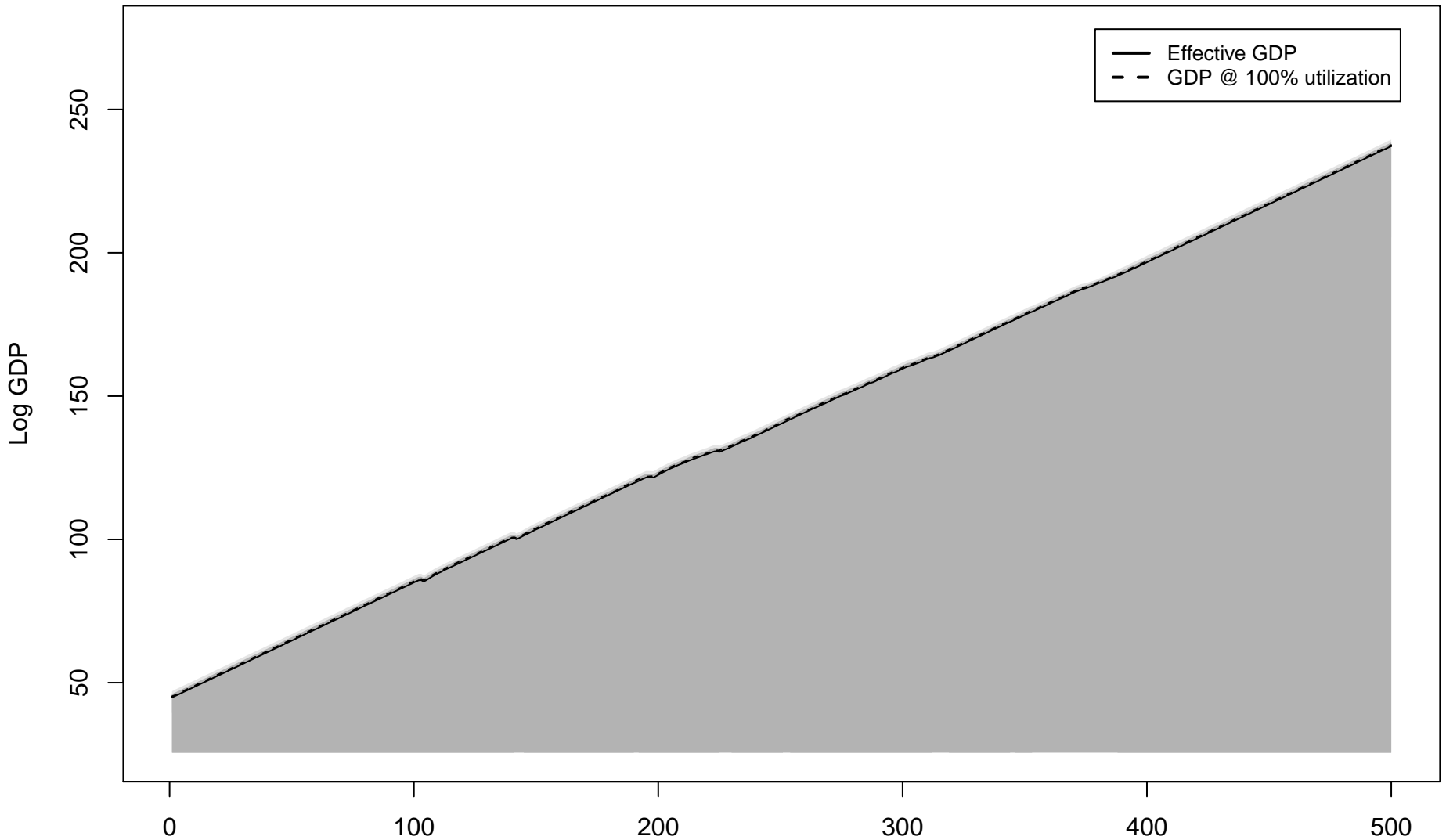
GDP (all experiments)

Free entry

Effective GDP
GDP @ 100% utilization

Log GDP

Time
(MC runs = 5)

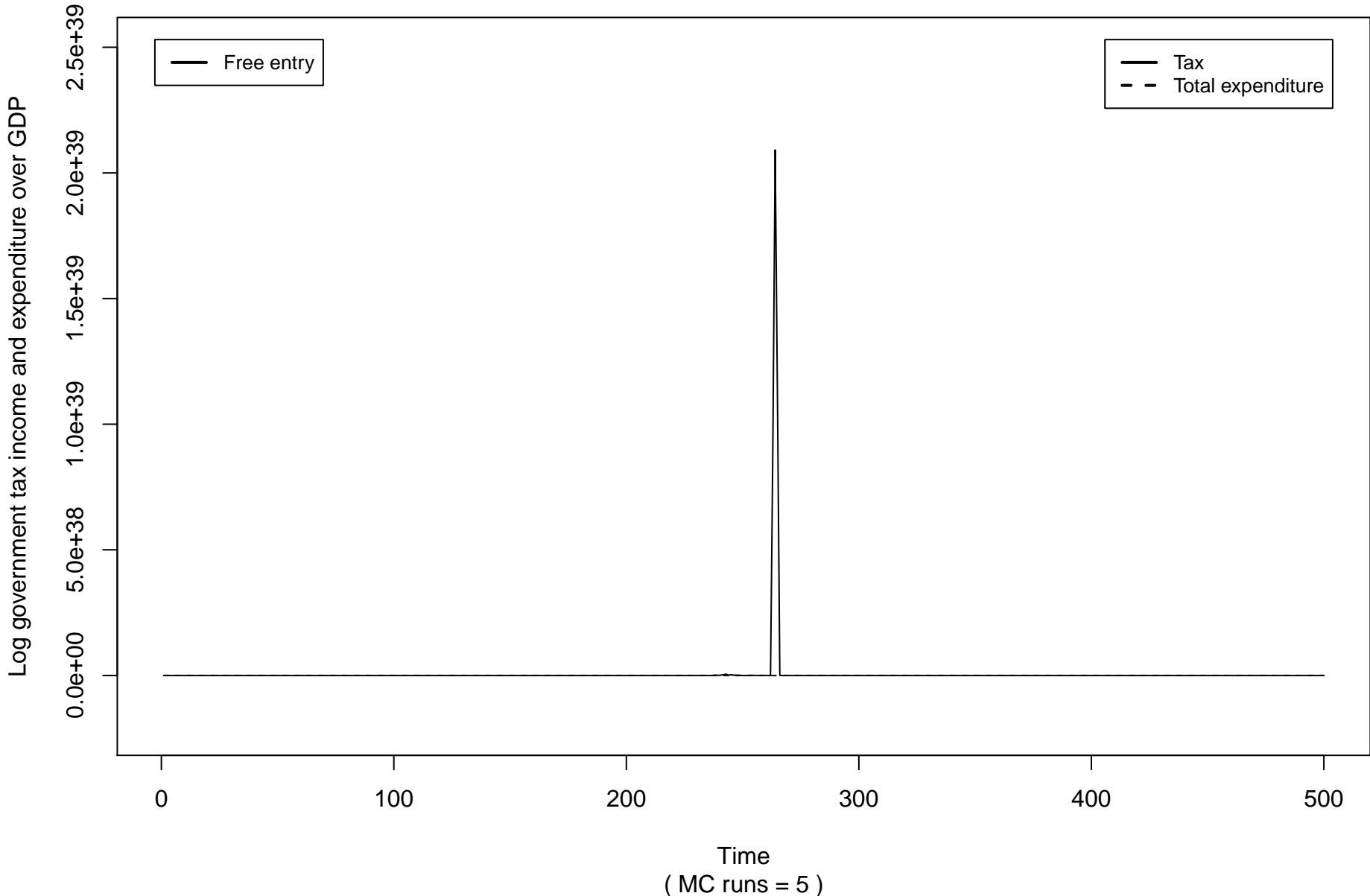# GDP (Free entry)


	Effective GDP
- -	GDP @ 100% utilization

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 5)

Government income and expenditure on GDP (all experiments)

Legend:
- Free entry
- Tax
- Total expenditure

Y-axis: Log government tax income and expenditure over GDP

X-axis: Time

(MC runs = 5)

Government income and expenditure on GDP (Free entry)

Log government tax income and expenditure over GDP

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 5)

Legend:
- —— Tax
- – – Total expenditure
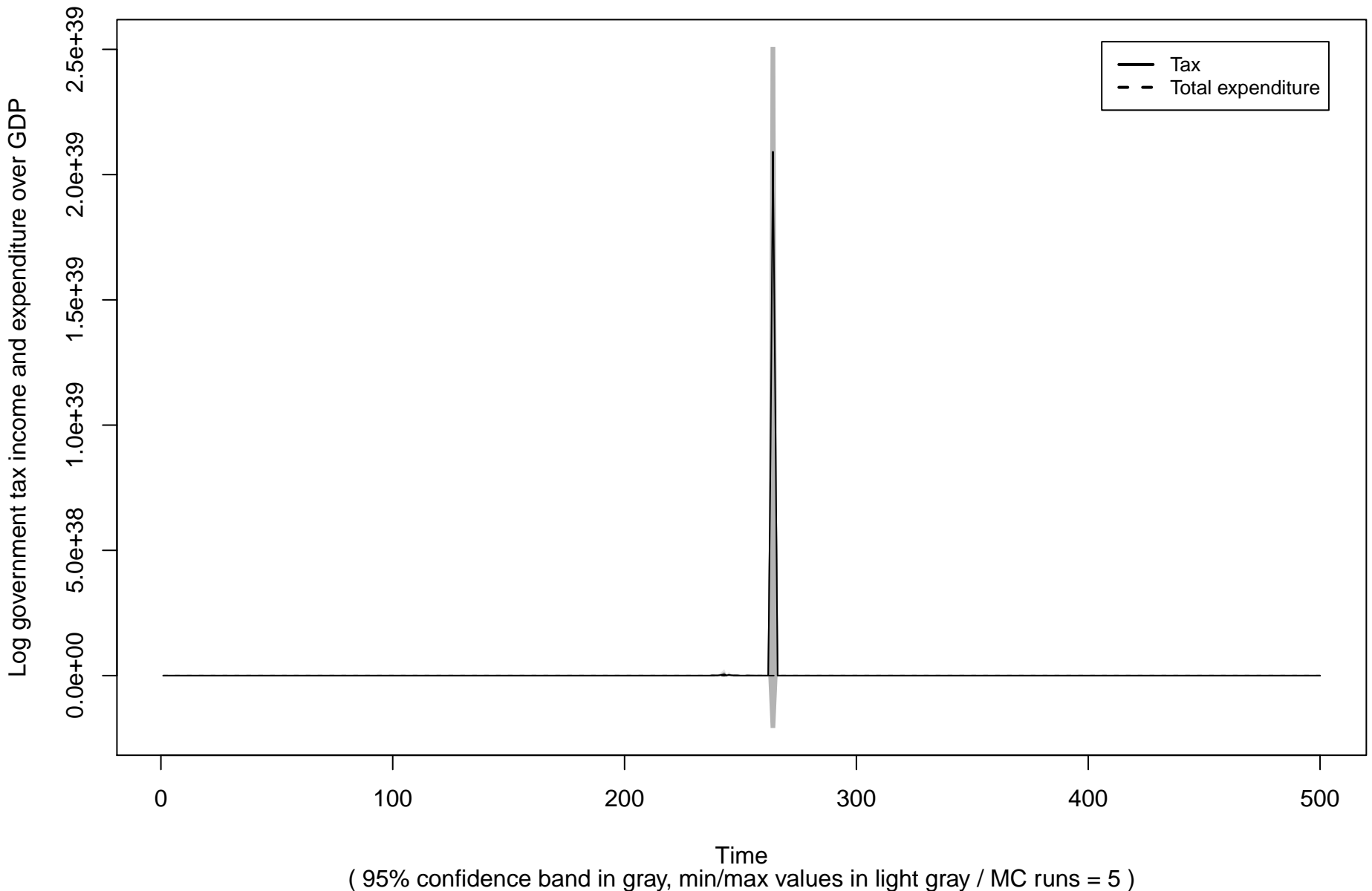
Government deficit on GDP (all experiments)

Government deficit over GDP

Time
(MC runs = 5)

Legend: —— Free entry

Government deficit on GDP (Free entry)

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 5)

Government debt on GDP (all experiments)

Government debt over GDP

Time
(MC runs = 5)
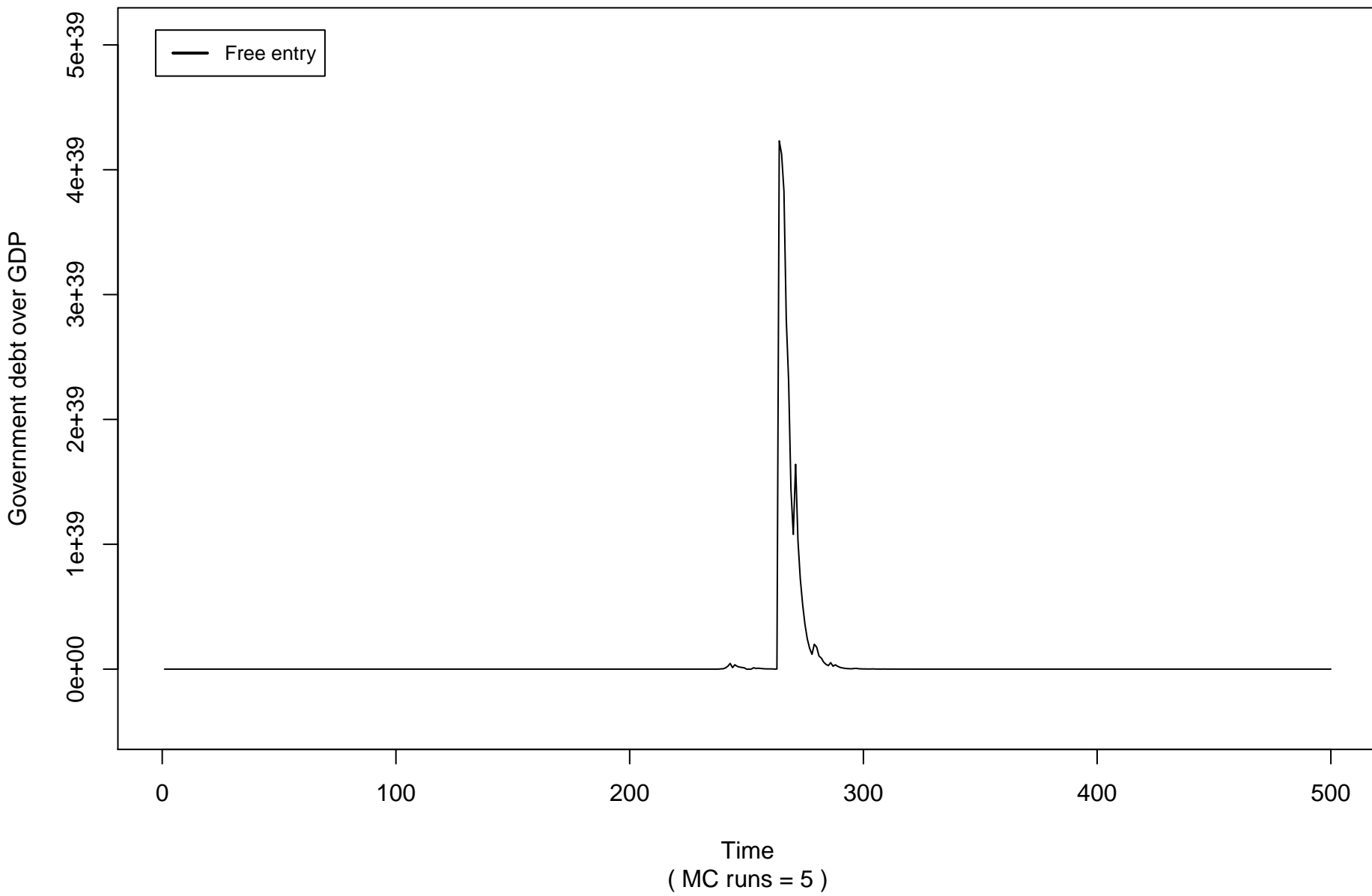
Free entry

Government debt on GDP (Free entry)

