GDP, investment and consumption (all experiments)

Benchmark

GDP
Investment
Consumption

Logs

25

20

15

10

0   200   400   600   800   1000

Time
(MC runs = 10)
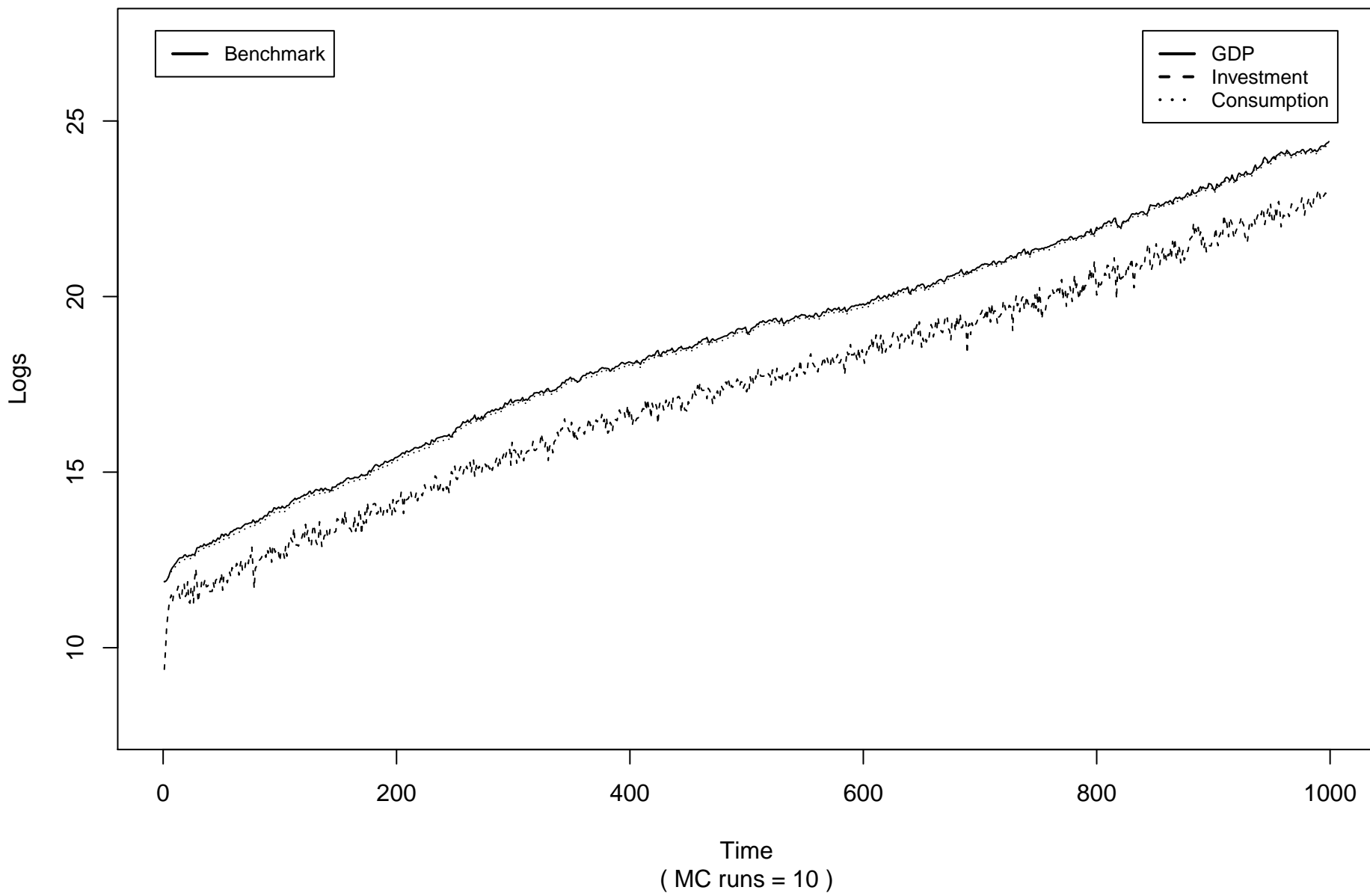
GDP, investment and consumption (Benchmark)