Time
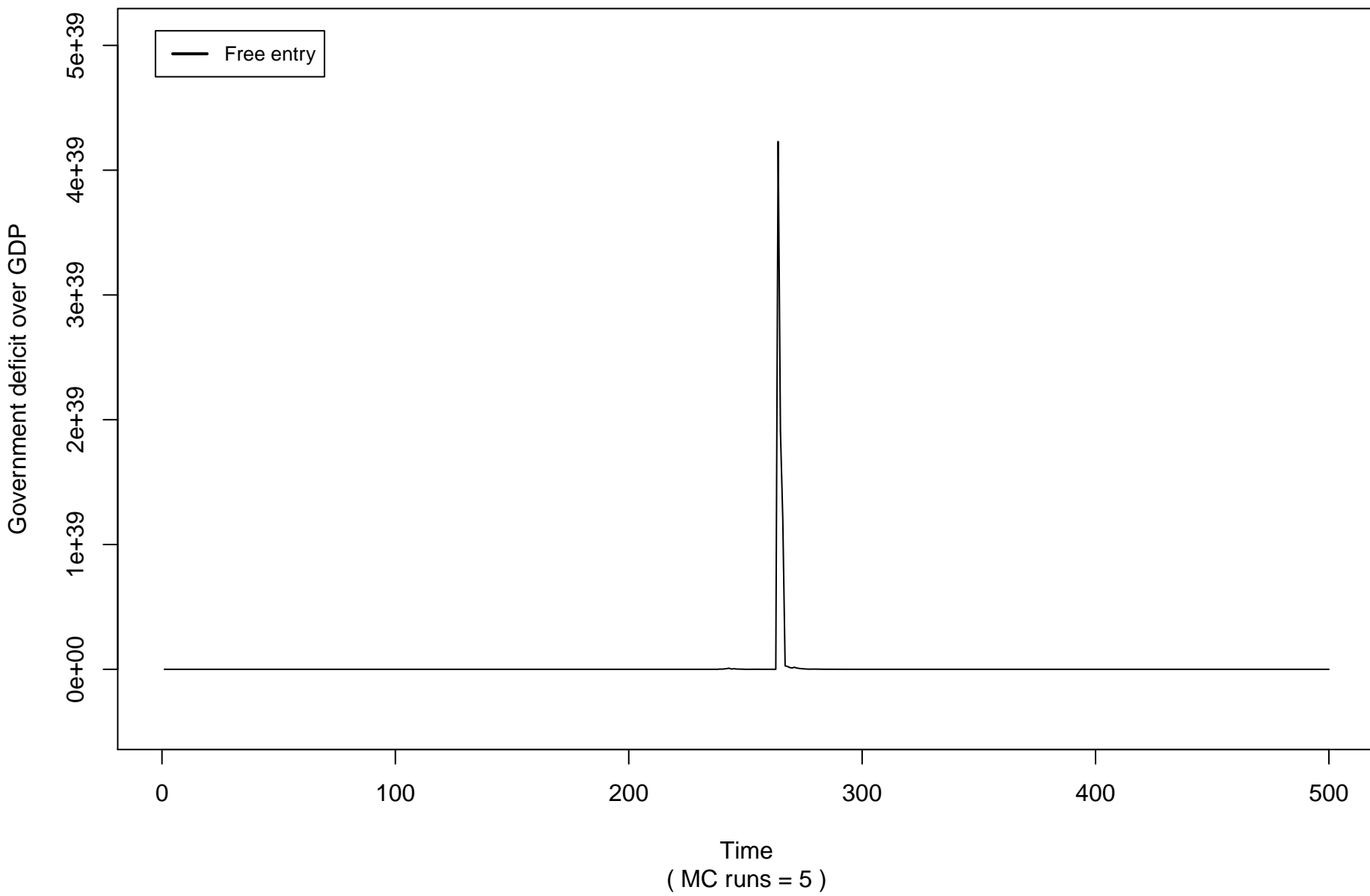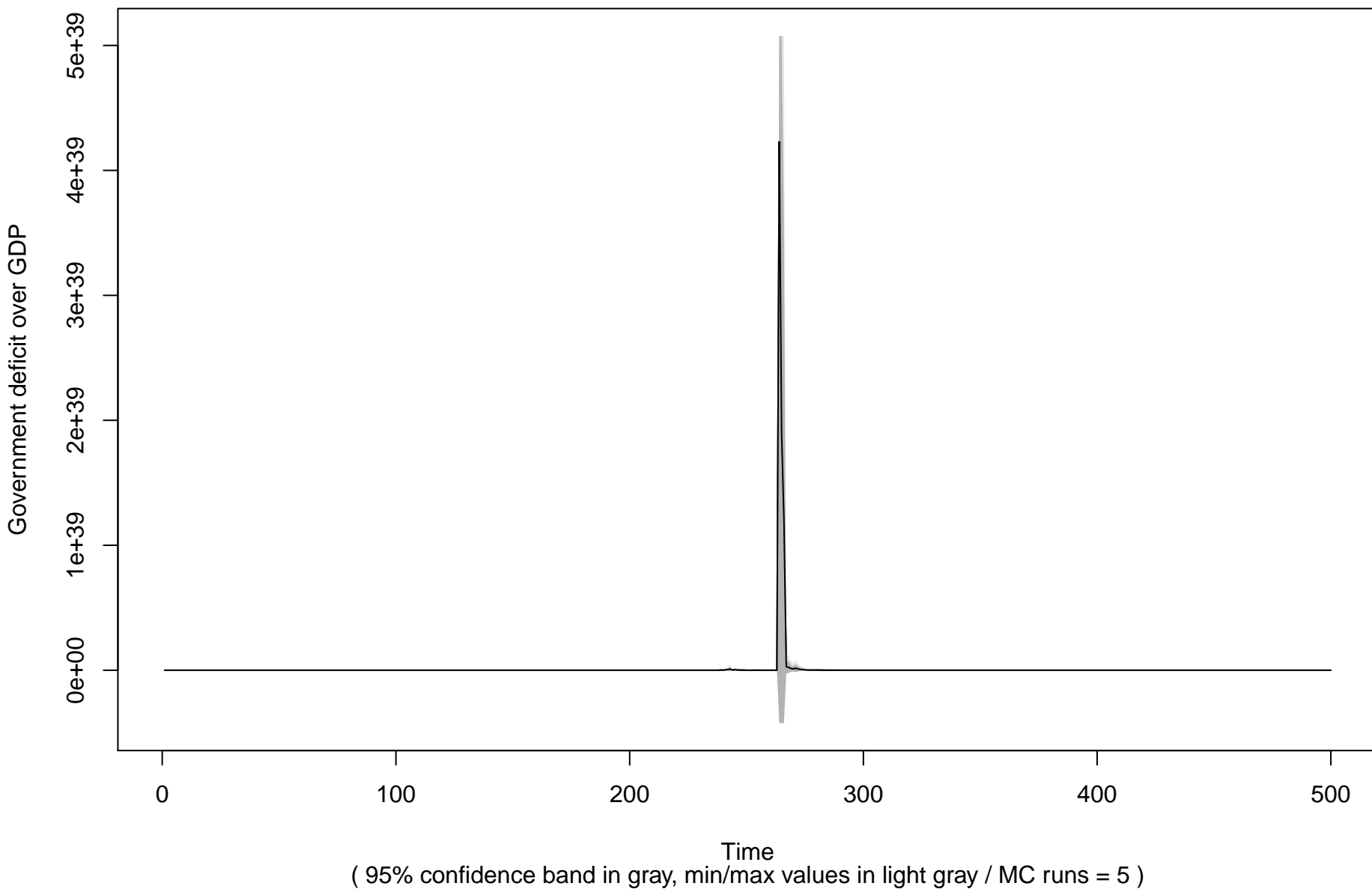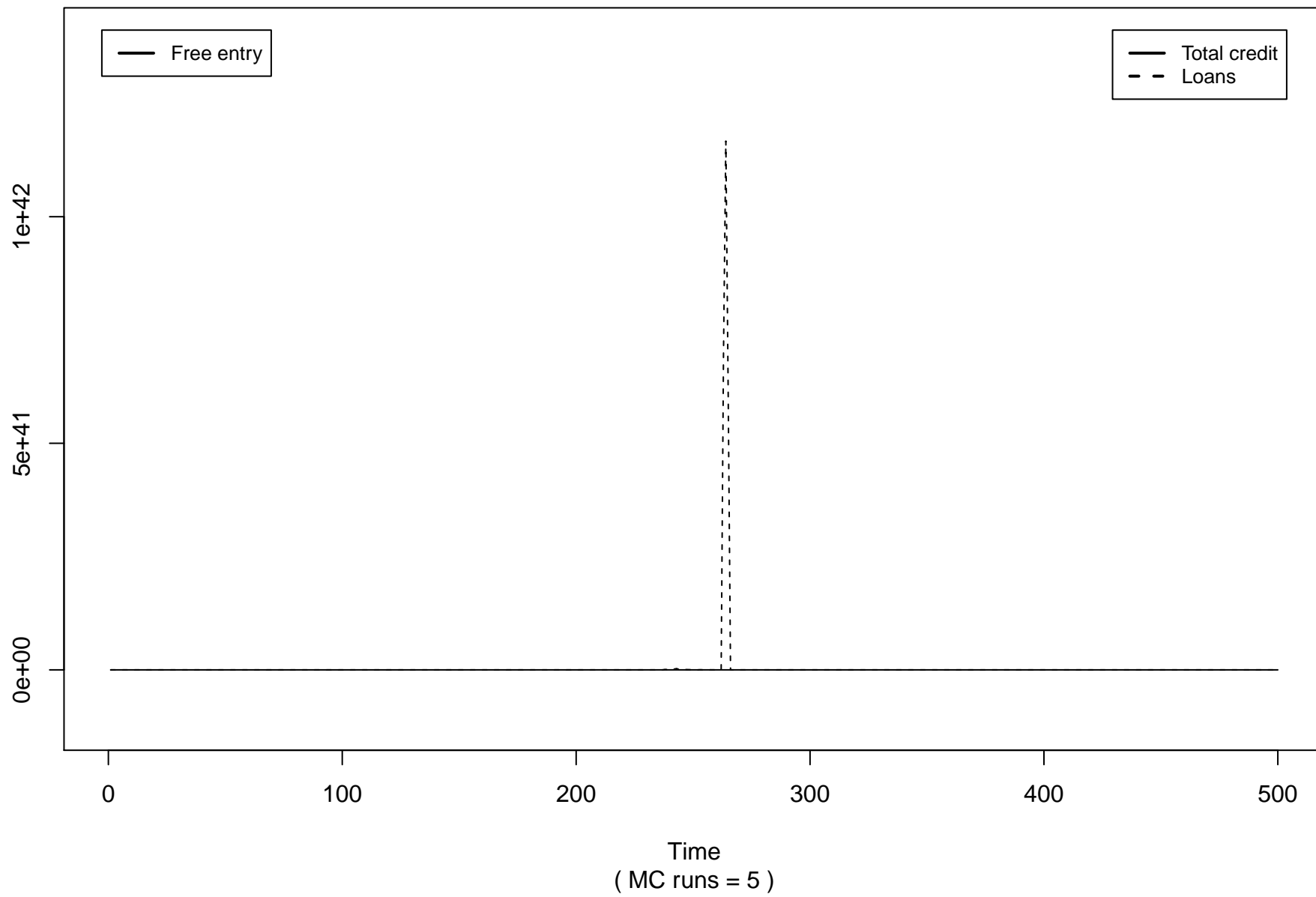(95% confidence band in gray, min/max values in light gray / MC runs = 5)
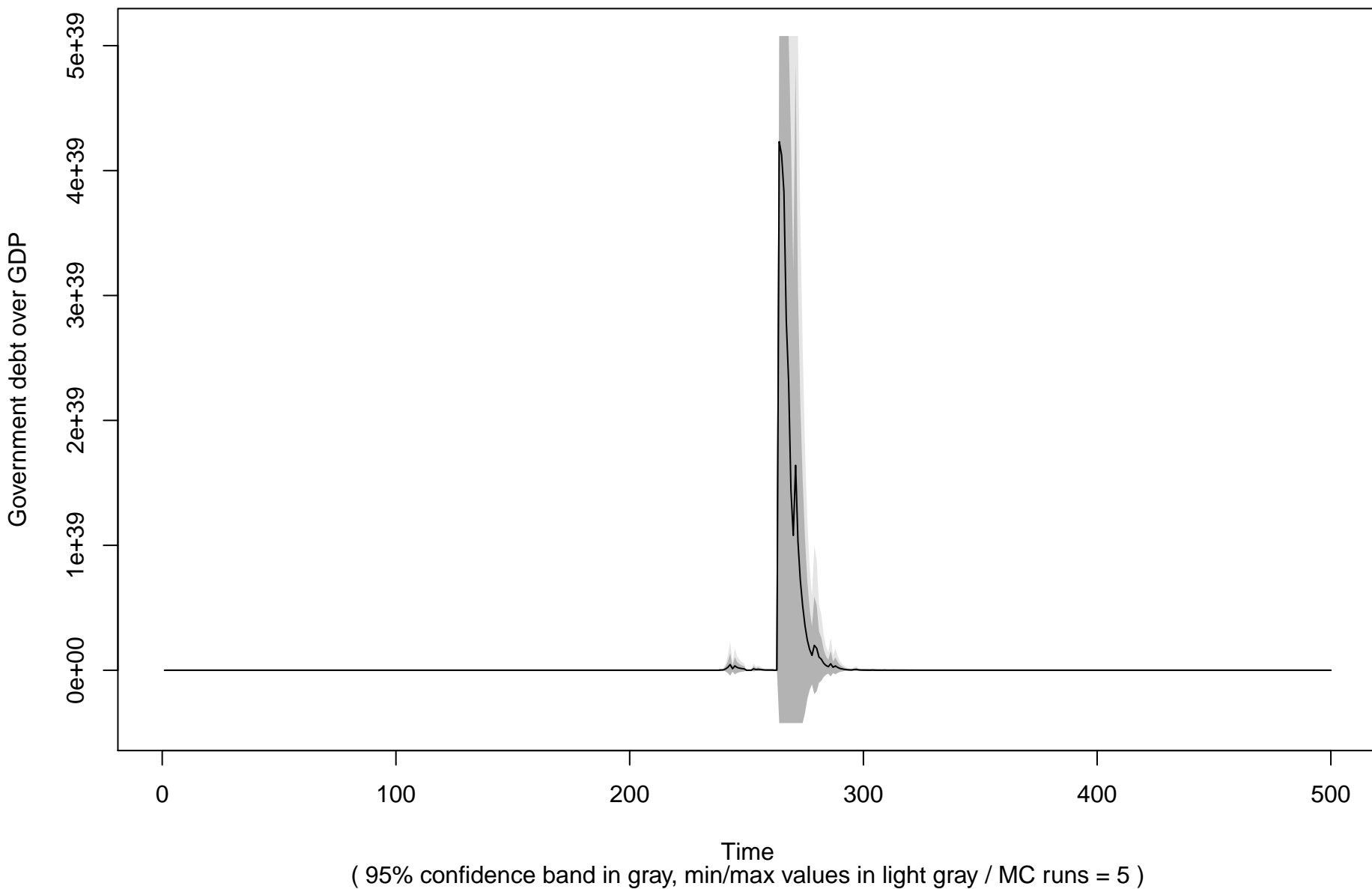
Total credit supply and loans on GDP (all experiments)

Total banks credit supply and firms loans debt over GDP

Free entry

Total credit
Loans

1e+42

5e+41

0e+00

0   100   200   300   400   500

Time
(MC runs = 5)

Total credit supply and loans on GDP (Free entry)

Total banks credit supply and firms loans debt over GDP

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 5)

Legend:
- Total credit (solid line)
- Loans (dashed line)

Y-axis values: 0e+00, 5e+41, 1e+42

X-axis values: 0, 100, 200, 300, 400, 500
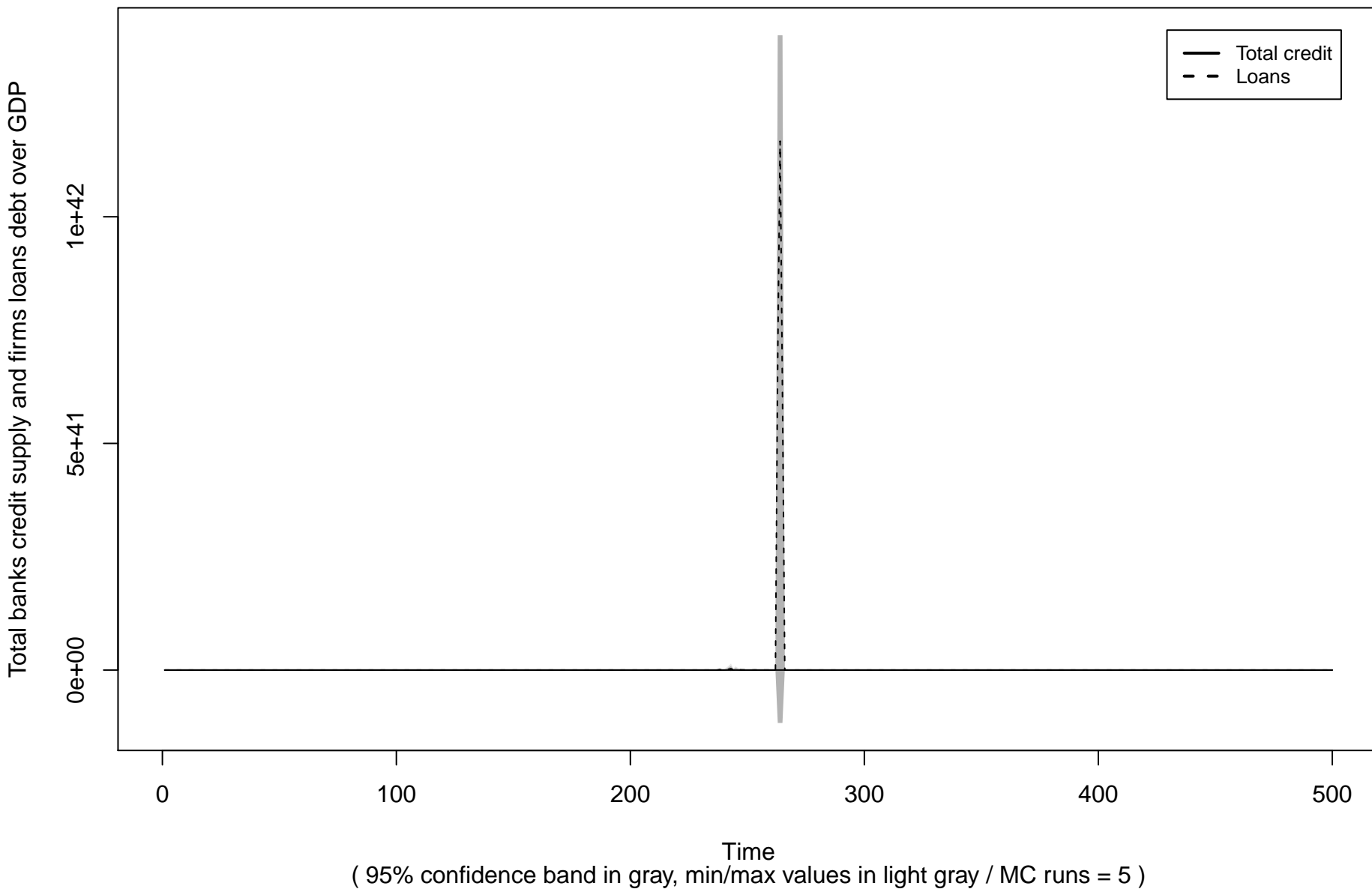
Unemployment and vacancy rates (all experiments)

Free entry

Unemployment
Vacancy

Rate

Time
(MC runs = 5)
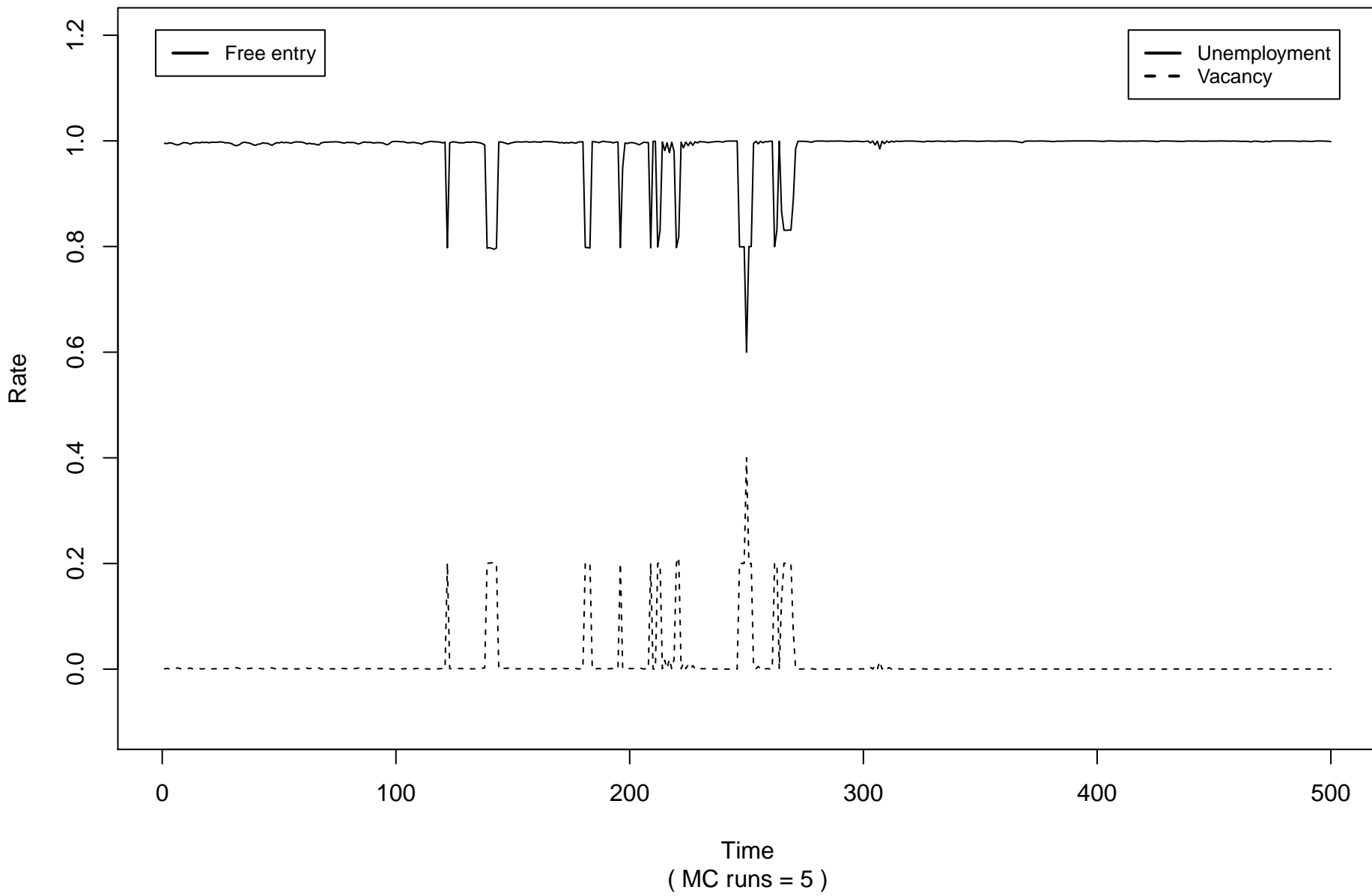
Unemployment and vacancy rates (Free entry)

Rate

1.2 1.0 0.8 0.6 0.4 0.2 0.0

Unemployment
Vacancy

0   100   200   300   400   500

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 5)
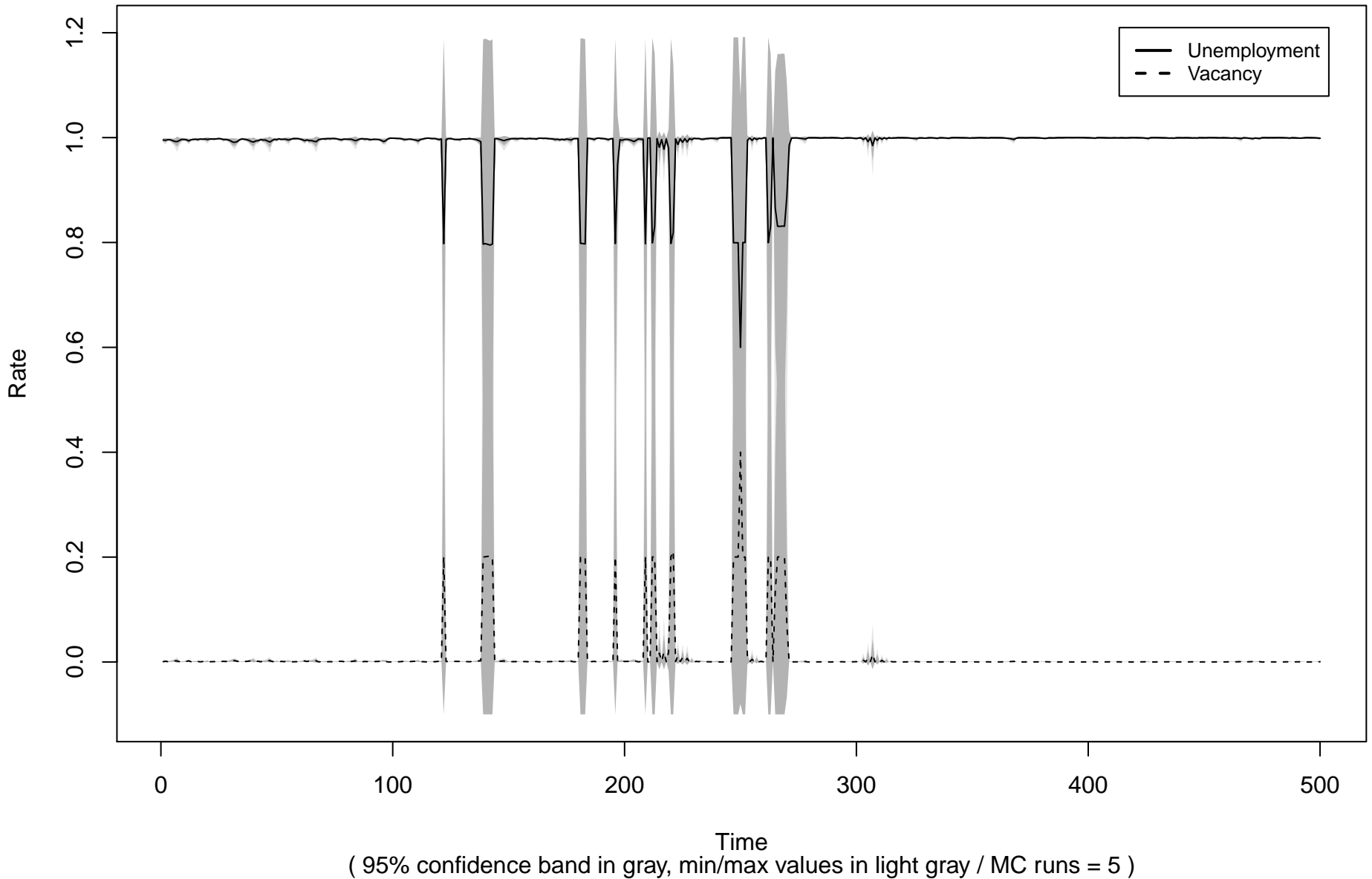
Real wages average (all experiments)

Log wages
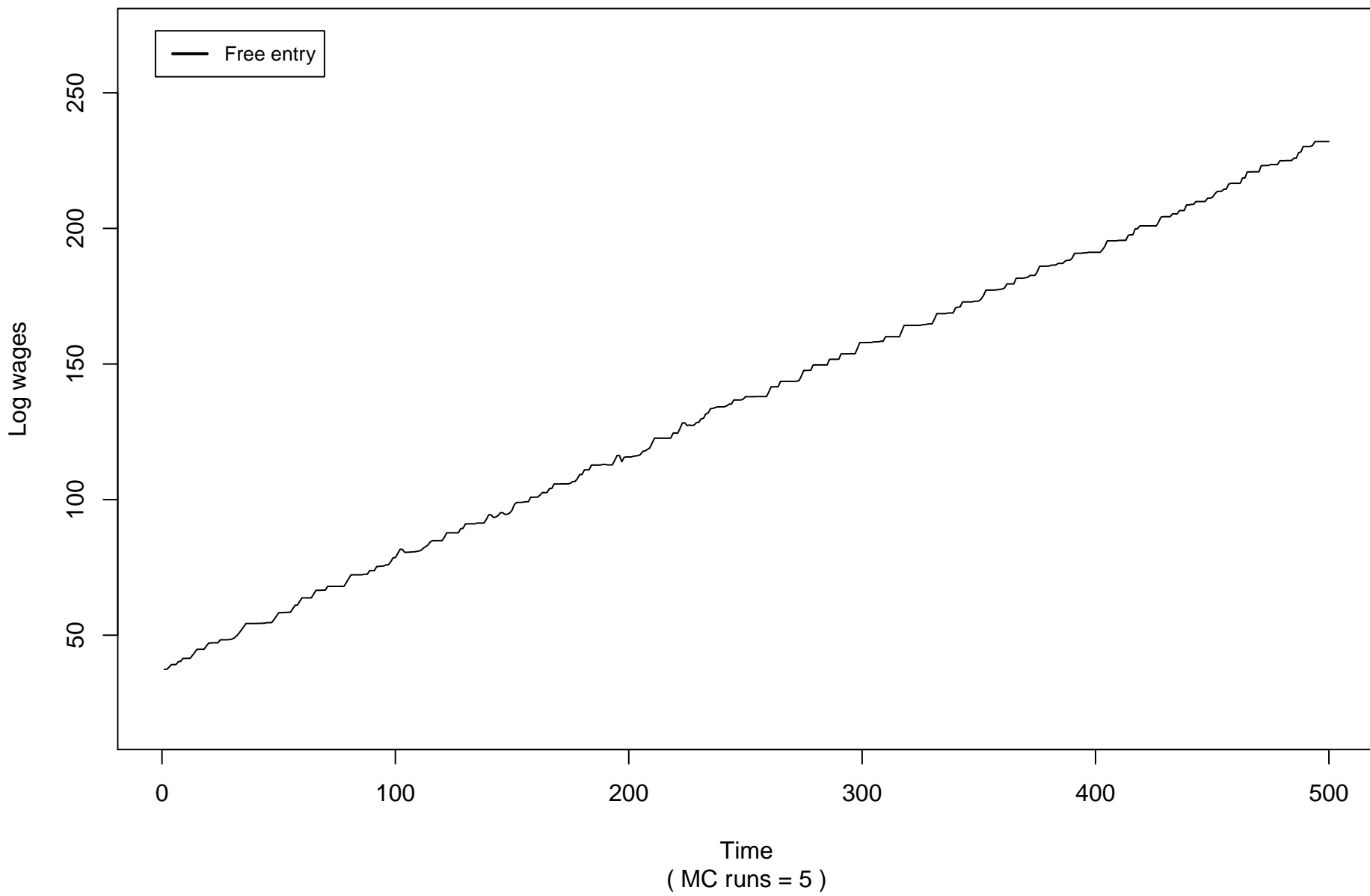
Time
(MC runs = 5)

Real wages average (Free entry)

Log wages

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 5)
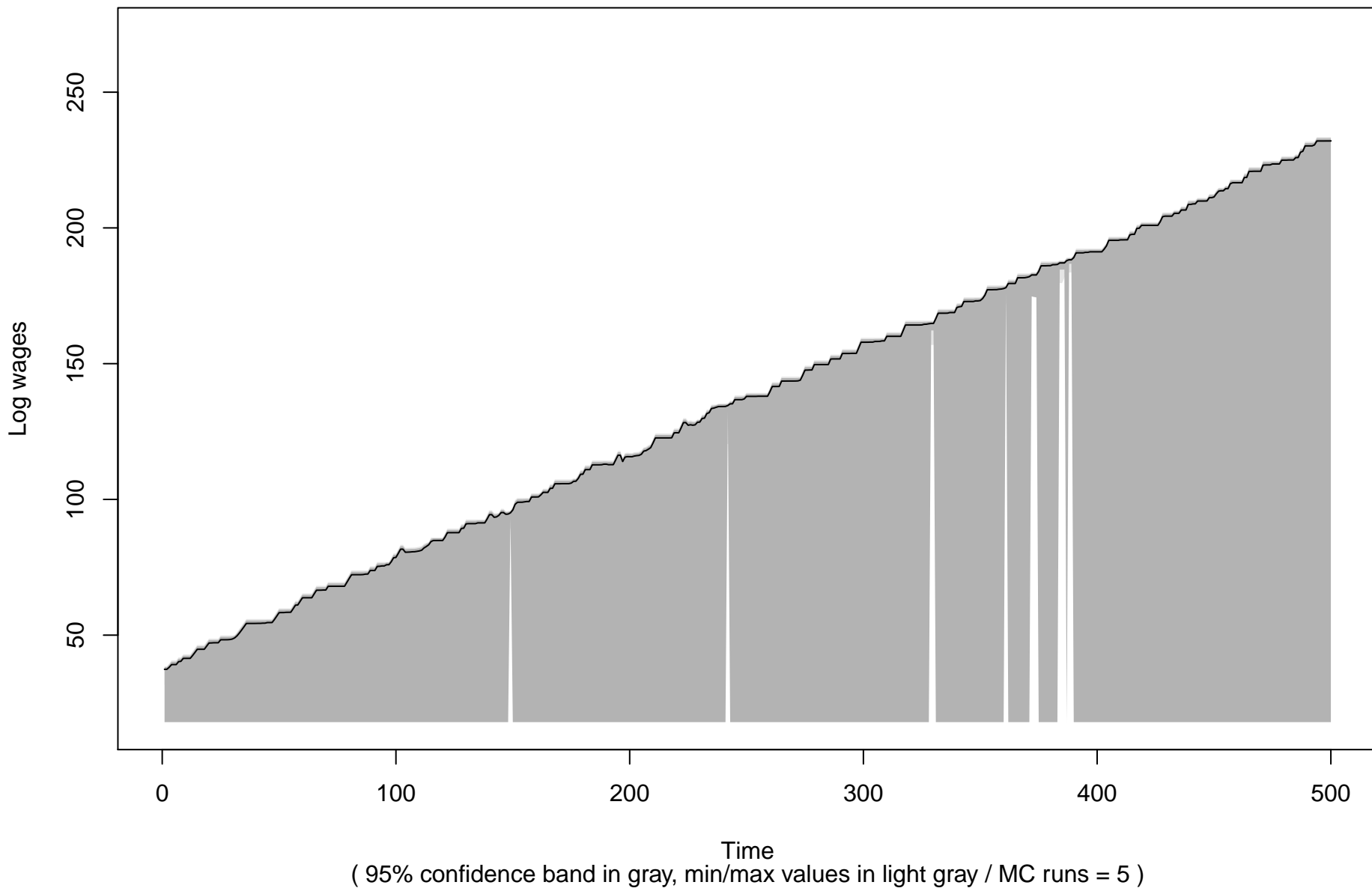
Wage share (all experiments)

Total real wages on GDP

Time
(MC runs = 5)

Free entry

Wage share (Free entry)

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 5)
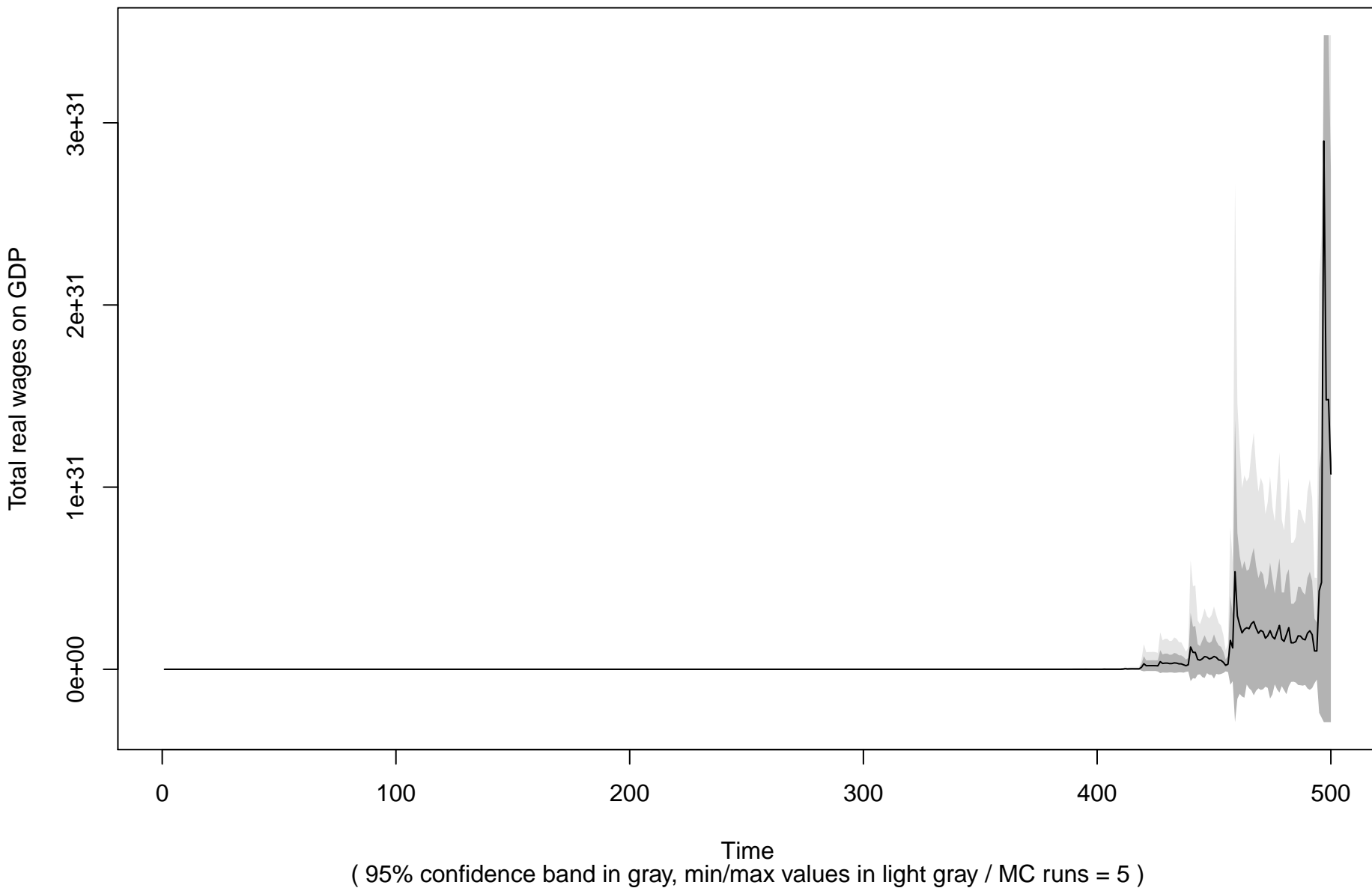
Innovation and imitation (all experiments)

Share of innovating and imitating firms

Free entry

Innovation
Imitation

Time
(sector 1 only / MC runs = 5)
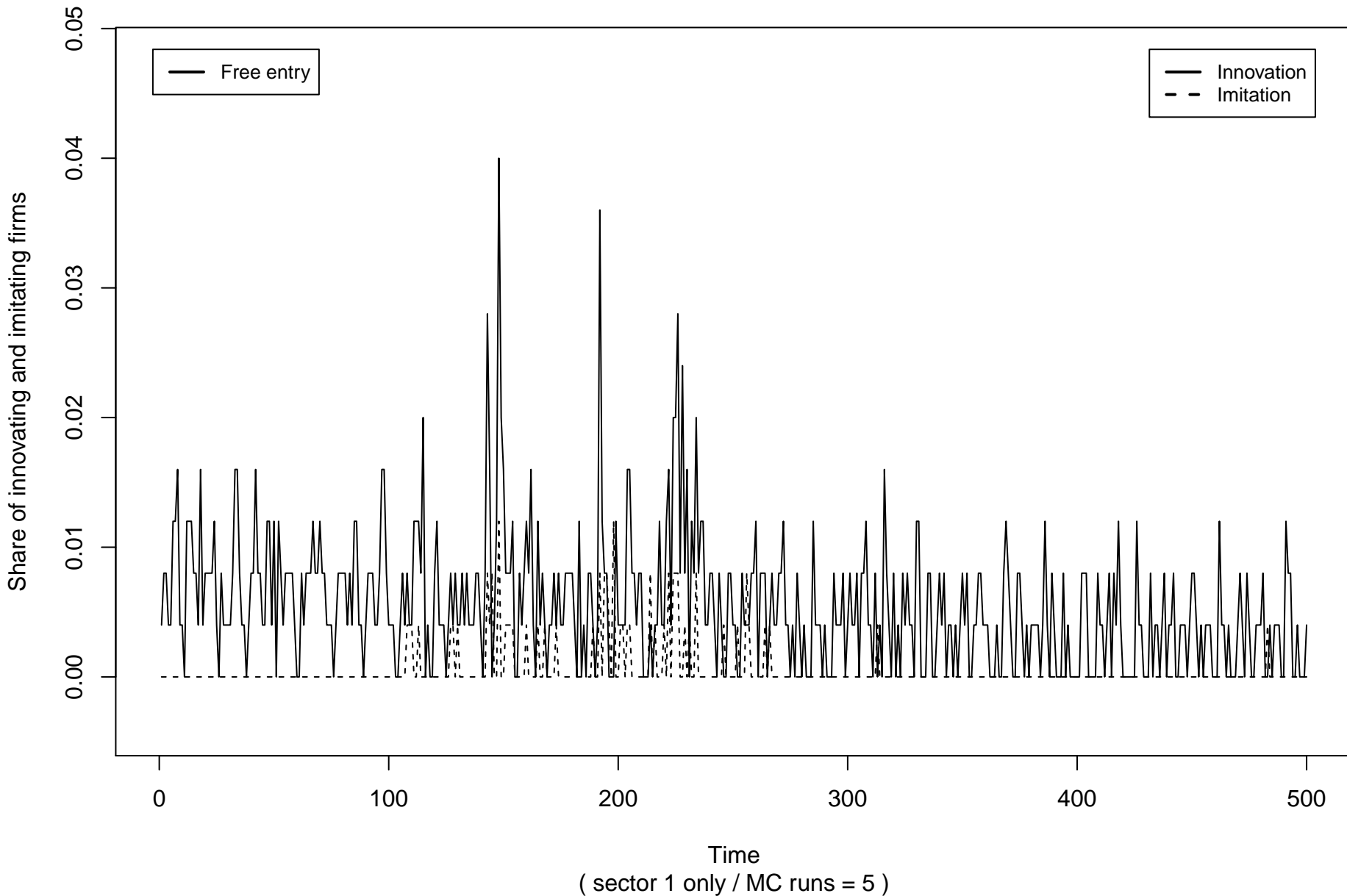
Innovation and imitation (Free entry)
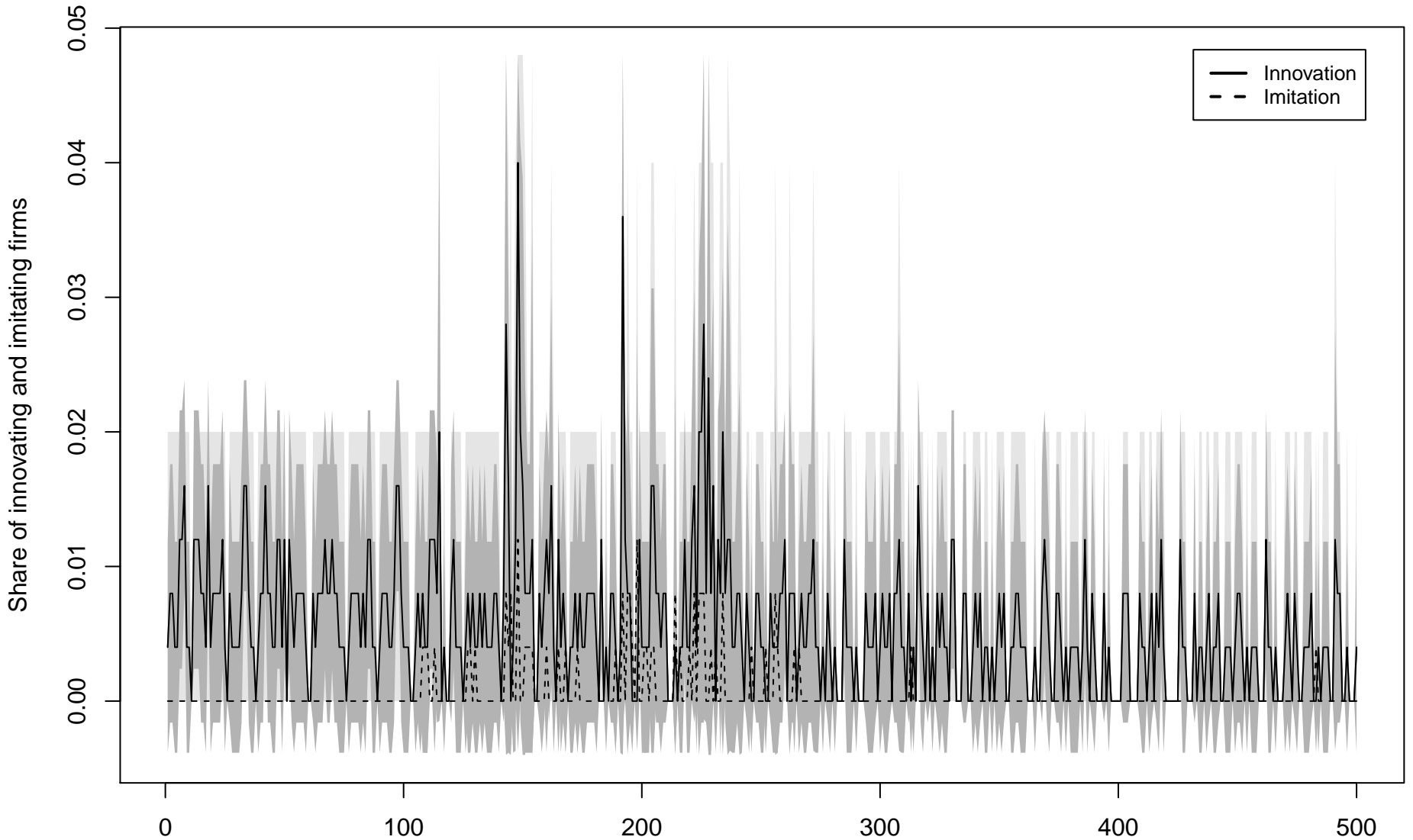
Time
(95% confidence band in gray, min/max values in light gray / sector 1 only / MC runs = 5)

Net entry of firms trend (all experiments)

Free entry

Consumption−good sector
Capital−good sector

Number of net entrant firms (HP−filtered)

Time
(MC runs = 5)

Net entry of firms trend (Free entry)

Number of net entrant firms (HP−filtered)

Consumption−good sector
Capital−good sector

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 5)

Market concentration (all experiments)

Standardized Herfindahl−Hirschman index
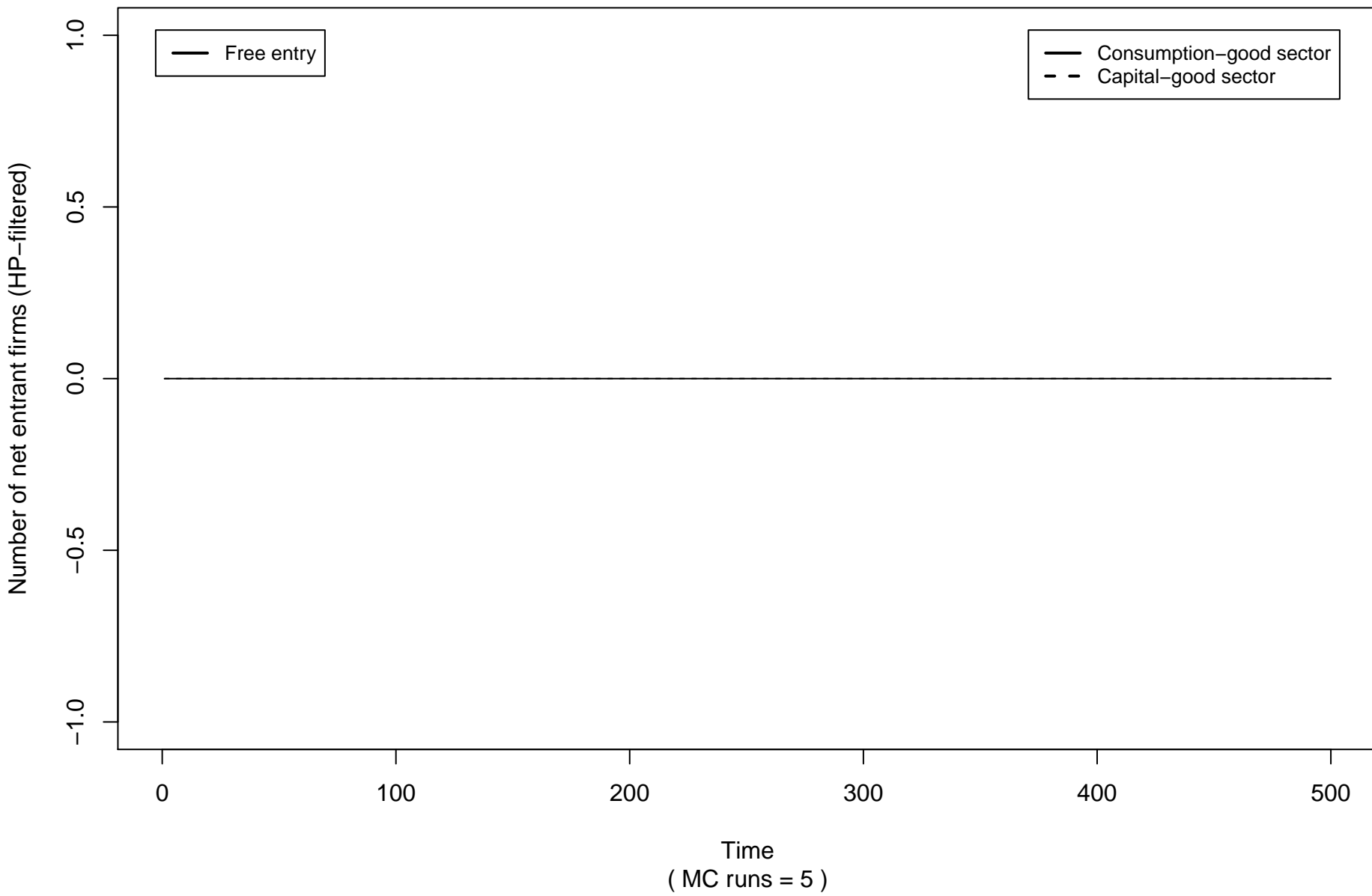
Free entry