Logs

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 10)

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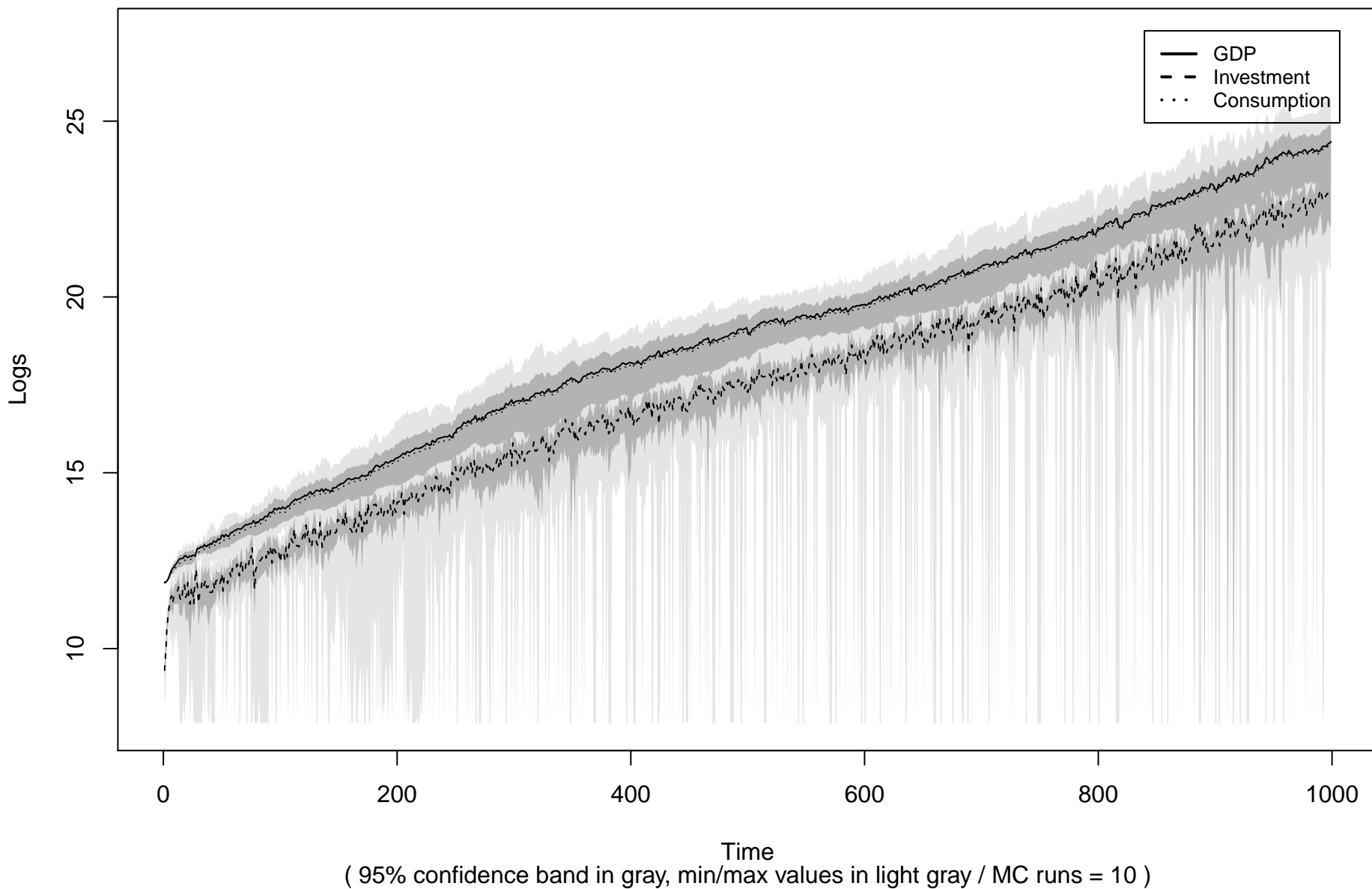
GDP (all experiments)