Time
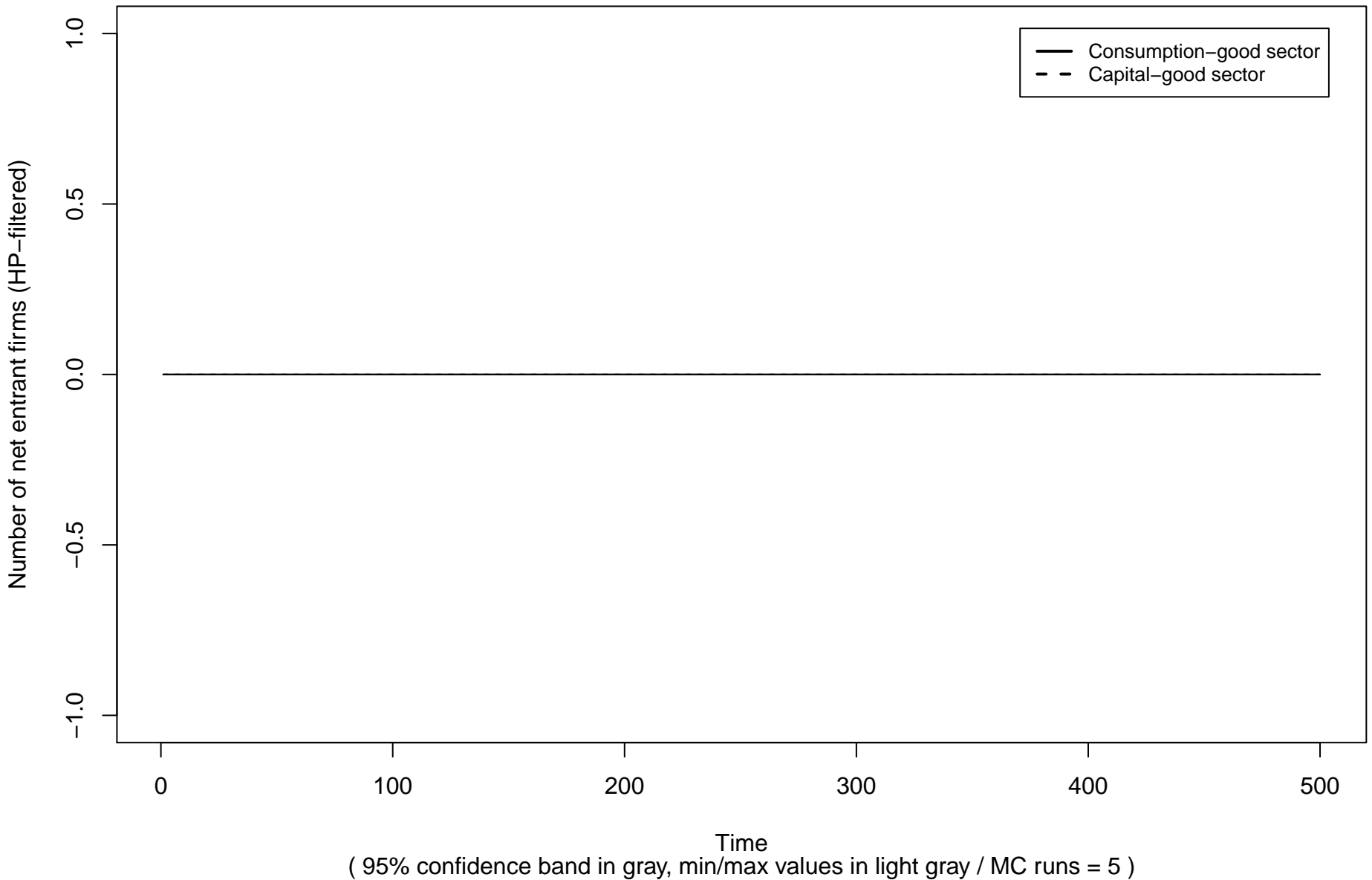(Sector 2 only / MC runs = 5)

Market concentration (Free entry)

Time
(95% confidence band in gray, min/max values in light gray / Sector 2 only / MC runs = 5)

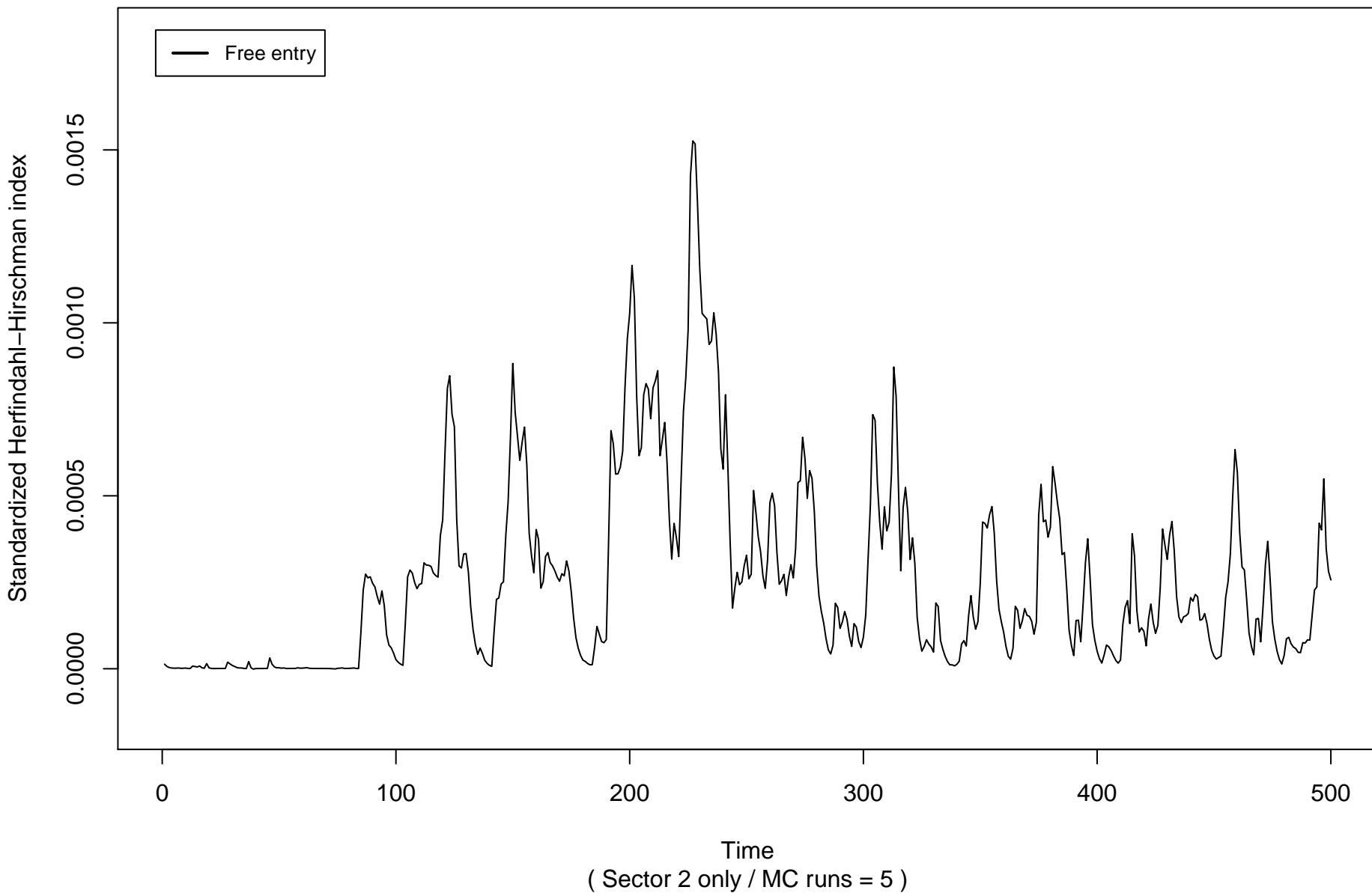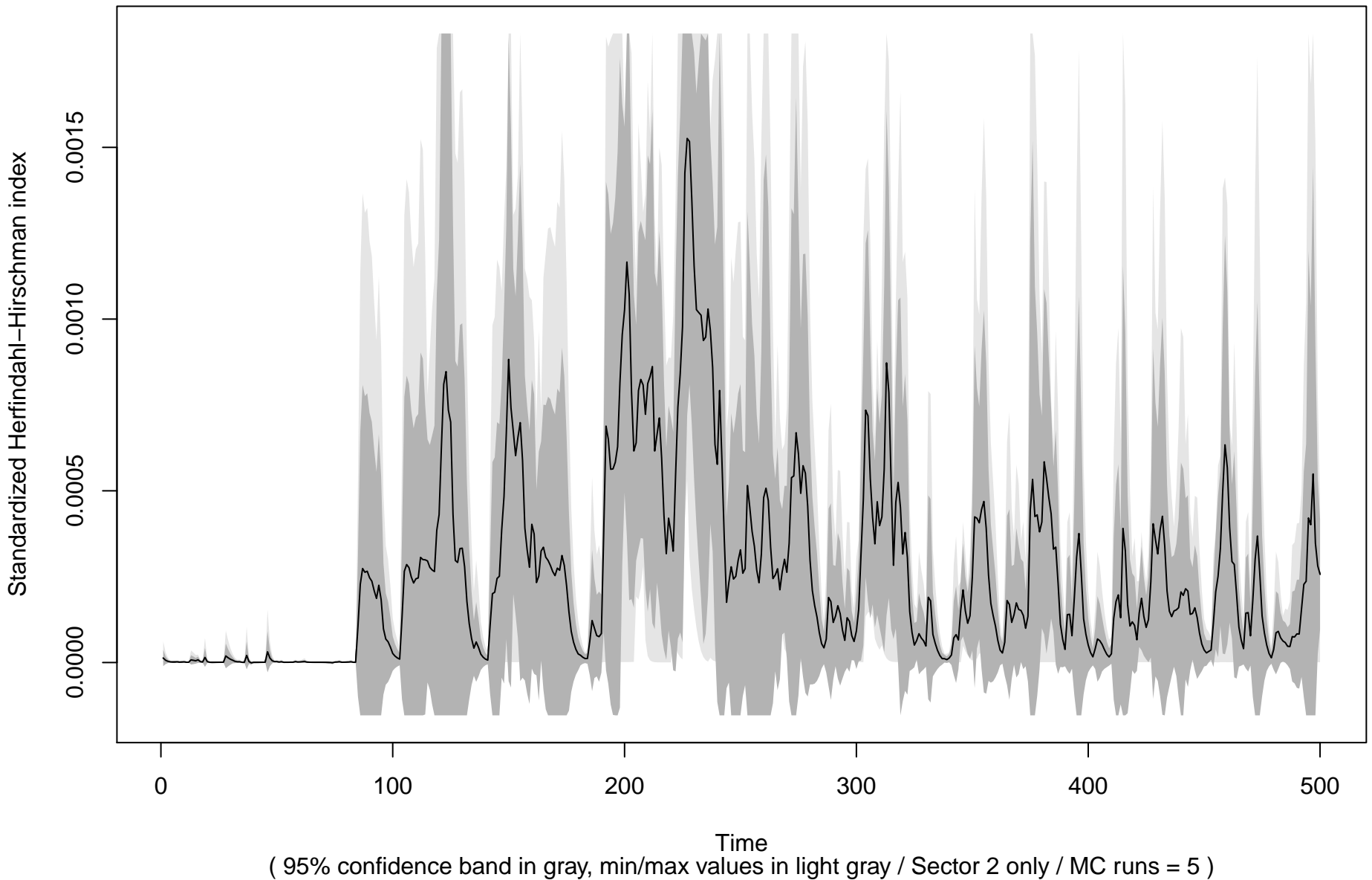# Mark−up average (all experiments)

Weighted average mark−up rate

Time
(Sector 2 only / MC runs = 5)
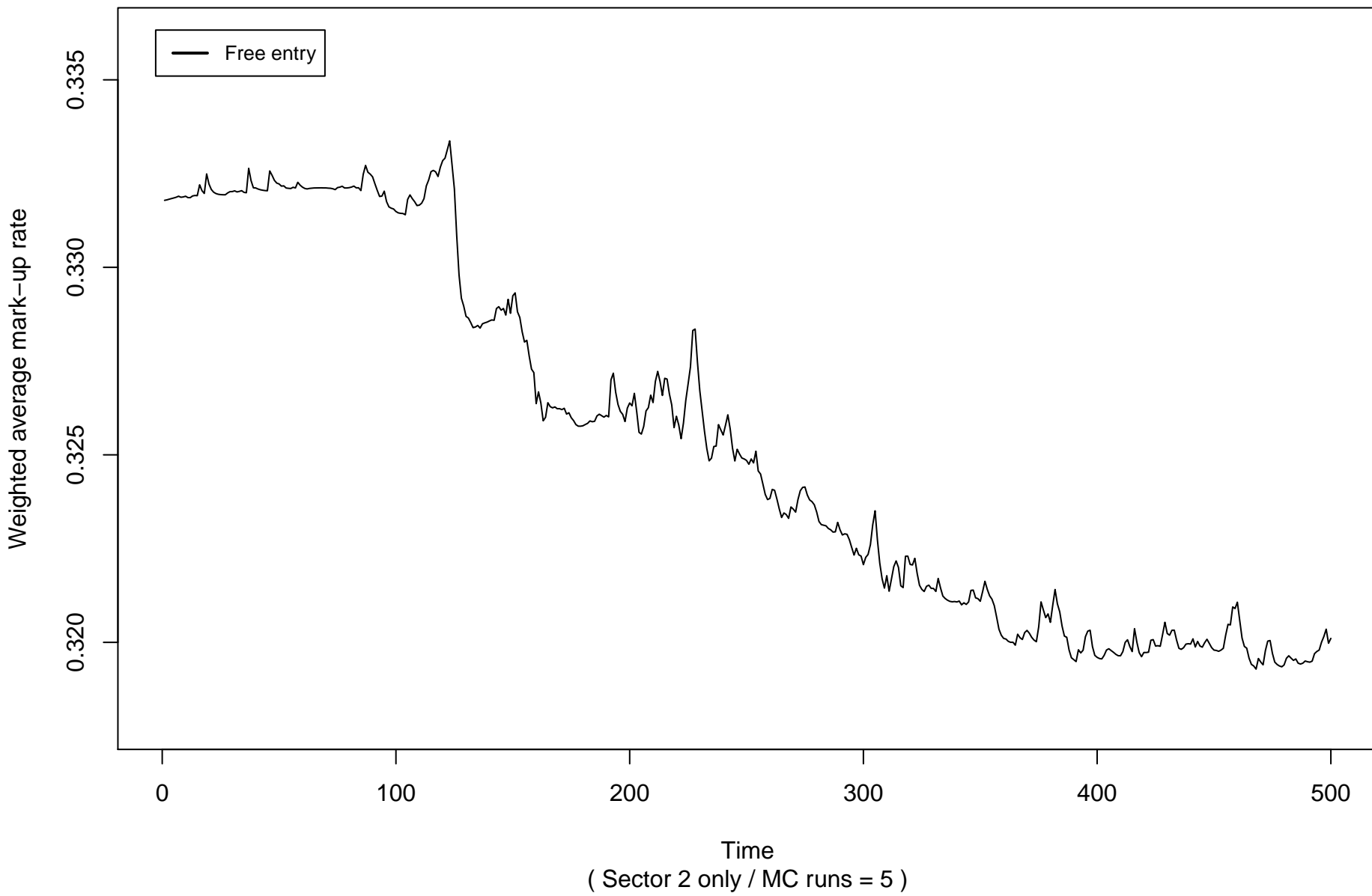
Mark−up average (Free entry)

Time
(95% confidence band in gray, min/max values in light gray / Sector 2 only / MC runs = 5)

GDP cycles (Free entry)

Legend:
- GDP
- Consumption
- Investment
- Productivity
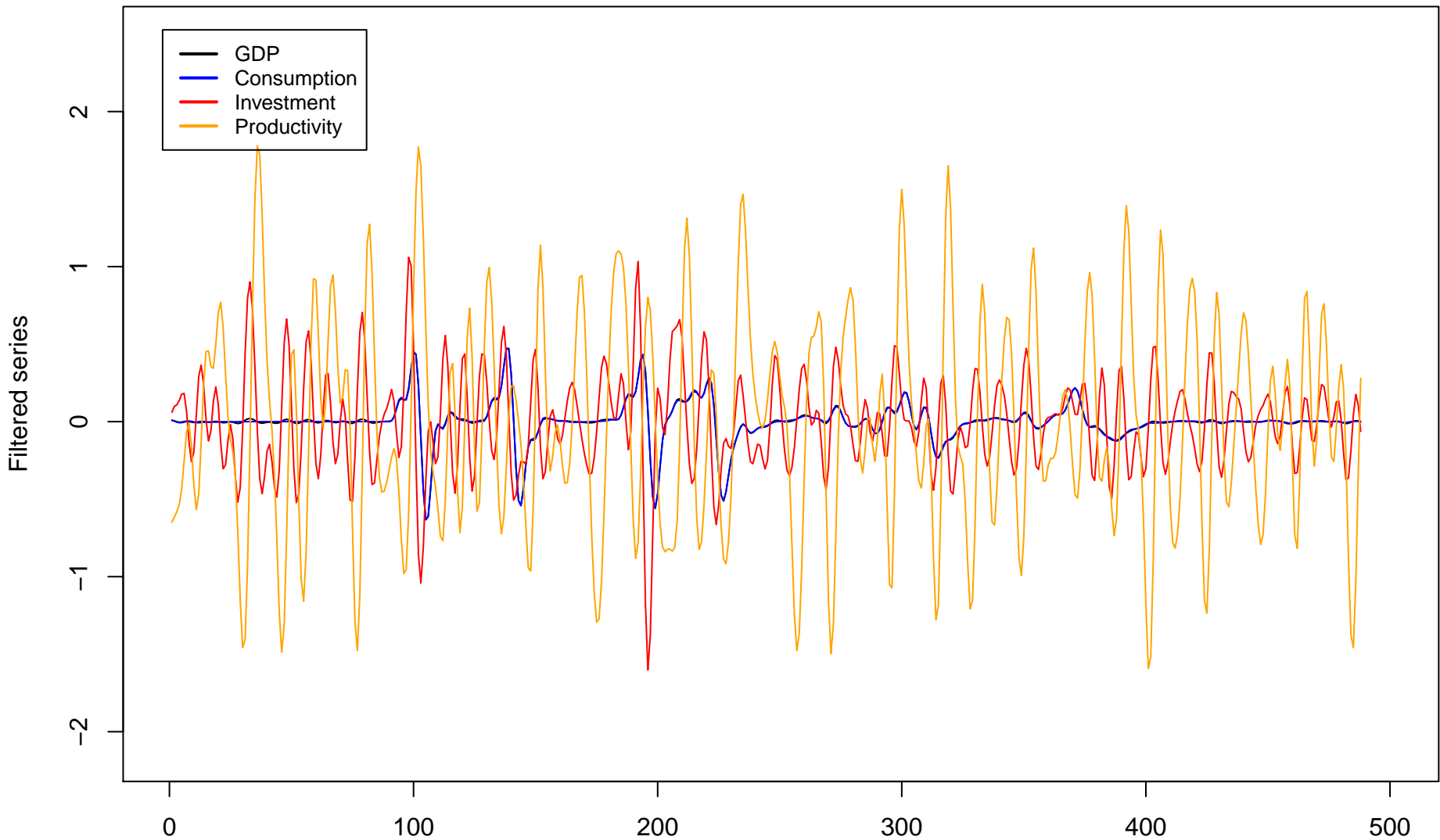
Time

(Baxter–King bandpass–filtered, low = 6Q / high = 32Q / order = 12 / MC runs = 5)

Shimer puzzle (Free entry)

Filtered series

Time
(Baxter–King bandpass–filtered, low = 6Q / high = 32Q / order = 12 / MC runs = 5)

Legend:
- Productivity
- Unemployment
- Vacancy

Net entry dynamics and business cycle (Free entry)

Time
(Baxter–King bandpass–filtered, low = 6Q / high = 32Q / order = 12 / MC runs = 5)

Key statistics and unit roots tests for cycles (Free entry)

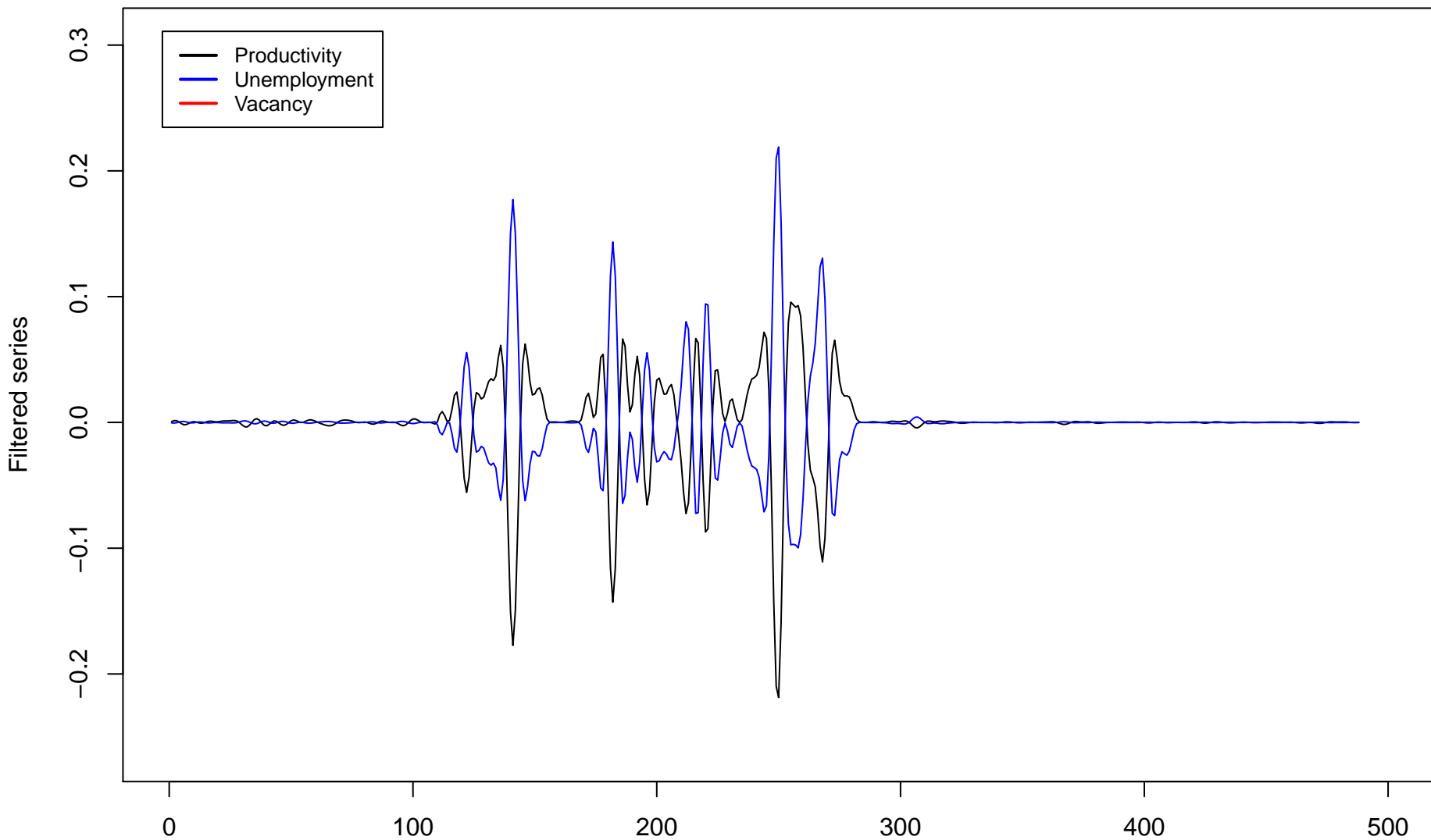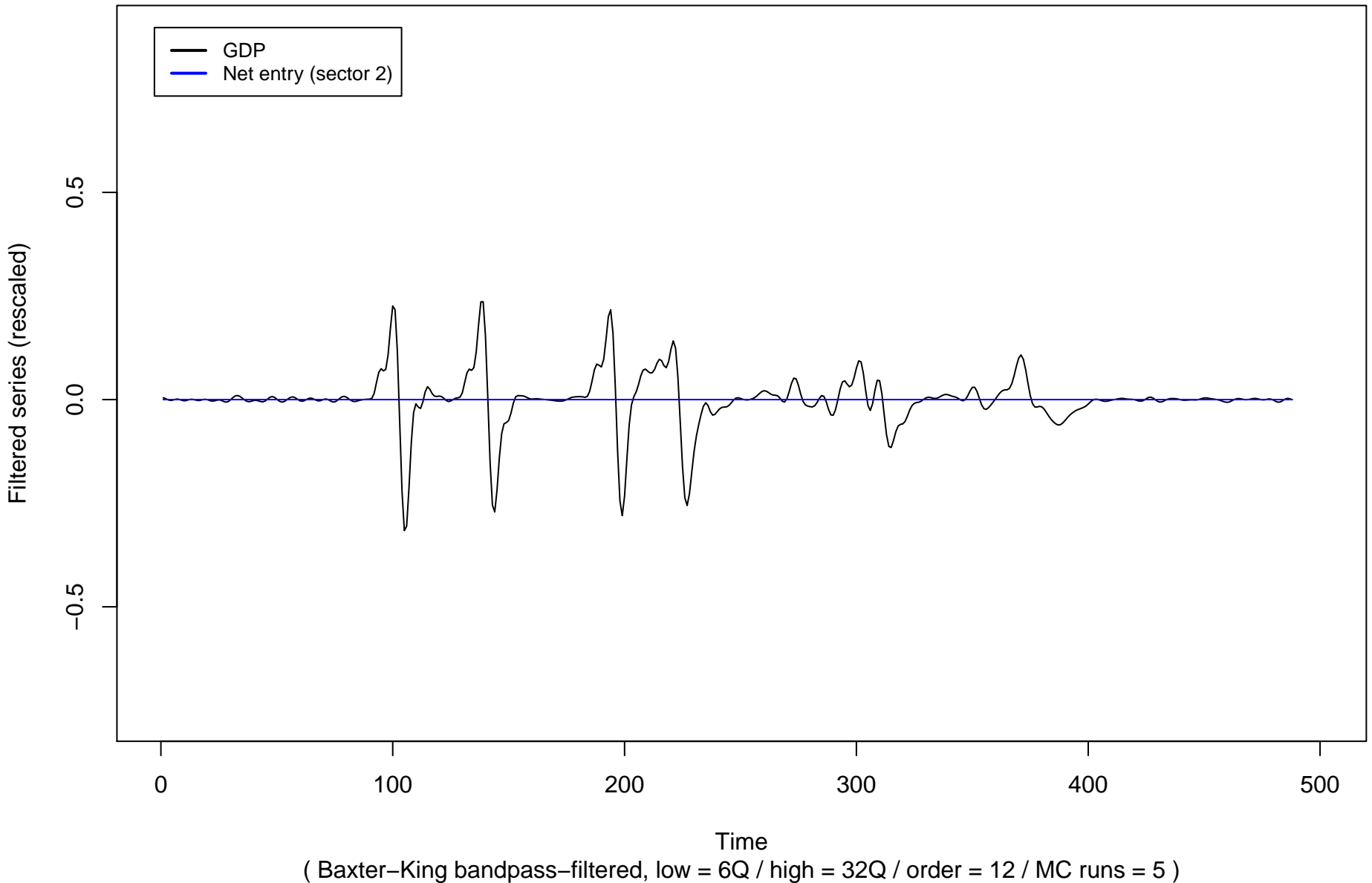|	GDP (output)	Consumption	Investment	Product.	Real wage
avg. growth rate	0.3557	0.3557	0.3544	0.3714	0.372
(s.e.)	0.02236	0.02236	0.02318	0.02294	0.02228
ADF test (logs)	−2.873	−3.137	−6.339	−3.033	−3.306
(s.e.)	1.241	1.214	0.7017	0.5886	0.6457
(p−val.)	0.4373	0.3349	0.01298	0.2273	0.2304
(s.e.)	0.1841	0.1816	0.002985	0.1851	0.178
ADF test (bpf)	−5.738	−5.536	−8.952	−6.179	−5.831
(s.e.)	0.2198	0.3545	1.287	0.468	0.06788
(p−val.)	0.01	0.01	0.01	0.01	0.01
(s.e.)	0	0	0	0	0
s.d. (bpf)	0.1927	0.286	6.357	0.8956	1.067
(s.e.)	0.03498	0.1338	2.807	0.05163	0.1356
relative s.d. (GDP)	1	1.484	32.99	4.648	5.537

(bpf: Baxter−King bandpass−filtered series, low = 6Q / high = 32Q / order = 12 / MC runs = 5 / period = 301 − 600)
(ADF test H0: there are unit roots / non−stationary at 5% level)

Correlation structure for GDP (Free entry)

	−4	−3	−2	−1	0	1	2	3	4
GDP (output)	−0.03566	0.2185	0.5658	0.8736	1	0.8736	0.5658	0.2185	−0.03566
(s.e.)	0.1149	0.1091	0.06856	0.02113	0	0.02113	0.06856	0.1091	0.1149
(p−val.)	0.02462	0.04926	0.001047	1.5e−06	NA	1.5e−06	0.001047	0.04926	0.02462
Consumption	0.05298	0.2435	0.5089	0.7656	0.8997	0.8279	0.5834	0.268	0.0002886
(s.e.)	0.1072	0.1512	0.1456	0.09817	0.06594	0.0894	0.09842	0.09163	0.09298
(p−val.)	0.03402	5.35e−05	0.009439	0.001106	0.0001204	0.0005582	0.003455	0.01425	0.01583
Investment	−0.1776	−0.2609	−0.3448	−0.3528	−0.2167	0.01259	0.2175	0.3075	0.2631
(s.e.)	0.04909	0.05945	0.0737	0.09309	0.08809	0.0841	0.09382	0.09507	0.09316
(p−val.)	0.05884	0.01916	0.01145	0.0214	0.09792	0.2214	0.1084	0.03747	0.06038
Net investment	−0.1748	−0.2626	−0.3522	−0.3653	−0.2315	−0.0003829	0.2101	0.3071	0.2681
(s.e.)	0.04897	0.06062	0.0771	0.09875	0.09491	0.08911	0.09595	0.09648	0.09552
(p−val.)	0.06255	0.01974	0.01211	0.02231	0.09291	0.1902	0.108	0.03909	0.06015
Change in inventories	−0.0686	0.3807	0.7275	0.7077	0.2879	−0.2969	−0.704	−0.7202	−0.3936
(s.e.)	NA	NA	NA	NA	NA	NA	NA	NA	NA
(p−val.)	0.9958	0.5191	0.338	0.3431	0.6416	0.6271	0.3441	0.3398	0.5062
Unemployment rate	−0.1513	−0.22	−0.2232	−0.108	0.1135	0.3174	0.4027	0.3452	0.1952
(s.e.)	0.07071	0.09117	0.08128	0.07317	0.1267	0.1734	0.1614	0.1056	0.07391
(p−val.)	0.1222	0.07031	0.05594	0.1248	0.1177	0.1016	0.05808	0.033	0.09714
Productivity	0.147	0.1708	0.1655	0.1268	0.06201	−0.00783	−0.05838	−0.07421	−0.05491
(s.e.)	0.03869	0.02824	0.02906	0.04037	0.05116	0.05591	0.06244	0.07386	0.07951
(p−val.)	0.07925	0.0162	0.02114	0.1552	0.2262	0.3847	0.01778	0.03807	0.1317
Mark−up (sector 2)	0.1818	0.05502	−0.07794	−0.1693	−0.1974	−0.1727	−0.1296	−0.09073	−0.06102
(s.e.)	0.09689	0.1121	0.09965	0.05963	0.02999	0.05655	0.06993	0.05867	0.04524
(p−val.)	0.1119	0.06158	0.1655	0.1044	0.008666	0.08831	0.2388	0.2681	0.1158
Total firm debt	0.2415	0.3285	0.3513	0.3028	0.2103	0.1194	0.06893	0.0681	0.0954
(s.e.)	0.0878	0.1128	0.1343	0.1475	0.1492	0.1301	0.08554	0.03737	0.06711
(p−val.)	0.06985	0.04616	0.0568	0.1027	0.1124	0.08597	0.1097	0.519	0.2305
Liquidity−to−sales ratio	0.1913	0.2189	0.1598	−0.003874	−0.2269	−0.3913	−0.4193	−0.2974	−0.08796
(s.e.)	0.1292	0.124	0.1097	0.0632	0.04897	0.09795	0.1005	0.04906	0.08273
(p−val.)	0.1353	0.05672	0.03609	0.2137	0.01999	0.01681	0.01394	0.005702	0.06792
Bankruptcy rate	0.2148	0.1868	0.09483	−0.0207	−0.115	−0.1576	−0.1588	−0.1383	−0.1116
(s.e.)	0.09441	0.08735	0.09289	0.09829	0.084	0.0656	0.0773	0.09174	0.07993
(p−val.)	0.006852	0.04479	0.1256	0.2106	0.1464	0.007653	0.09136	0.161	0.1415

(non−rate/ratio series are Baxter−King bandpass−filtered, low = 6Q / high = 32Q / order = 12 / MC runs = 5 / period = 301 − 600)

(test H0: lag coefficient is not significant at 5% level)

Correlation structure for GDP (Free entry)

	−4	−3	−2	−1	0	1	2	3	4
GDP (output)	−0.03566	0.2185	0.5658	0.8736	1	0.8736	0.5658	0.2185	−0.03566
(s.e.)	0.1149	0.1091	0.06856	0.02113	0	0.02113	0.06856	0.1091	0.1149
(p−val.)	0.02462	0.04926	0.001047	1.5e−06	NA	1.5e−06	0.001047	0.04926	0.02462
Consumption	0.05298	0.2435	0.5089	0.7656	0.8997	0.8279	0.5834	0.268	0.0002886
(s.e.)	0.1072	0.1512	0.1456	0.09817	0.06594	0.0894	0.09842	0.09163	0.09298
(p−val.)	0.03402	5.35e−05	0.009439	0.001106	0.0001204	0.0005582	0.003455	0.01425	0.01583
Investment	−0.1776	−0.2609	−0.3448	−0.3528	−0.2167	0.01259	0.2175	0.3075	0.2631
(s.e.)	0.04909	0.05945	0.0737	0.09309	0.08809	0.0841	0.09382	0.09507	0.09316
(p−val.)	0.05884	0.01916	0.01145	0.0214	0.09792	0.2214	0.1084	0.03747	0.06038
Productivity	0.147	0.1708	0.1655	0.1268	0.06201	−0.00783	−0.05838	−0.07421	−0.05491
(s.e.)	0.03869	0.02824	0.02906	0.04037	0.05116	0.05591	0.06244	0.07386	0.07951
(p−val.)	0.07925	0.0162	0.02114	0.1552	0.2262	0.3847	0.01778	0.03807	0.1317
Net entry	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
(s.e.)	NA	NA	NA	NA	NA	NA	NA	NA	NA
(p−val.)	1	1	1	1	1	1	1	1	1
Entry	−0.1828	−0.1128	−0.01273	0.1074	0.2289	0.3005	0.3032	0.2425	0.1503
(s.e.)	0.02935	0.0277	0.03135	0.0537	0.0743	0.06902	0.04686	0.04576	0.07012
(p−val.)	0.01243	0.151	0.8965	0.004871	0.02587	0.01654	0.004441	0.0119	0.06722
Wage	0.07196	0.06538	0.08219	0.113	0.1298	0.1097	0.05431	−0.009512	−0.047
(s.e.)	0.05612	0.06544	0.05192	0.08334	0.1437	0.1684	0.1393	0.07792	0.05196
(p−val.)	0.01226	0.03235	0.4433	0.2268	0.09753	0.07621	0.06099	0.08273	0.3326
Unemployment rate	−0.1513	−0.22	−0.2232	−0.108	0.1135	0.3174	0.4027	0.3452	0.1952
(s.e.)	0.07071	0.09117	0.08128	0.07317	0.1267	0.1734	0.1614	0.1056	0.07391
(p−val.)	0.1222	0.07031	0.05594	0.1248	0.1177	0.1016	0.05808	0.033	0.09714
Vacancy rate	0.152	0.209	0.2041	0.08831	−0.1258	−0.3192	−0.3964	−0.3367	−0.1894
(s.e.)	0.07317	0.09911	0.08899	0.07094	0.125	0.1775	0.1686	0.1119	0.07482
(p−val.)	0.1441	0.08088	0.0802	0.1566	0.1192	0.08816	0.06689	0.04173	0.1087

(non−rate/ratio series are Baxter−King bandpass−filtered, low = 6Q / high = 32Q / order = 12 / MC runs = 5 / period = 301 − 600)
(test H0: lag coefficient is not significant at 5% level)

Stationarity, i.i.d. and ergodicity tests (Free entry)

	avg.ADF	rej.ADF	avg.PP	rej.PP	avg.KPSS	rej.KPSS	avg.BDS	rej.BDS	avg.KS	rej.KS	AD	W
dGDP	0.01	1.00	0.01	1.00	0.07	0.20	0.00	1.00	0.00	1.00	0.00	0
dA	0.01	1.00	0.01	1.00	0.07	0.20	0.10	0.20	0.01	0.90	0.00	0
dw	0.01	1.00	0.01	1.00	0.08	0.20	0.05	0.80	0.01	0.90	0.00	0
V	0.01	1.00	0.01	1.00	0.06	0.40	0.00	1.00	0.00	1.00	0.00	0
U	0.01	1.00	0.01	1.00	0.06	0.40	0.00	1.00	0.00	1.00	0.00	0
mu2avg	0.34	0.20	0.26	0.20	0.01	1.00	0.00	1.00	0.00	1.00	0.00	0
HH1	0.01	1.00	0.01	1.00	0.02	0.80	0.00	1.00	0.46	0.20	0.99	0
HH2	0.01	1.00	0.01	1.00	0.04	0.60	0.00	1.00	0.04	0.90	0.00	0

(average p−values for testing H0 and rate of rejection of H0 / MC runs = 5 / period = 301 − 600)
(ADF/PP H0: non−stationary, KPSS H0: stationary, BDS H0: i.i.d., KS/AD/WW H0: ergodic)
(significance = 0.05)

GDP growth

Average GDP growth rate

0.400
0.395
0.390
0.385
0.380
0.375
0.370
0.365
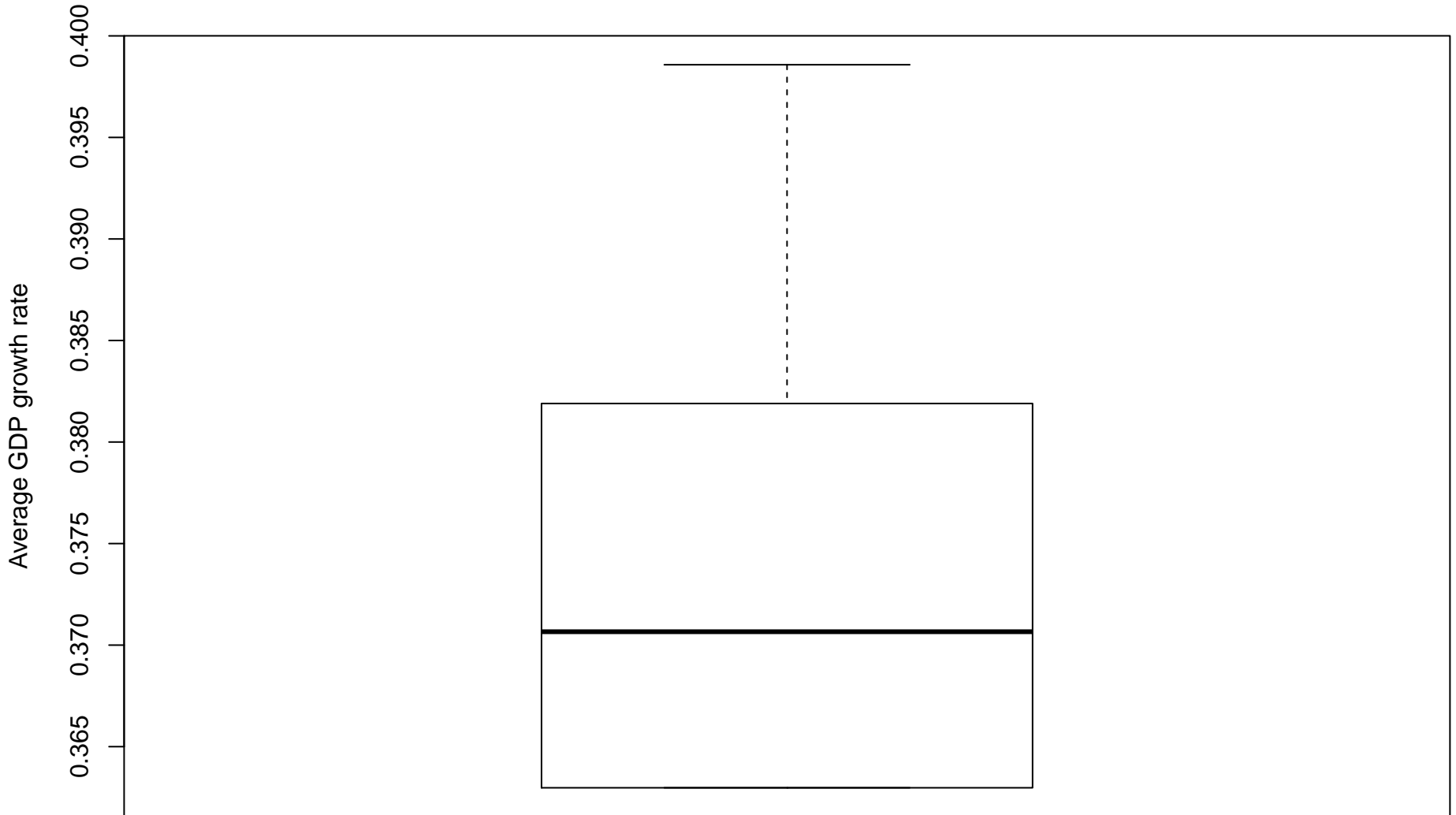
(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)