GDP (Benchmark)

Log GDP

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 10)

Effective GDP
GDP @ 100% utilization
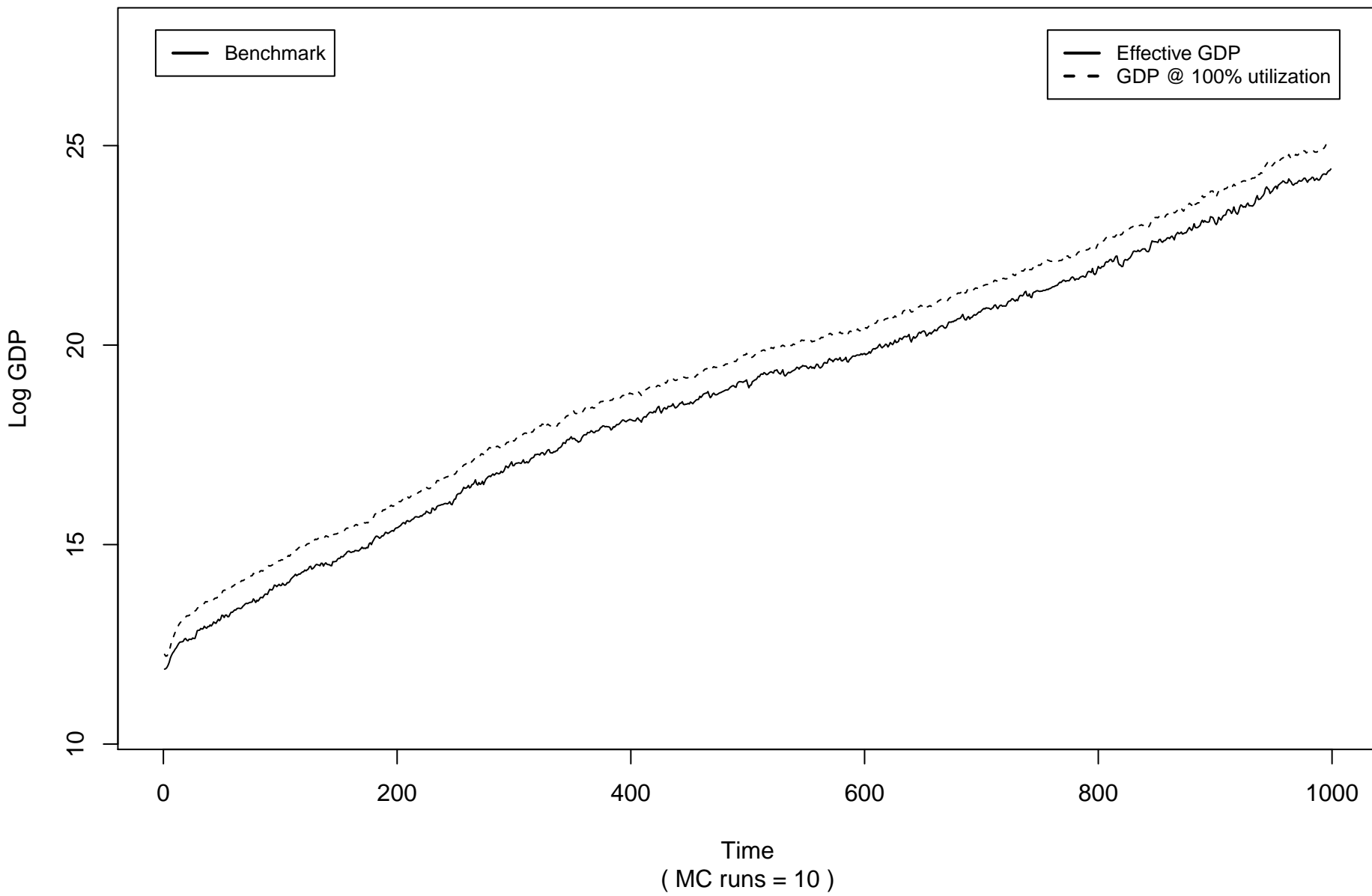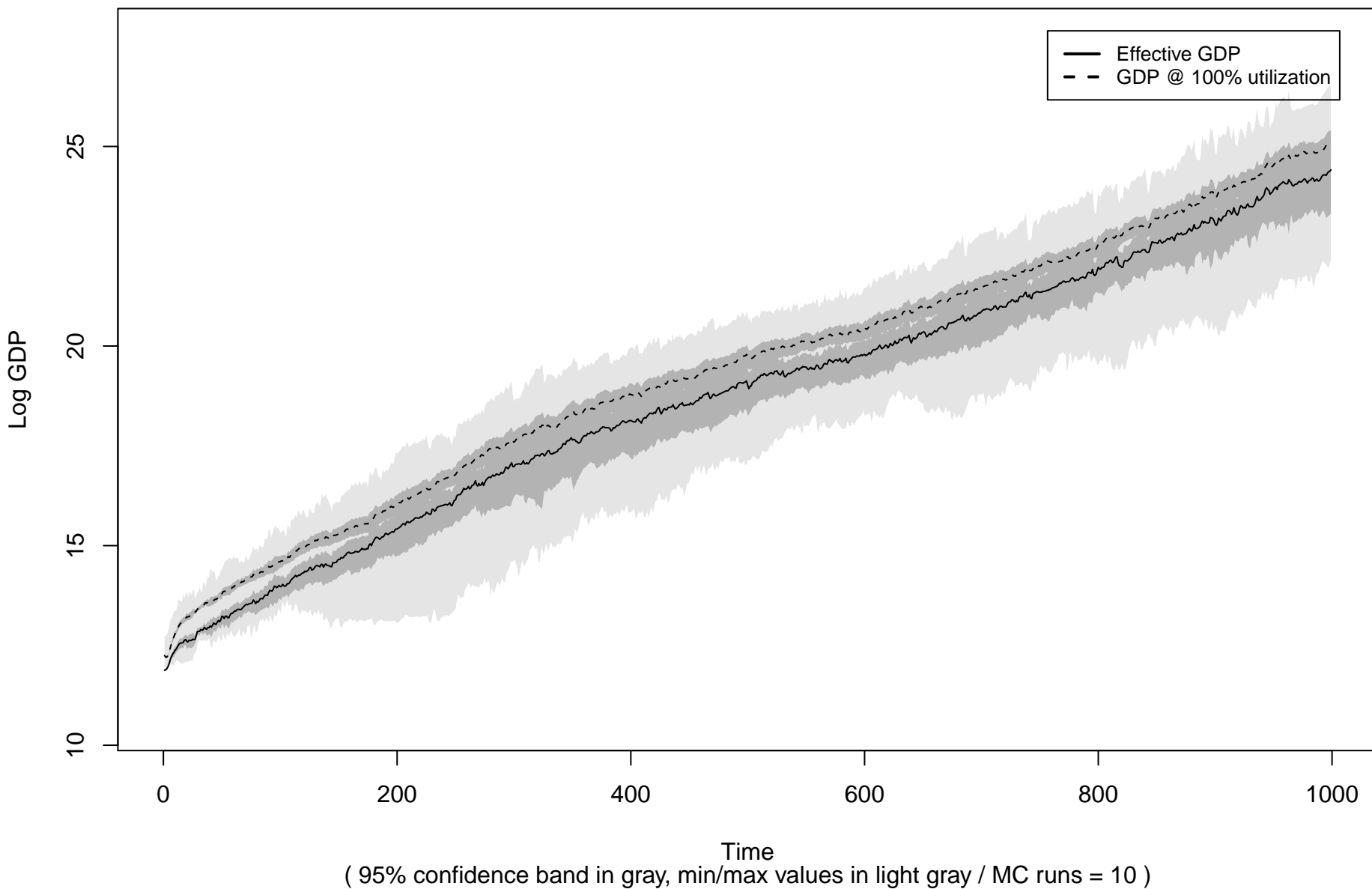
Government income and expenditure on GDP (all experiments)