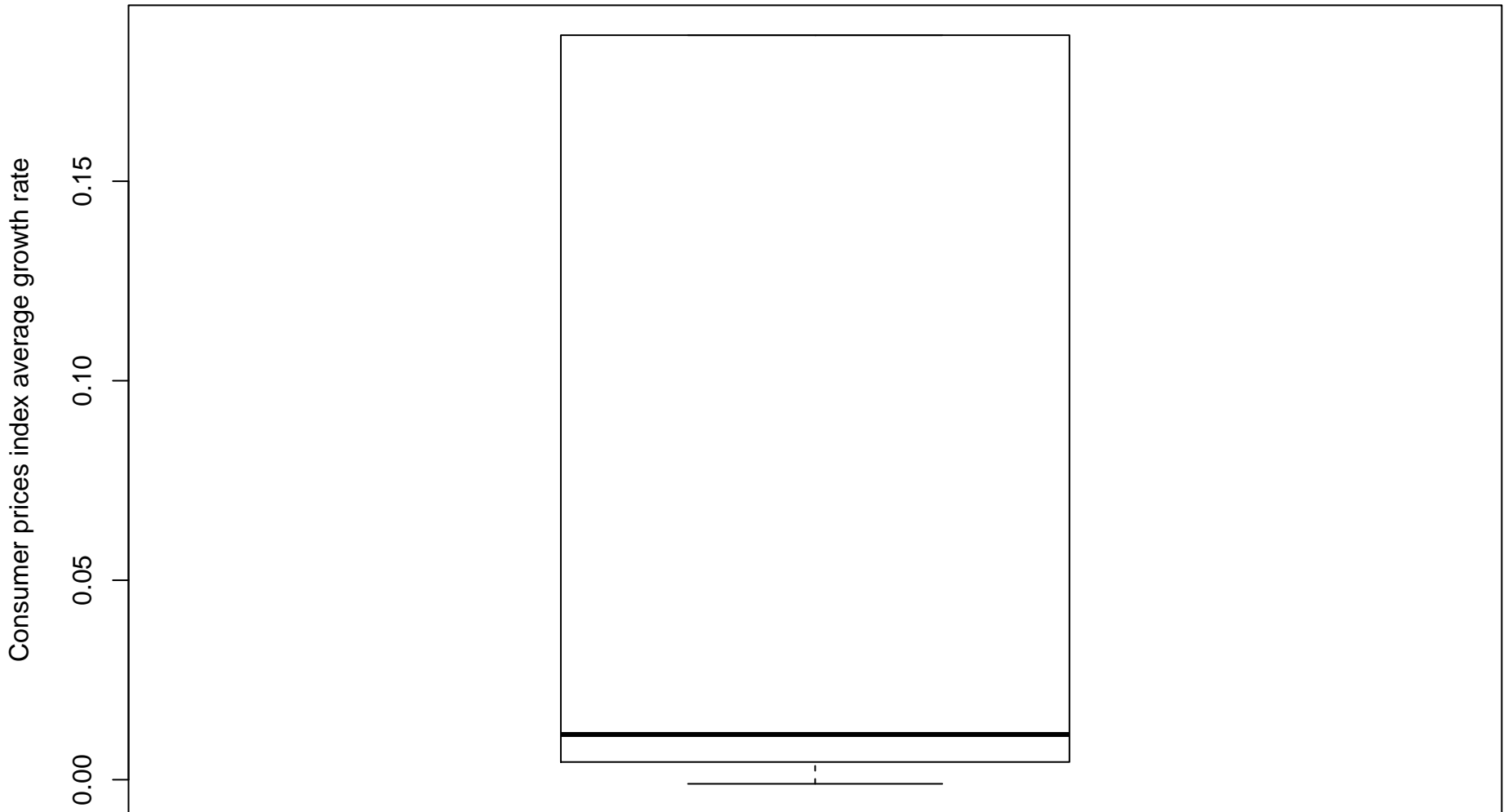# Volatility of GDP growth

Standard deviation of GDP growth rate
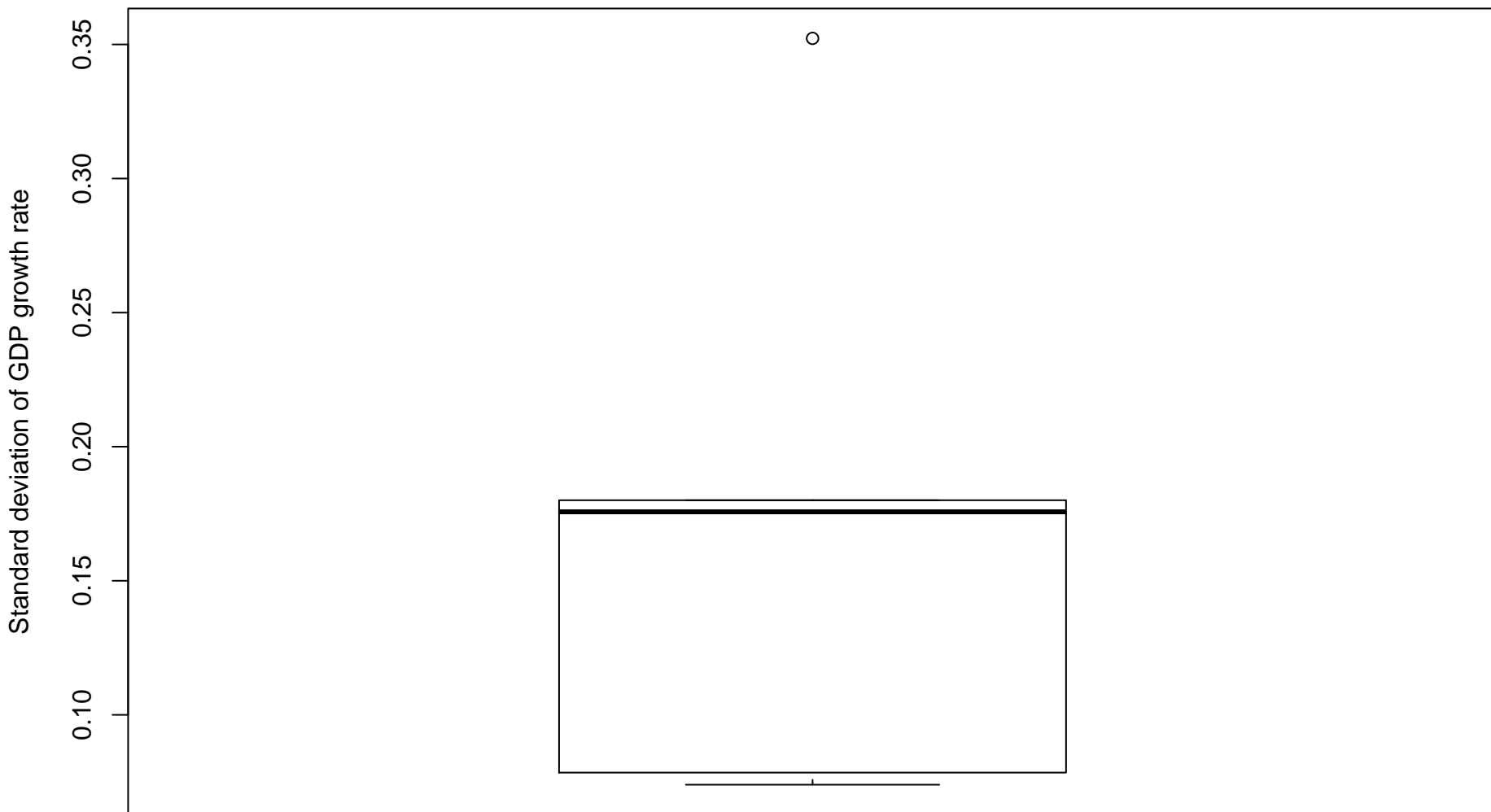
(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)
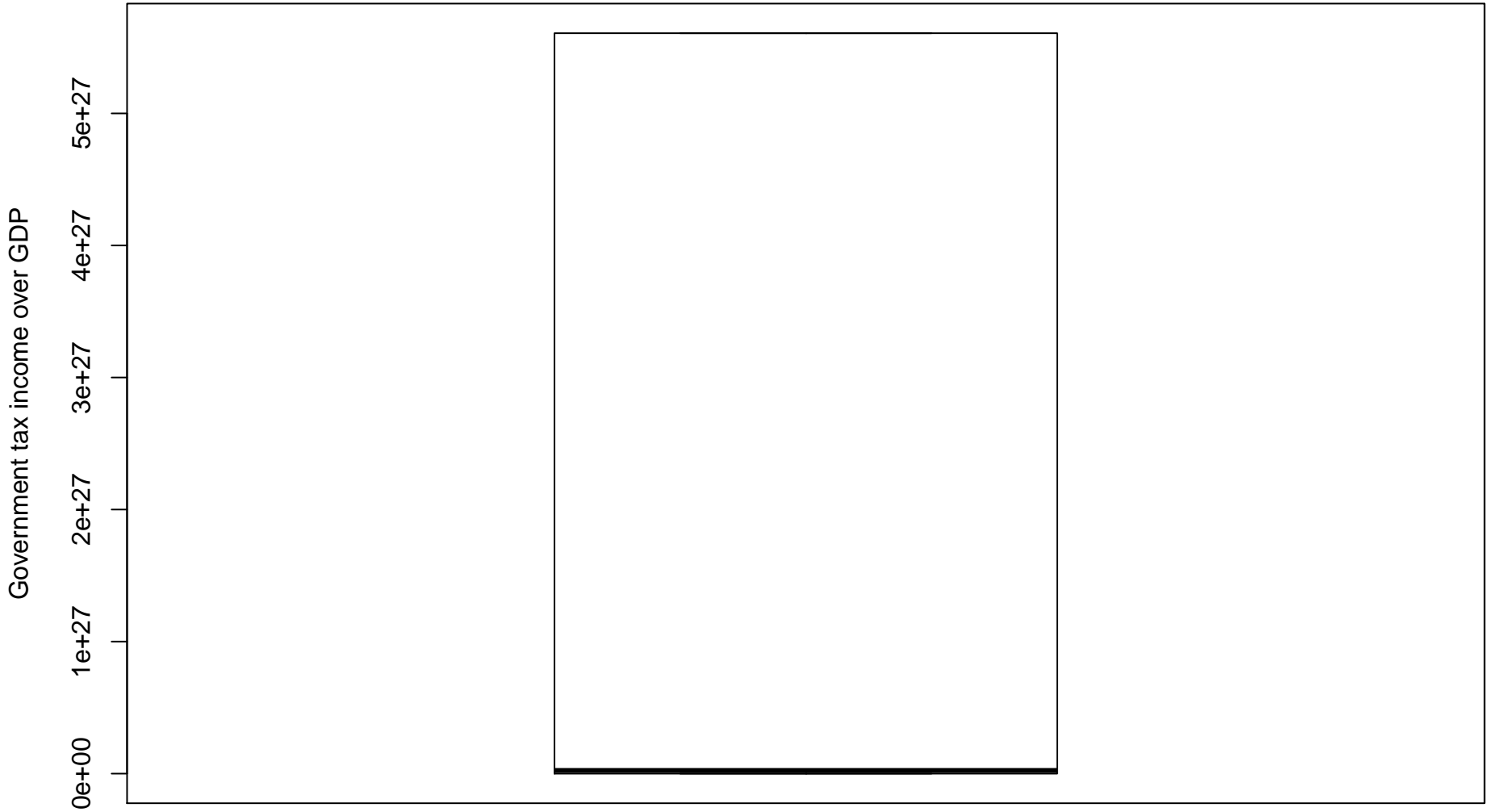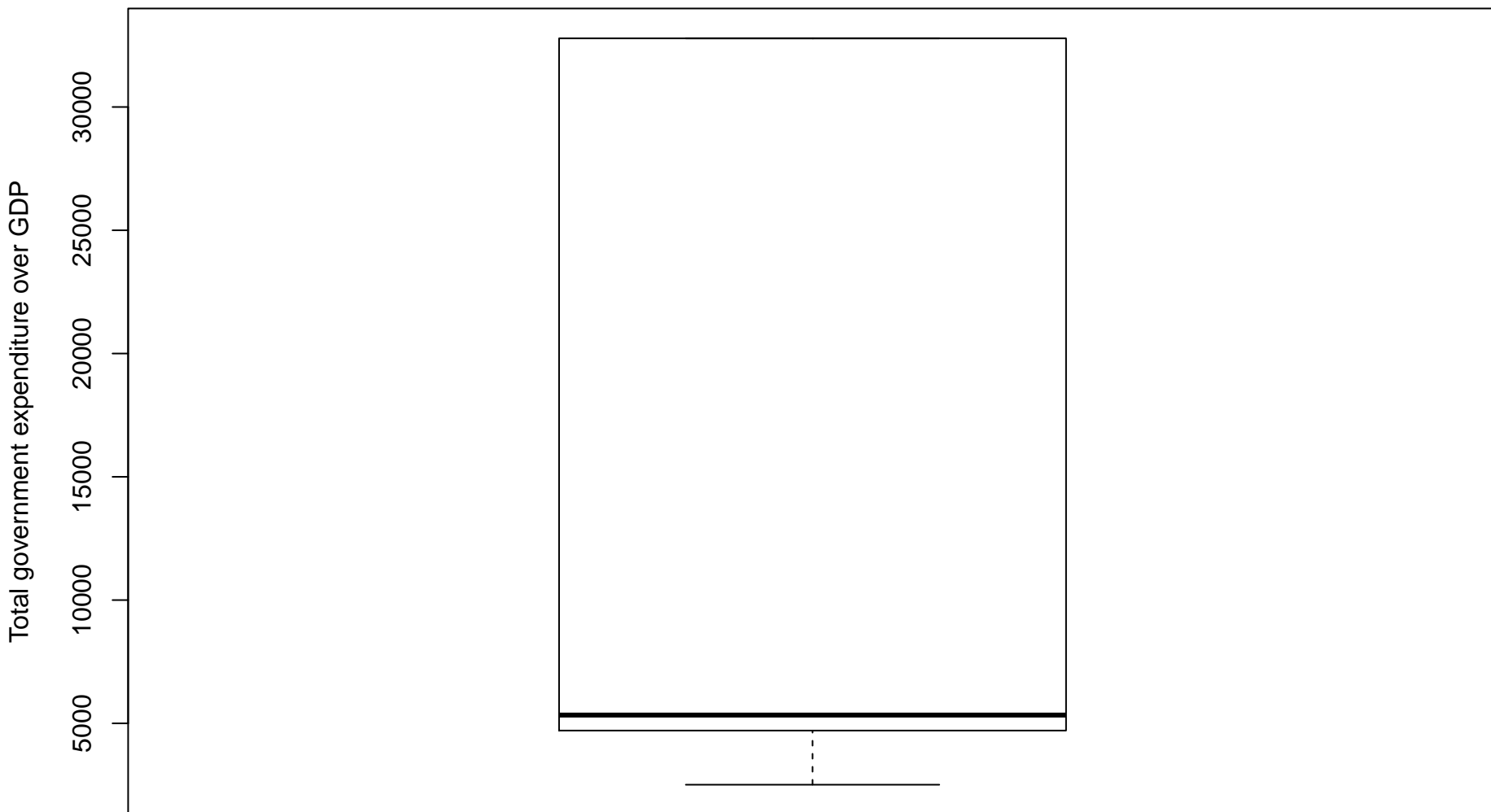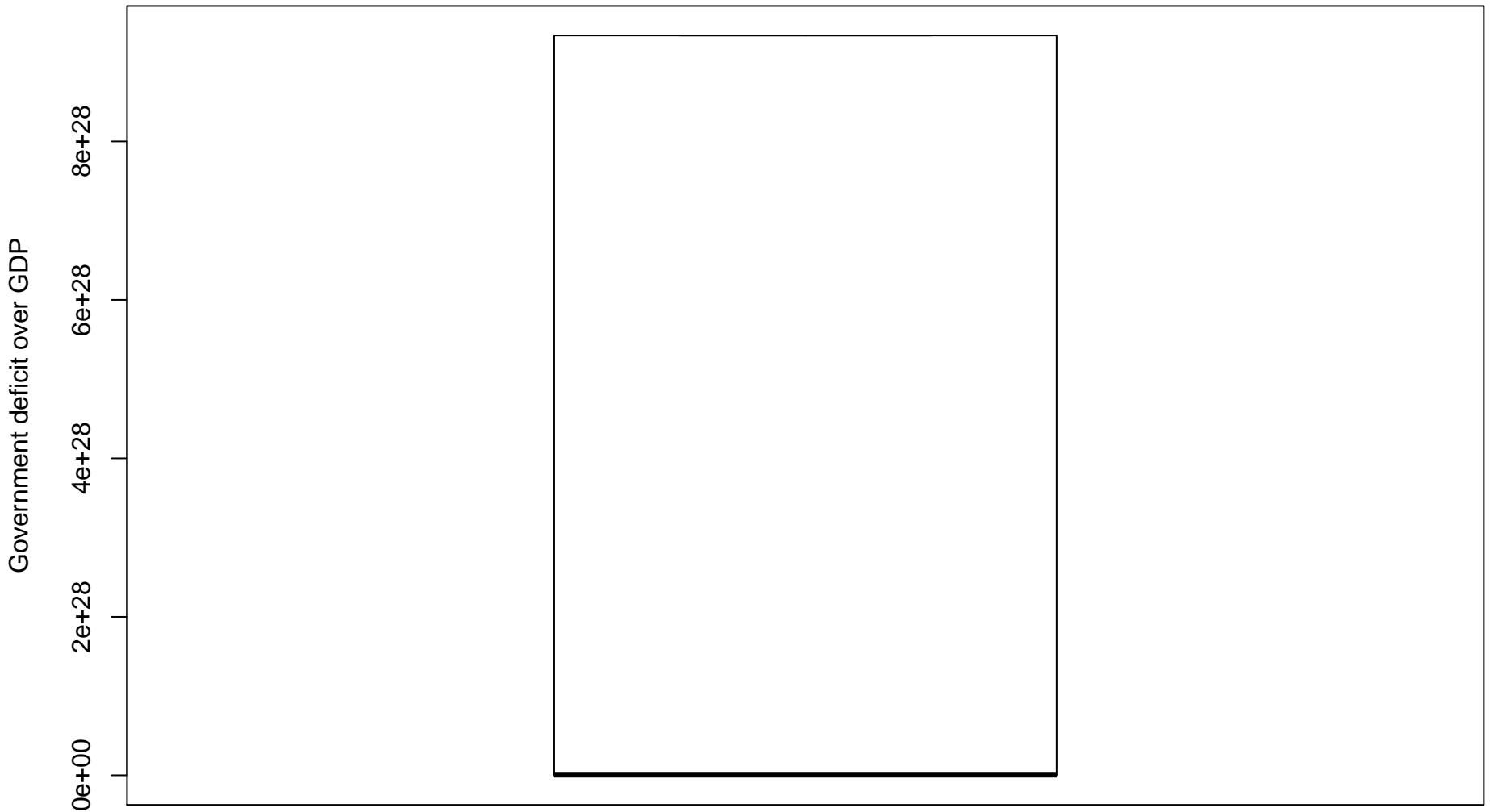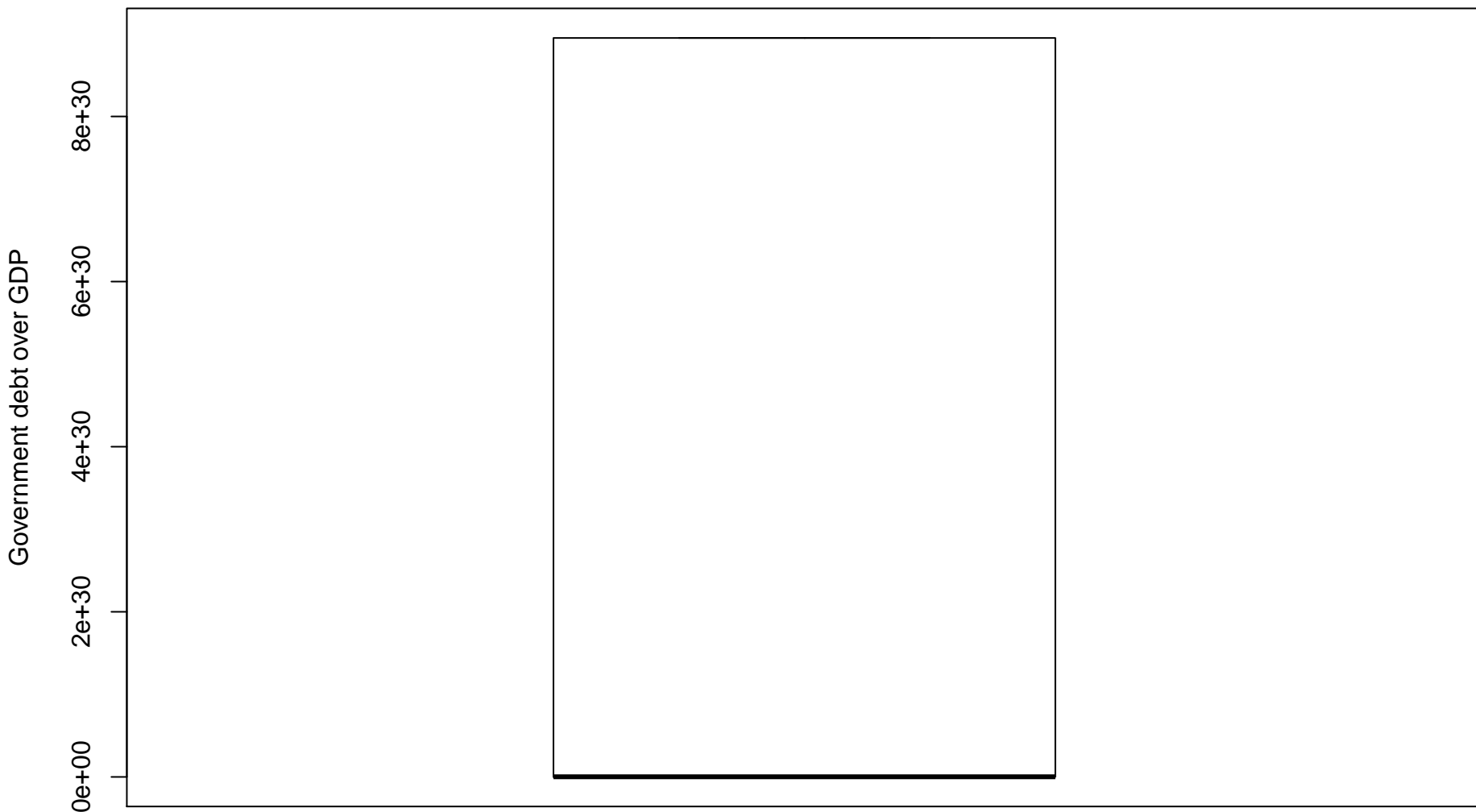
Likelihood of GDP crises
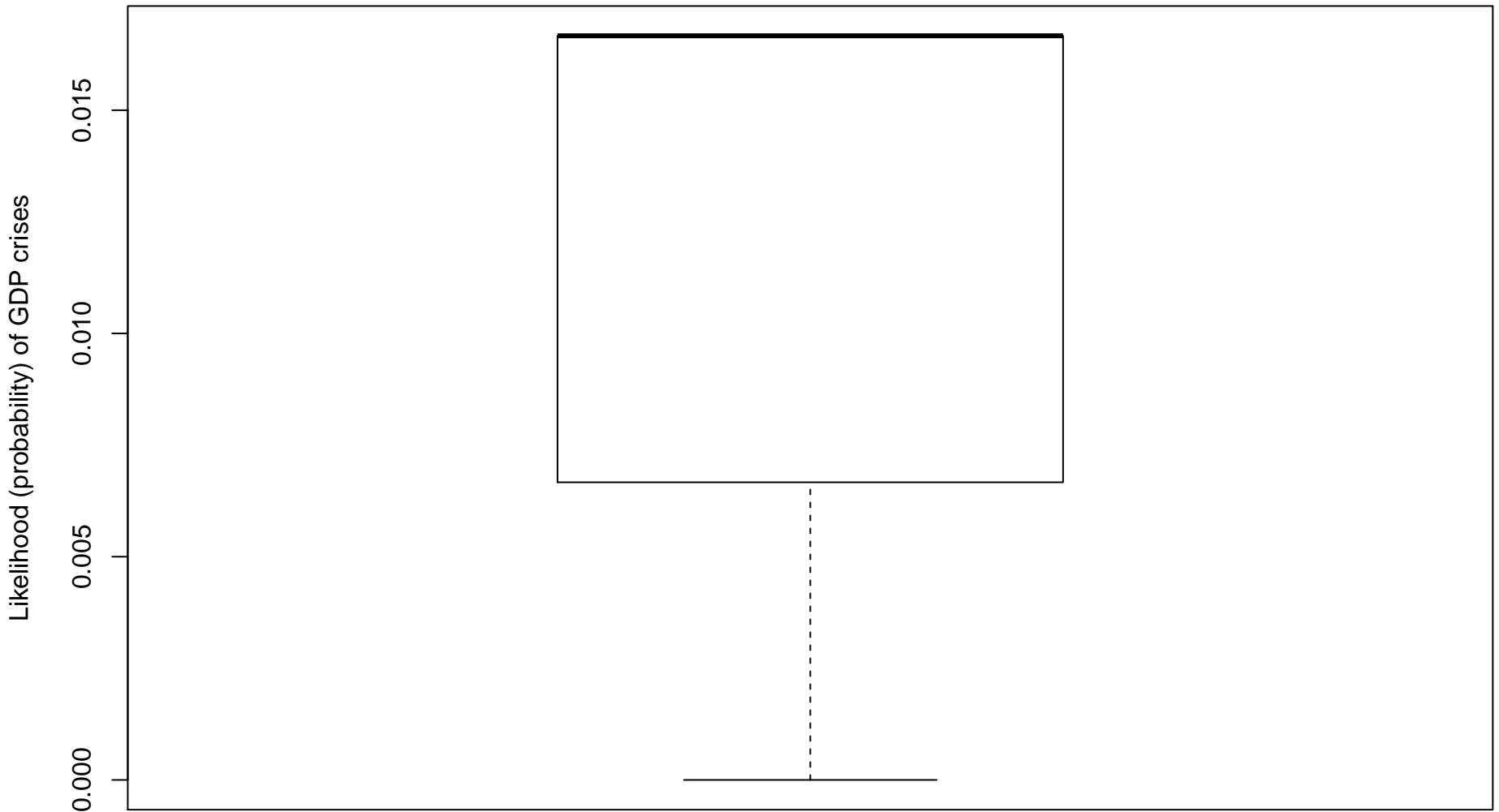
(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)

Inflation

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)