Log government tax income and expenditure over GDP

Benchmark

Tax
Total expenditure
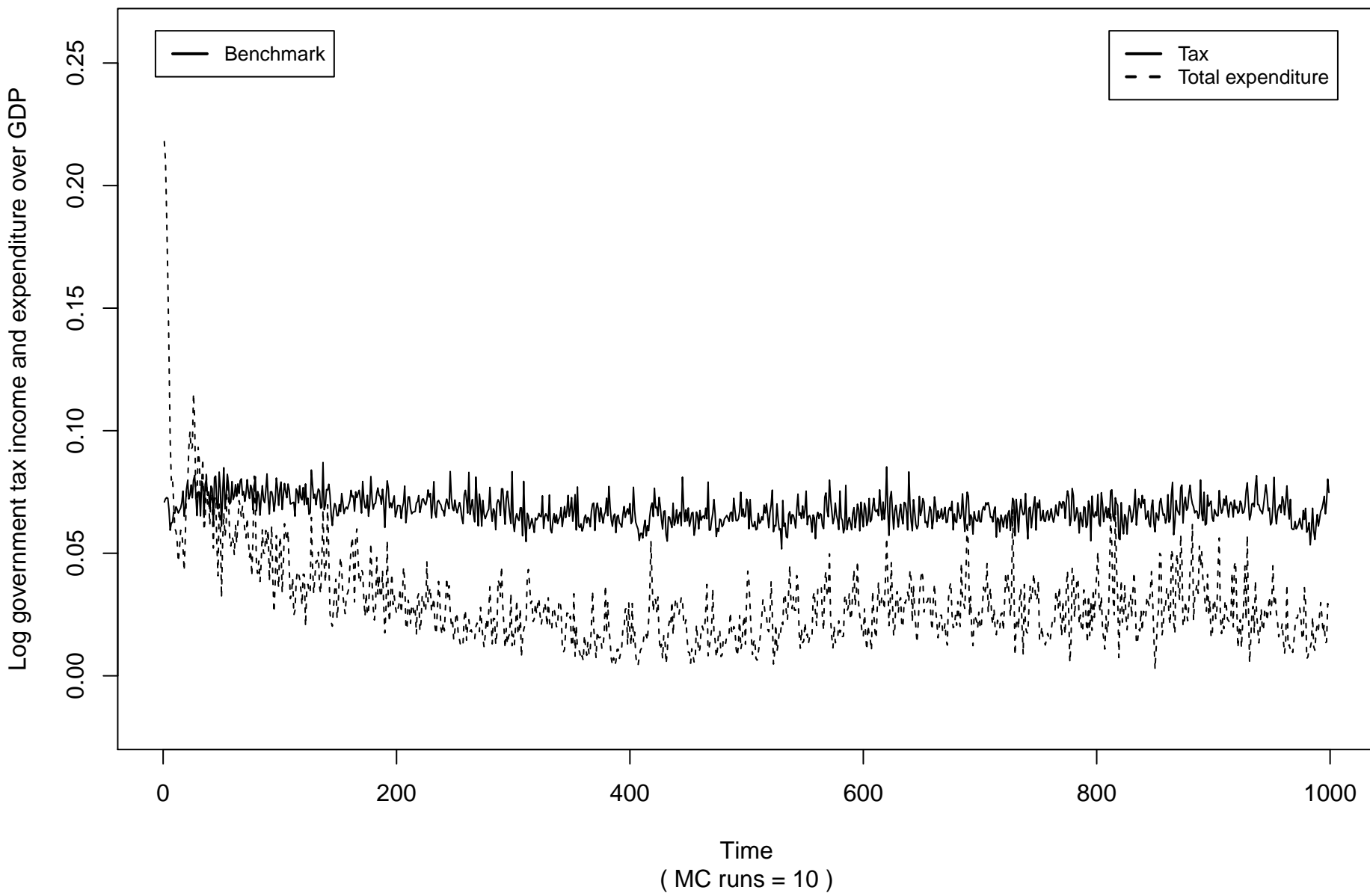
Time
(MC runs = 10)

Government income and expenditure on GDP (Benchmark)