Tax
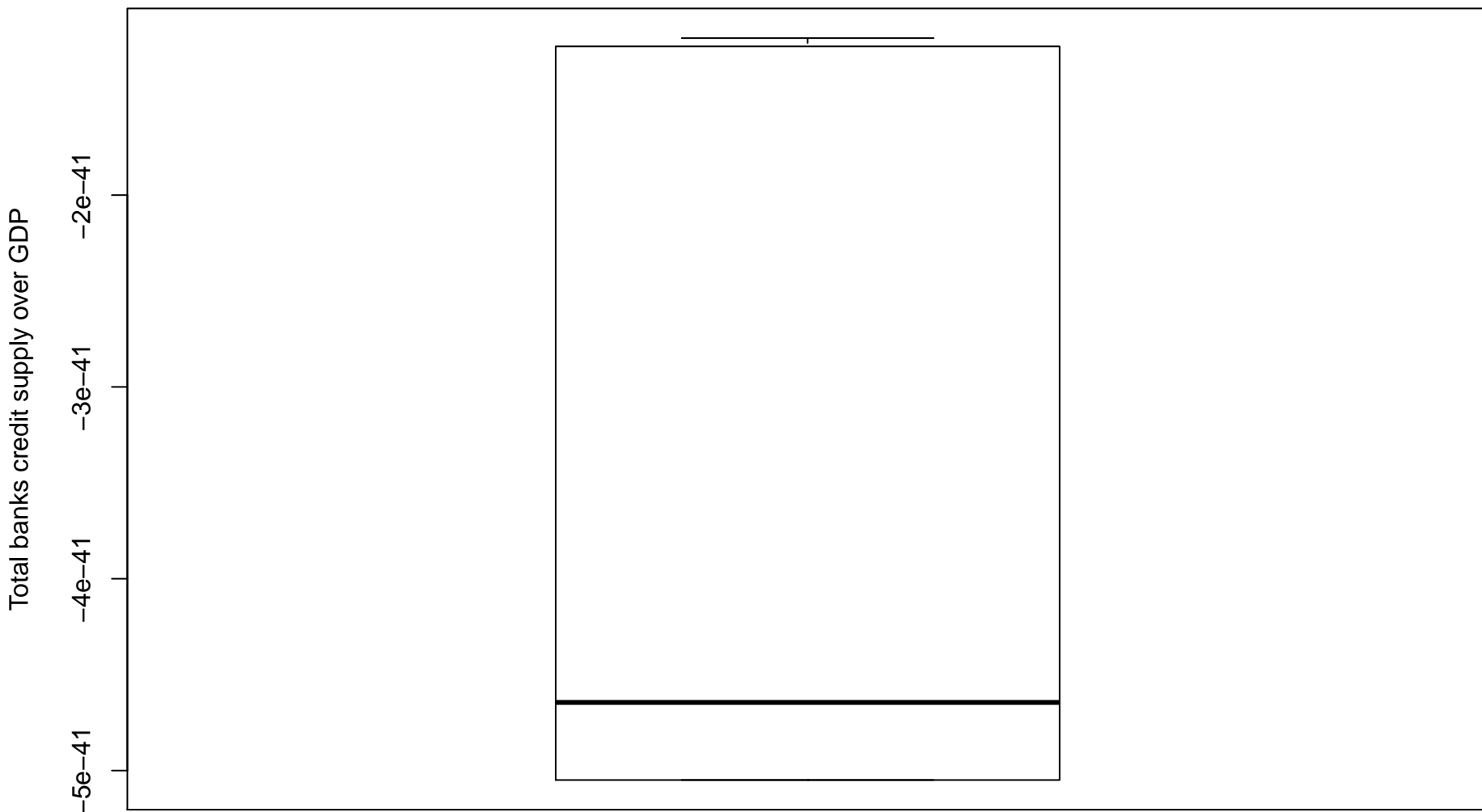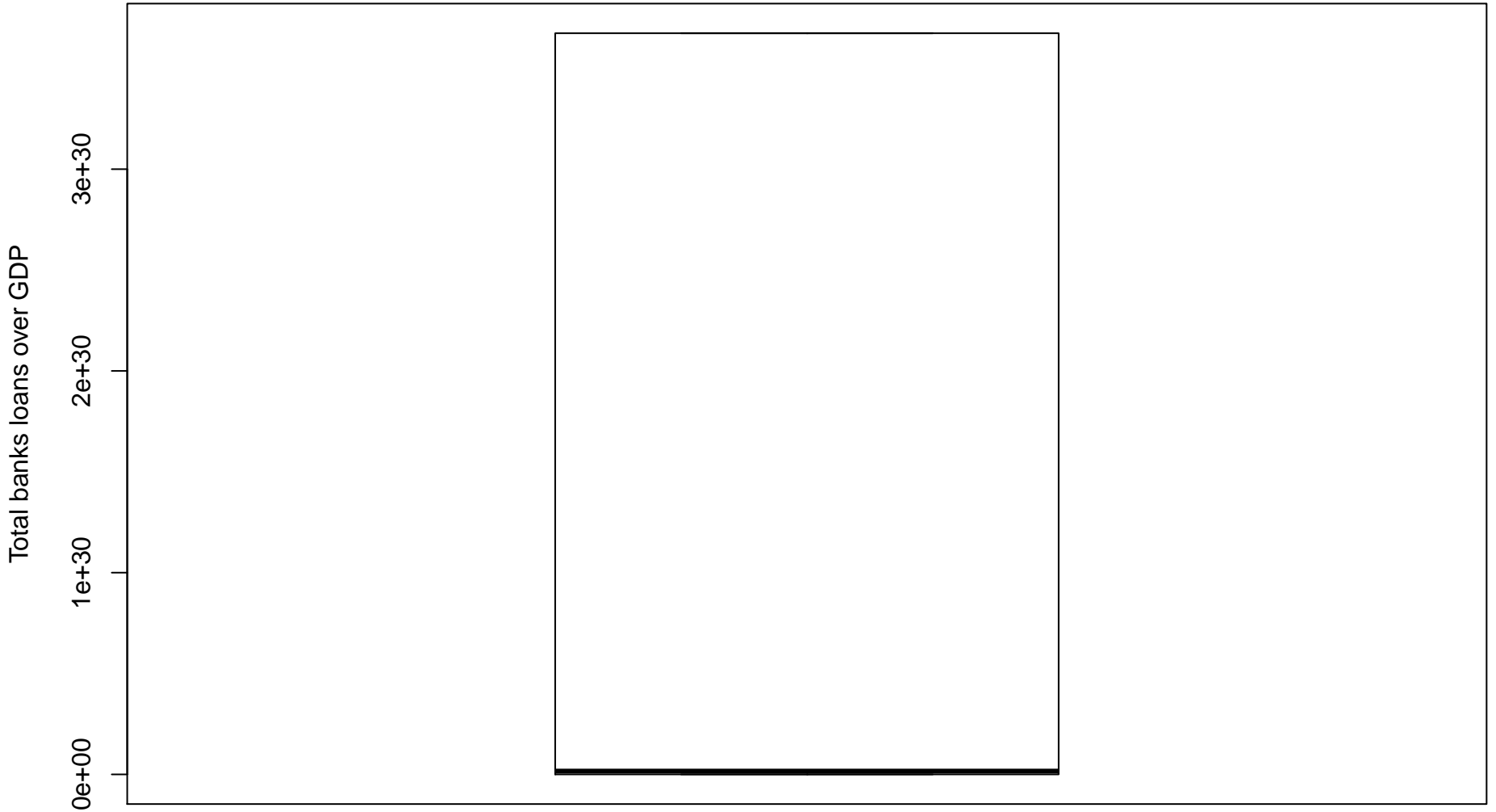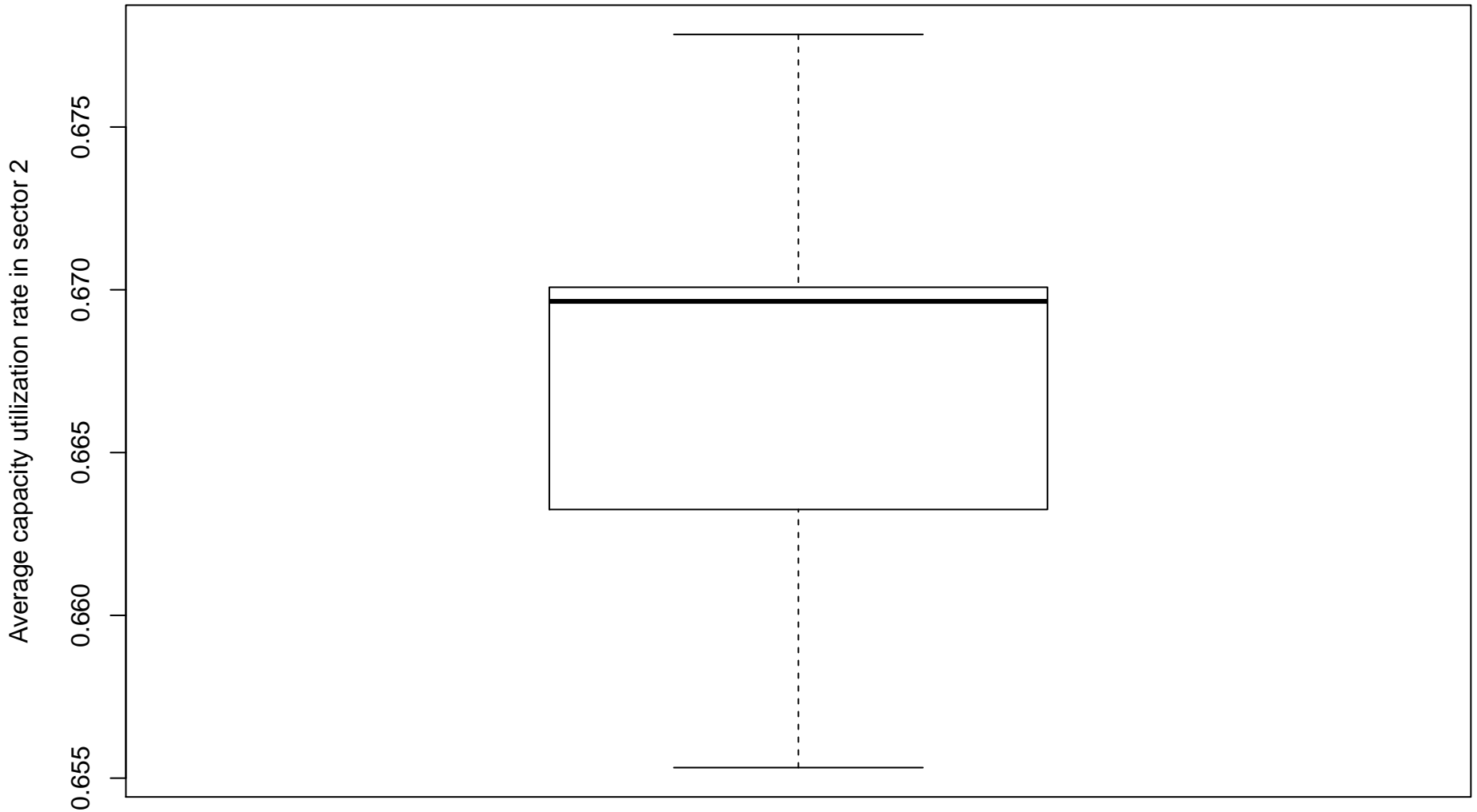

Government tax income over GDP

(bar: median / box: 2nd–3rd quartile / whiskers: max−min / points: outliers / MC runs = 5 / period = 301 − 600)

Government total expenditure

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)

Government deficit

Government deficit over GDP

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 5 / period = 301 − 600)

Government debt

Government debt over GDP

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)

Credit supply

Total banks credit supply over GDP

−2e−41

−3e−41

−4e−41

−5e−41

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 5 / period = 301 − 600)

Loans

Total banks loans over GDP

3e+30

2e+30

1e+30

0e+00

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)
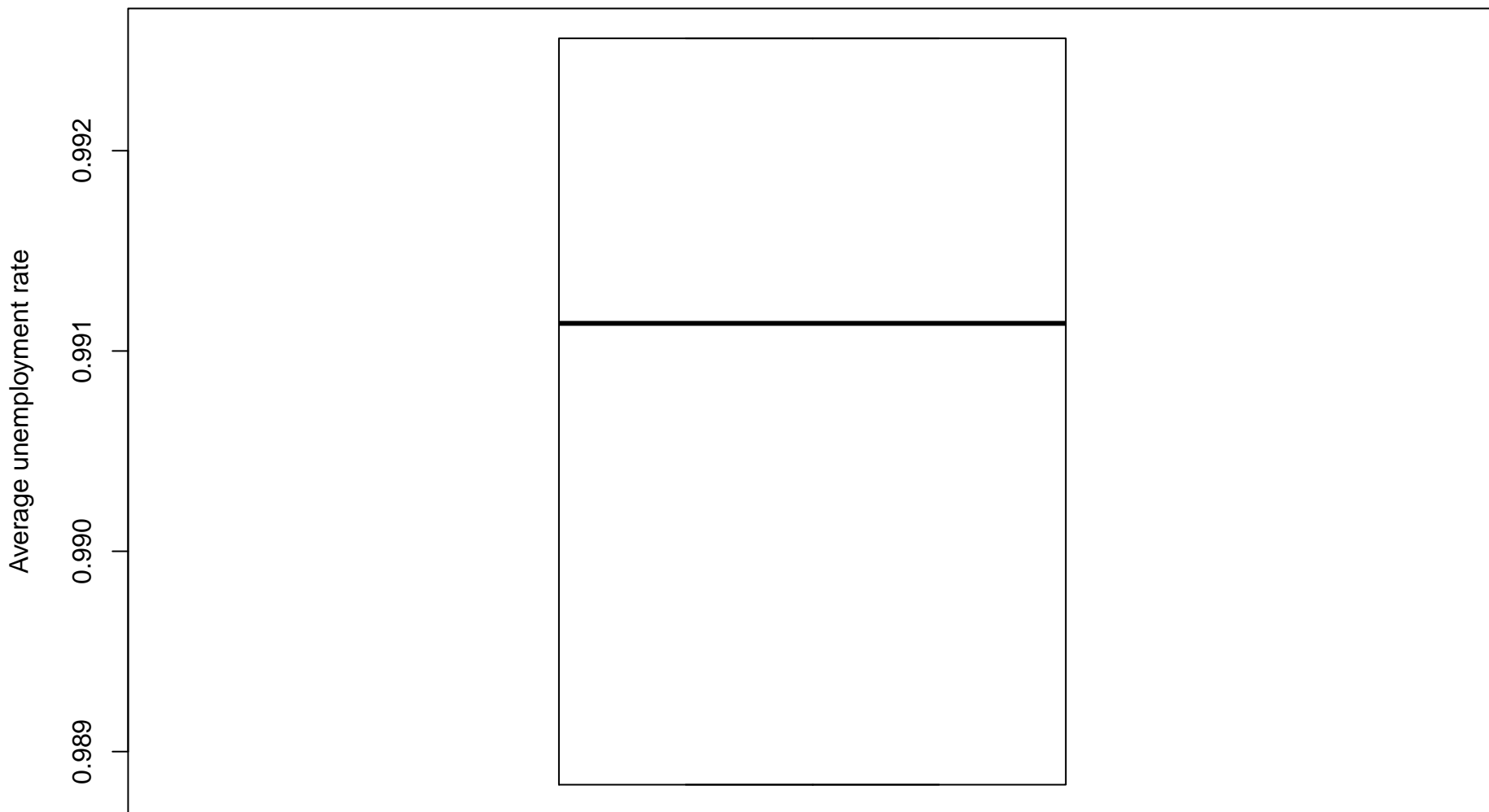
Capacity utilization

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 5 / period = 301 − 600)
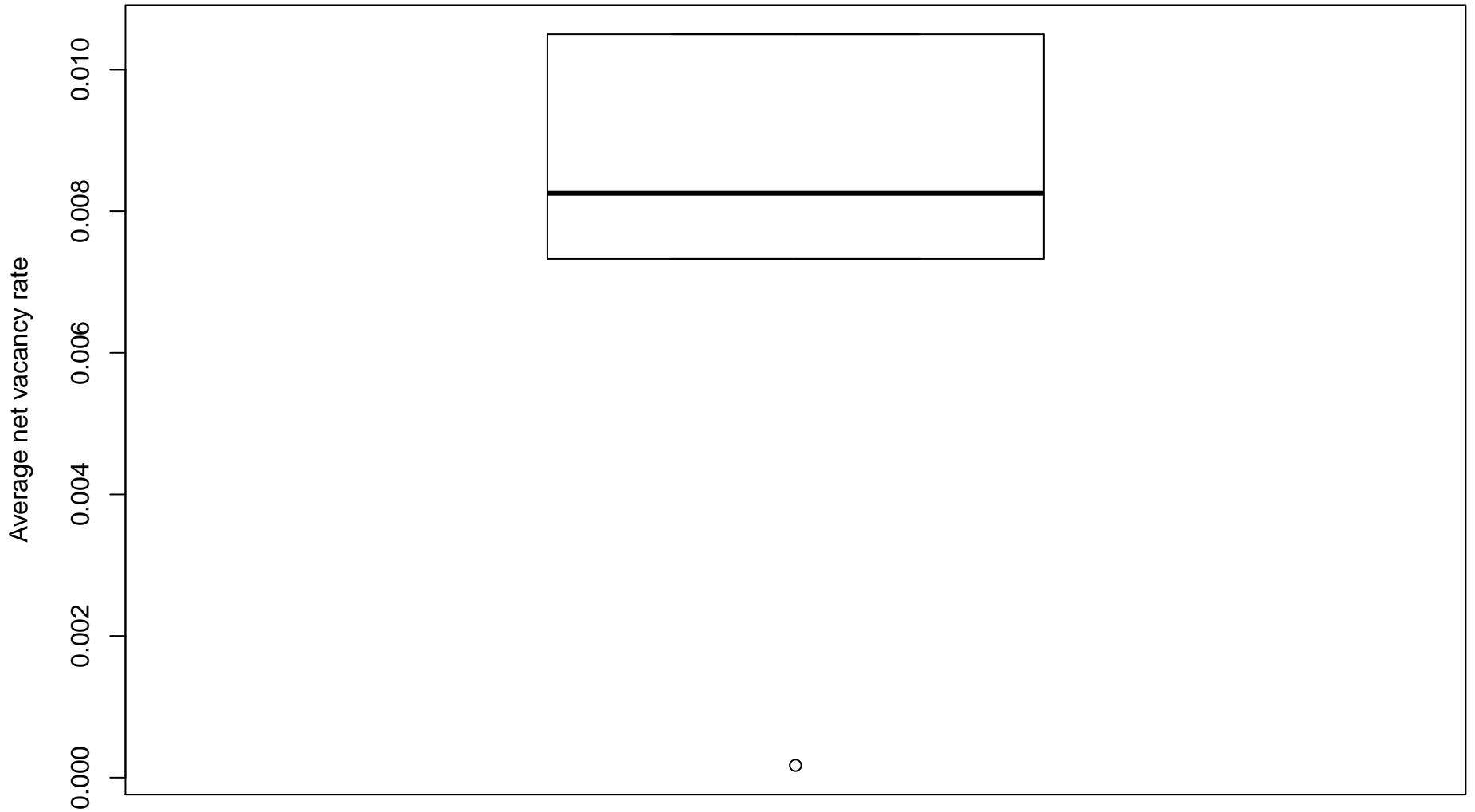
Full employment frequency

Frequency (probability) of full employment
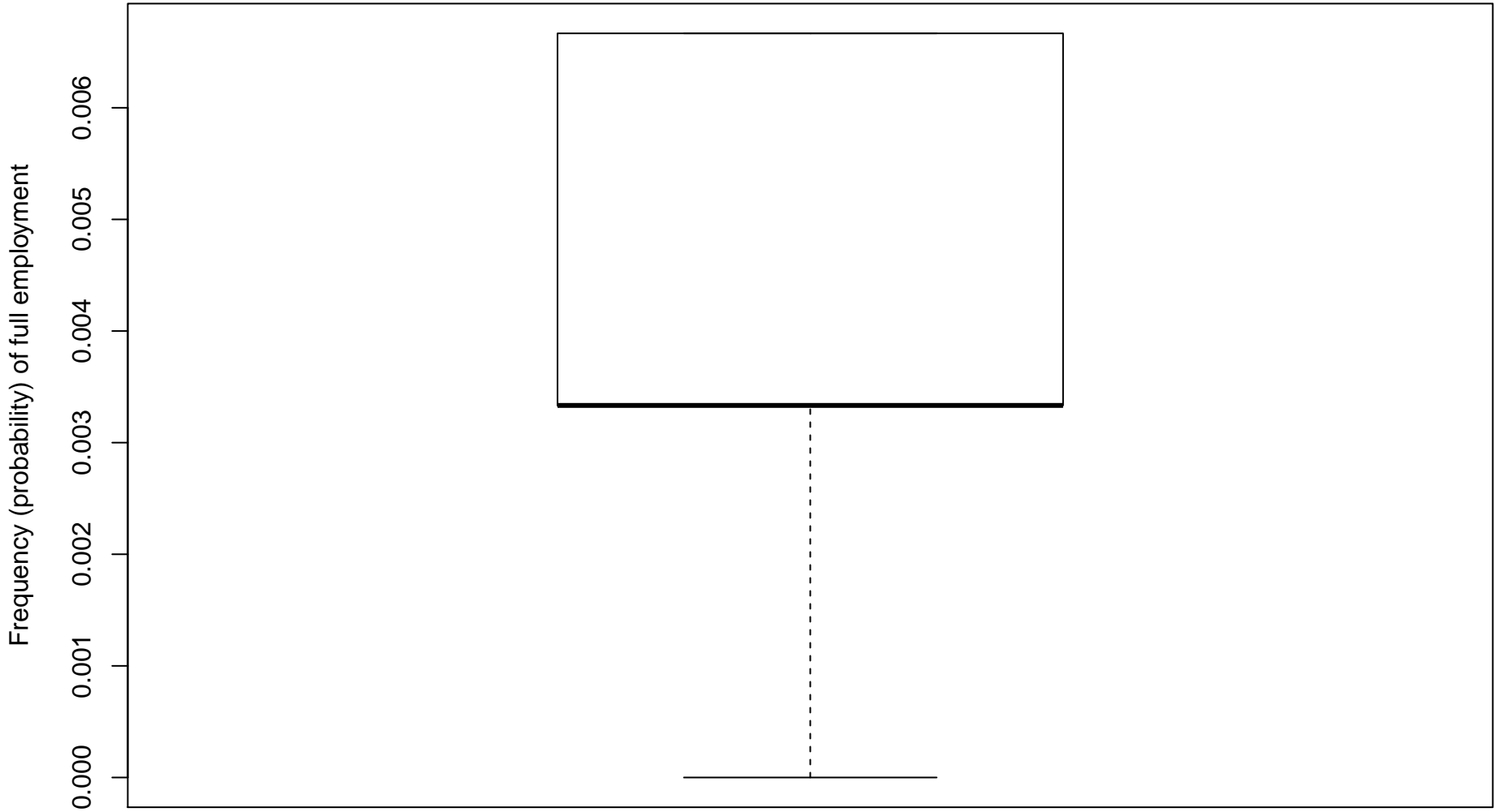
(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)

Unemployment
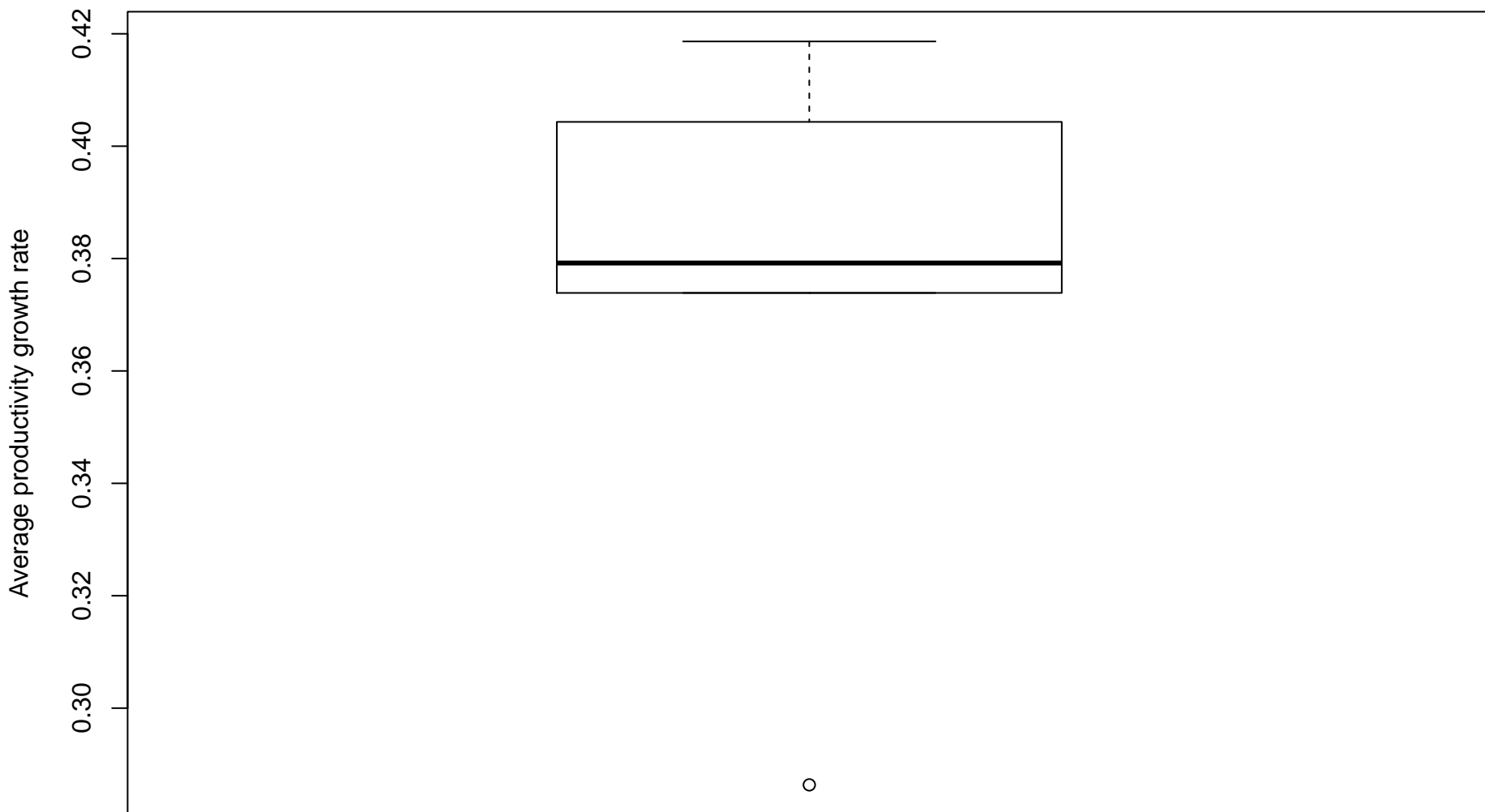

Average unemployment rate

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)

Vacancy

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 − 600)
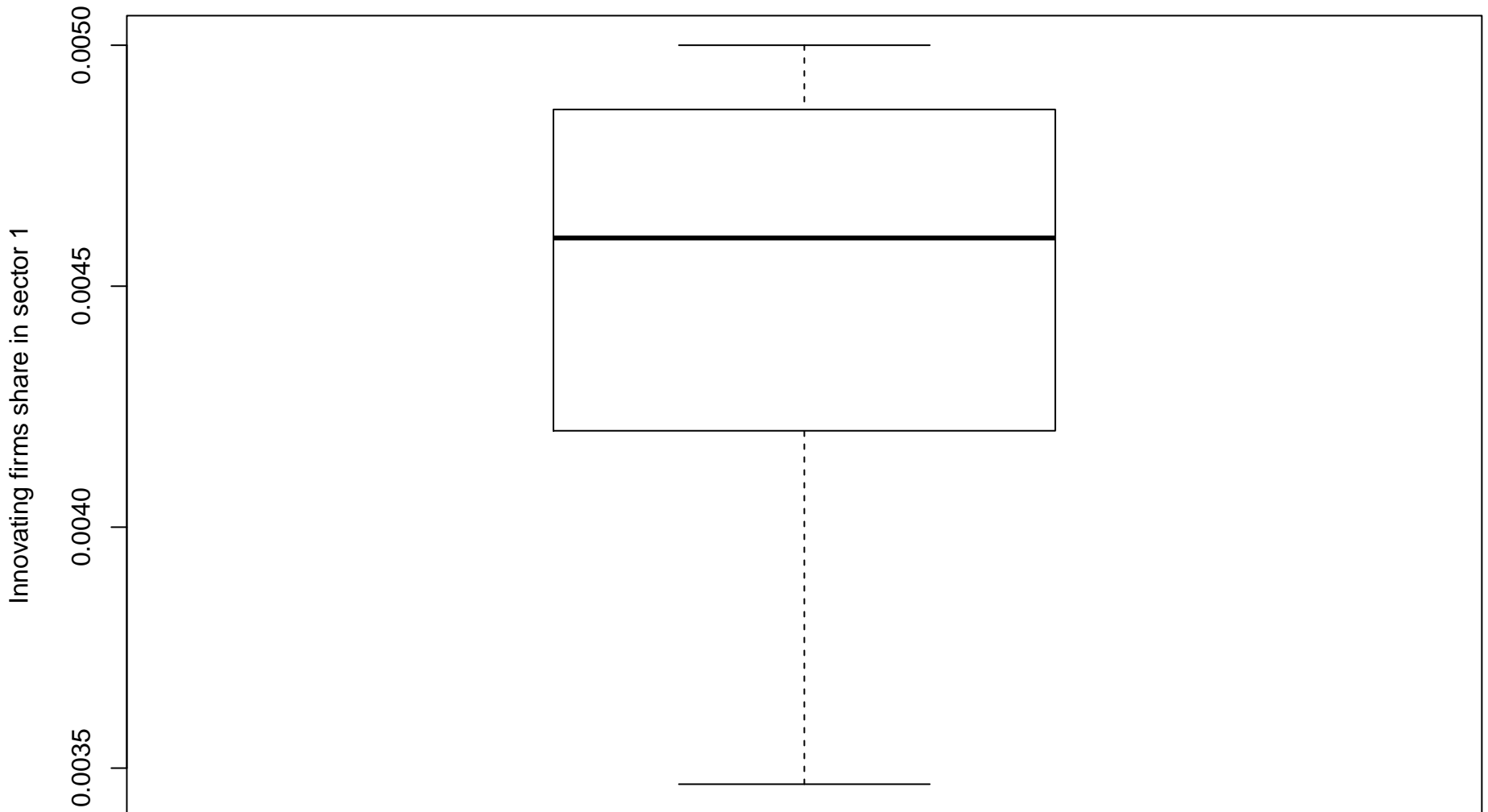
Productivity growth

Average productivity growth rate

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)
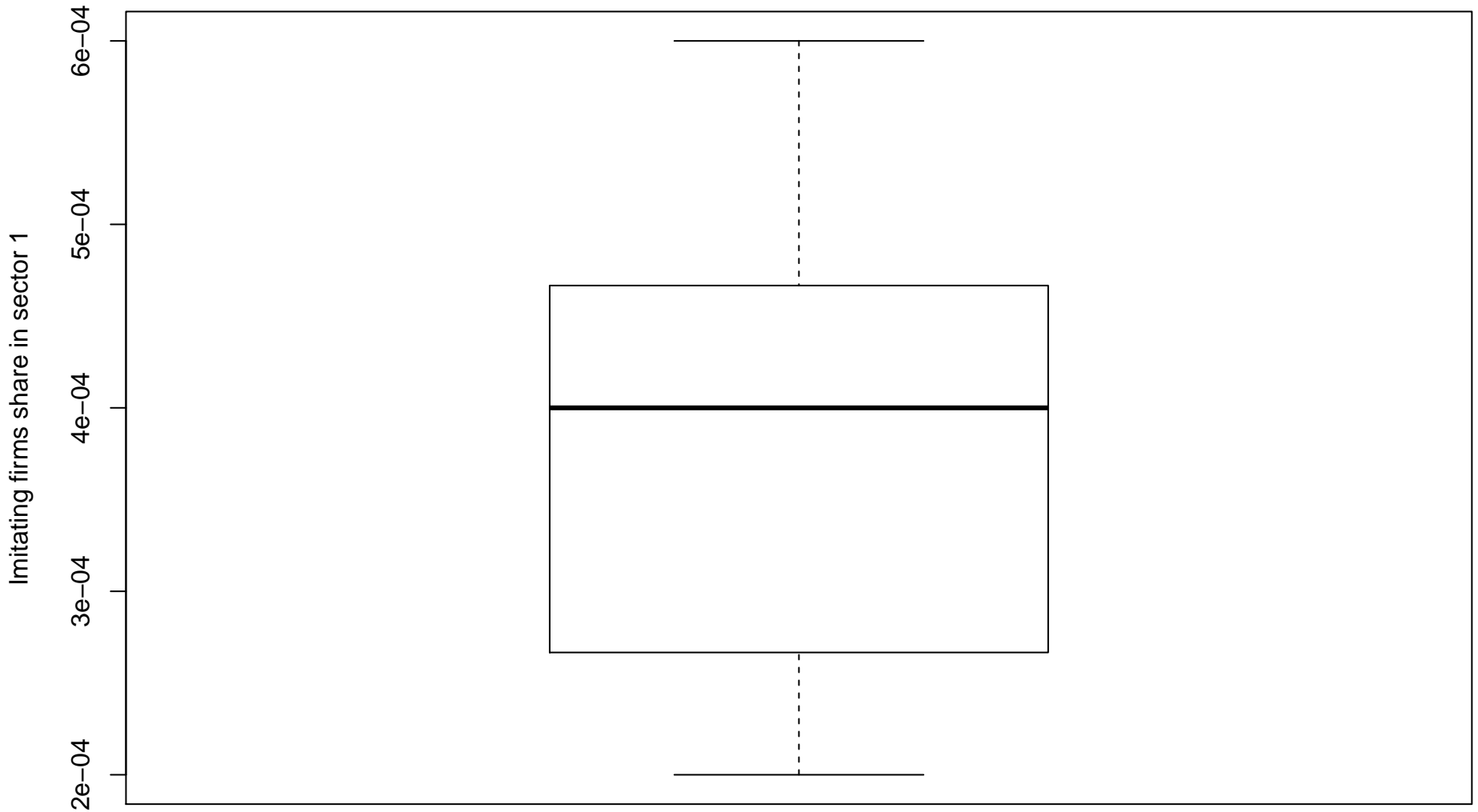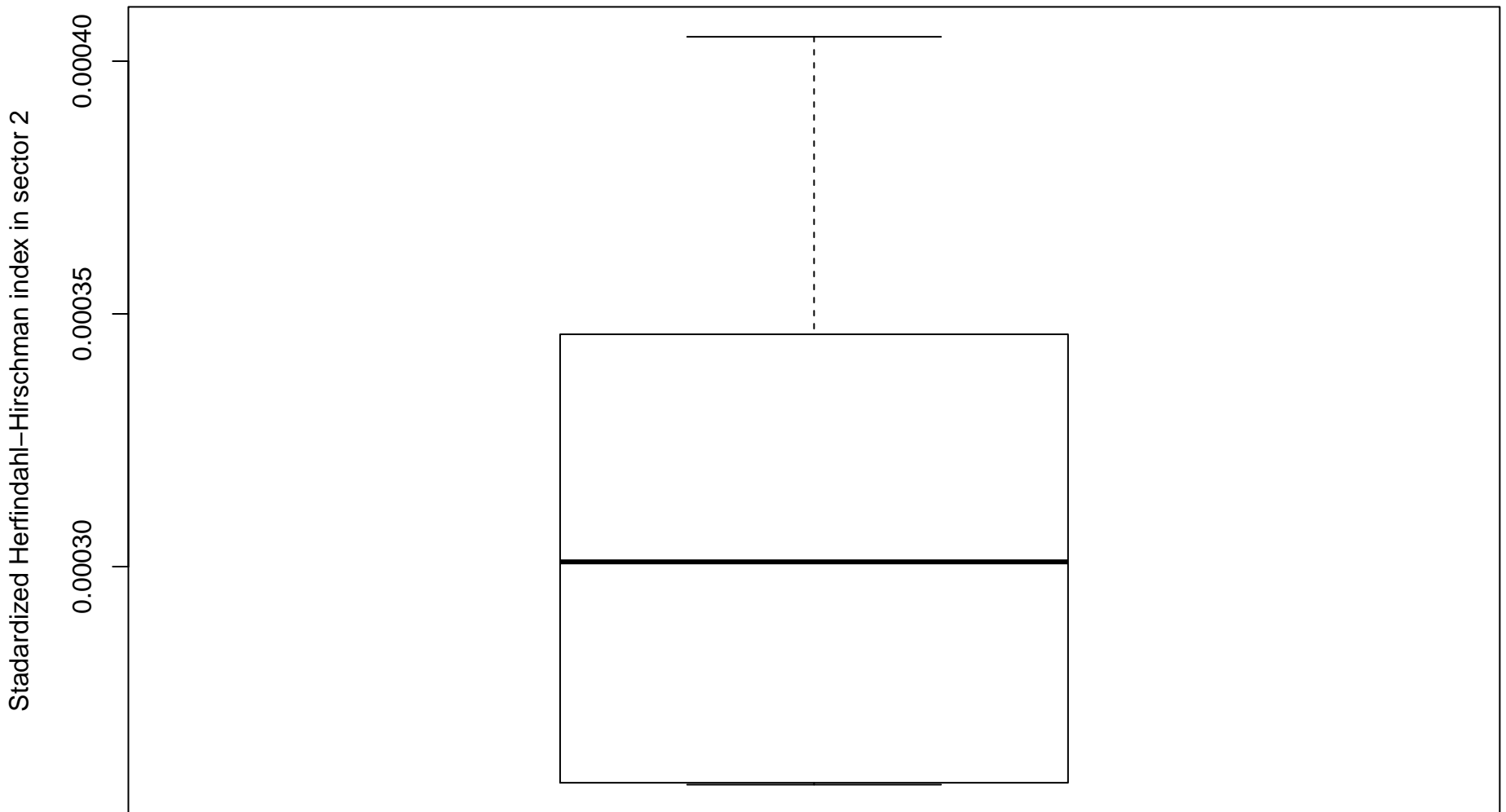
Innovation

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 − 600)
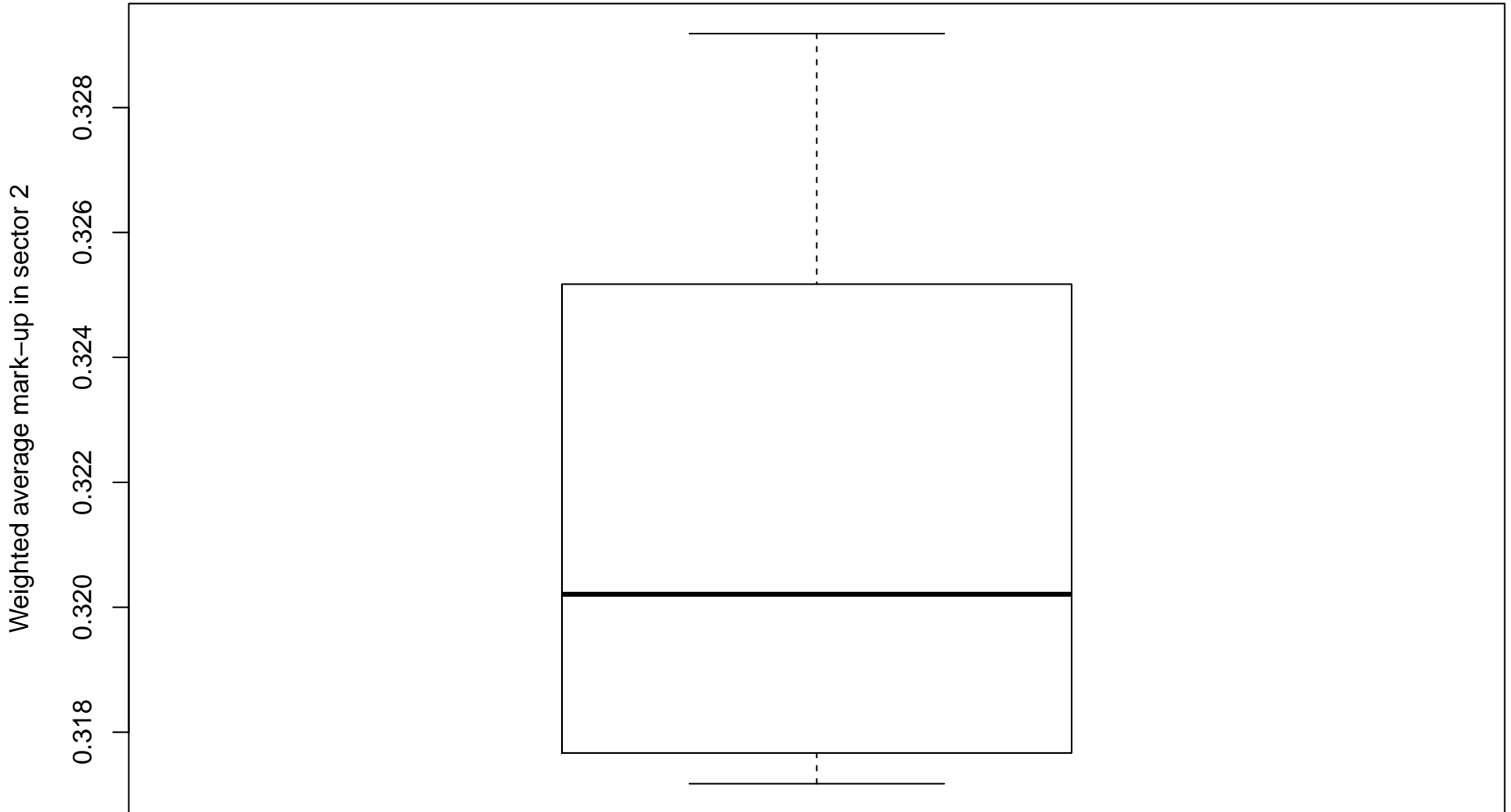
Imitation

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 5 / period = 301 − 600)

Market concentration

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 5 / period = 301 – 600)

Mark−ups

Weighted average mark−up in sector 2

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 5 / period = 301 − 600)

Net entry of firms

Net entries in both markets

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 5 / period = 301 − 600)

Monte Carlo descriptive statistics (all experiments)
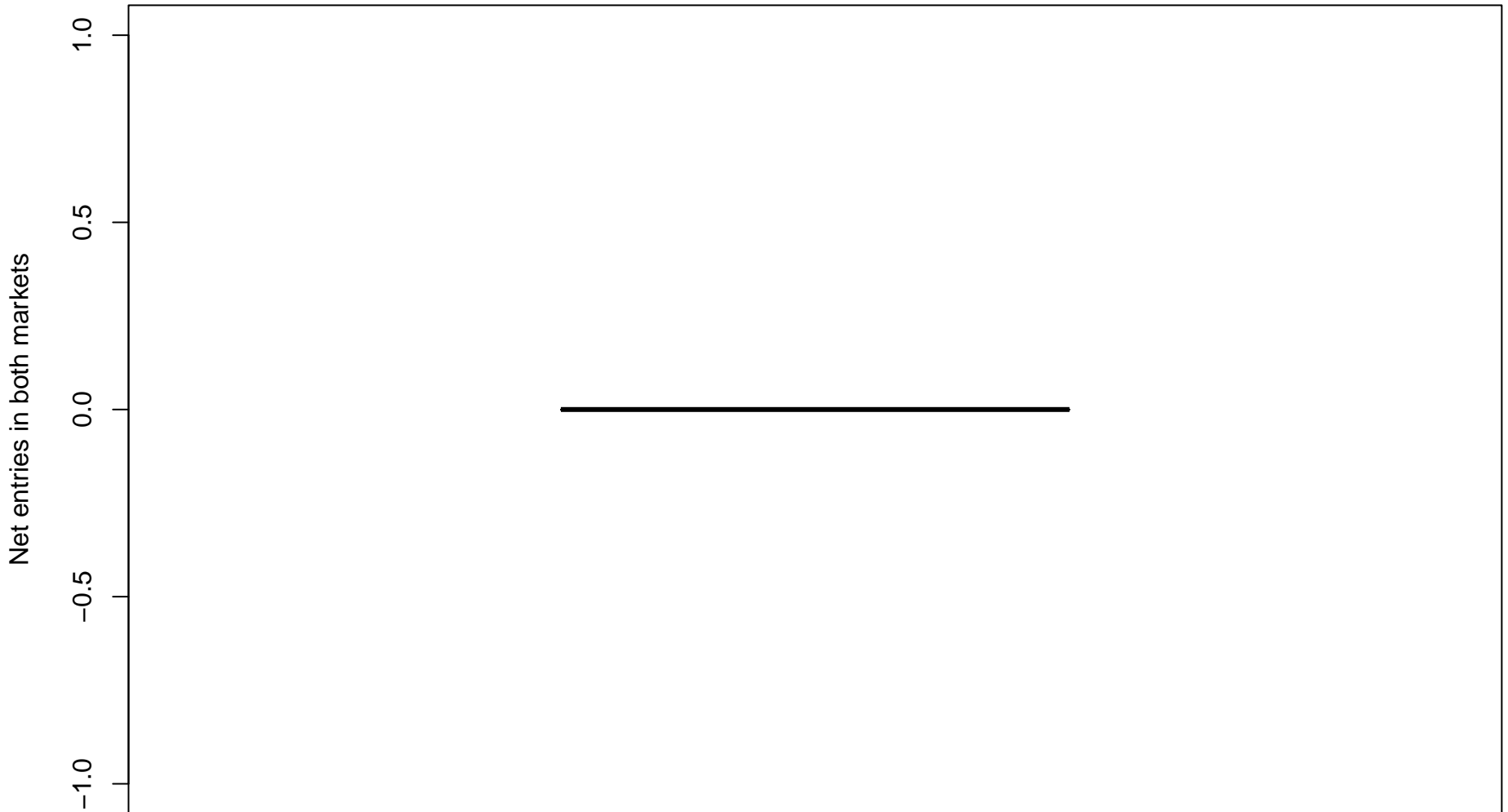
	Avg[1]	SD[1]	Min[1]	Max[1]
GDP growth	0.3571	0.04986	0.2711	0.3986
Volatility of GDP growth	0.1721	0.1128	0.07395	0.3523
Likelihood of GDP crises	0.02067	0.02488	0	0.06333
Inflation	1.008e+06	2.254e+06	−0.001031	5.041e+06
Tax	1.325e+45	2.962e+45	4.352e+04	6.624e+45
Government total expenditure	6.175e+09	1.381e+10	2511	3.087e+10
Government deficit	6.483e+47	1.45e+48	2.879e+07	3.241e+48
Government debt	6.521e+49	1.458e+50	1.989e+08	3.261e+50
Credit supply	−1.534e−36	3.431e−36	−7.672e−36	−1.182e−41
Loans	9.721e+47	2.174e+48	2.682e+07	4.861e+48
Capacity utilization	0.6672	0.008428	0.6553	0.6778
Full employment frequency	0.006667	0.007817	0	0.02
Unemployment	0.9866	0.01487	0.9609	0.9994
Vacancy	0.0134	0.01576	0.0001728	0.04073
Productivity growth	0.3725	0.0515	0.2864	0.4186
Innovation	0.004427	0.0006175	0.003467	0.005
Imitation	0.0003867	0.0001592	0.0002	0.0006
Market concentration	0.0003132	6.31e−05	0.0002569	0.0004048
Mark−ups	0.3219	0.00517	0.3172	0.3292
Net entry of firms	0	0	0	0

Experiments: [1] Free entry
(numbers in brackets indicate the experiment number / MC runs = 5 / period = 301 − 600)