Log government tax income and expenditure over GDP

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 10)
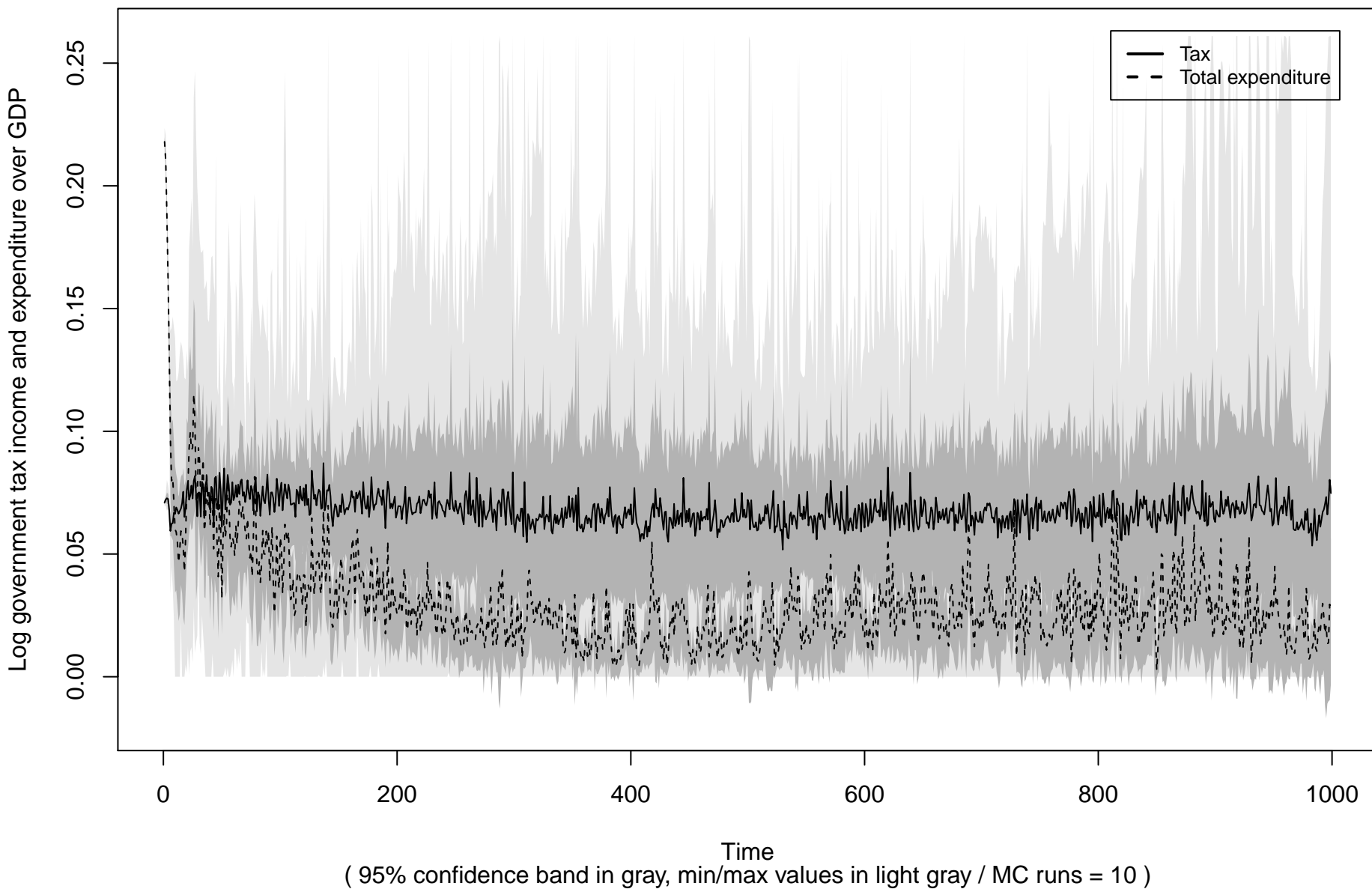
Government deficit on GDP (all experiments)

Government deficit over GDP

Benchmark
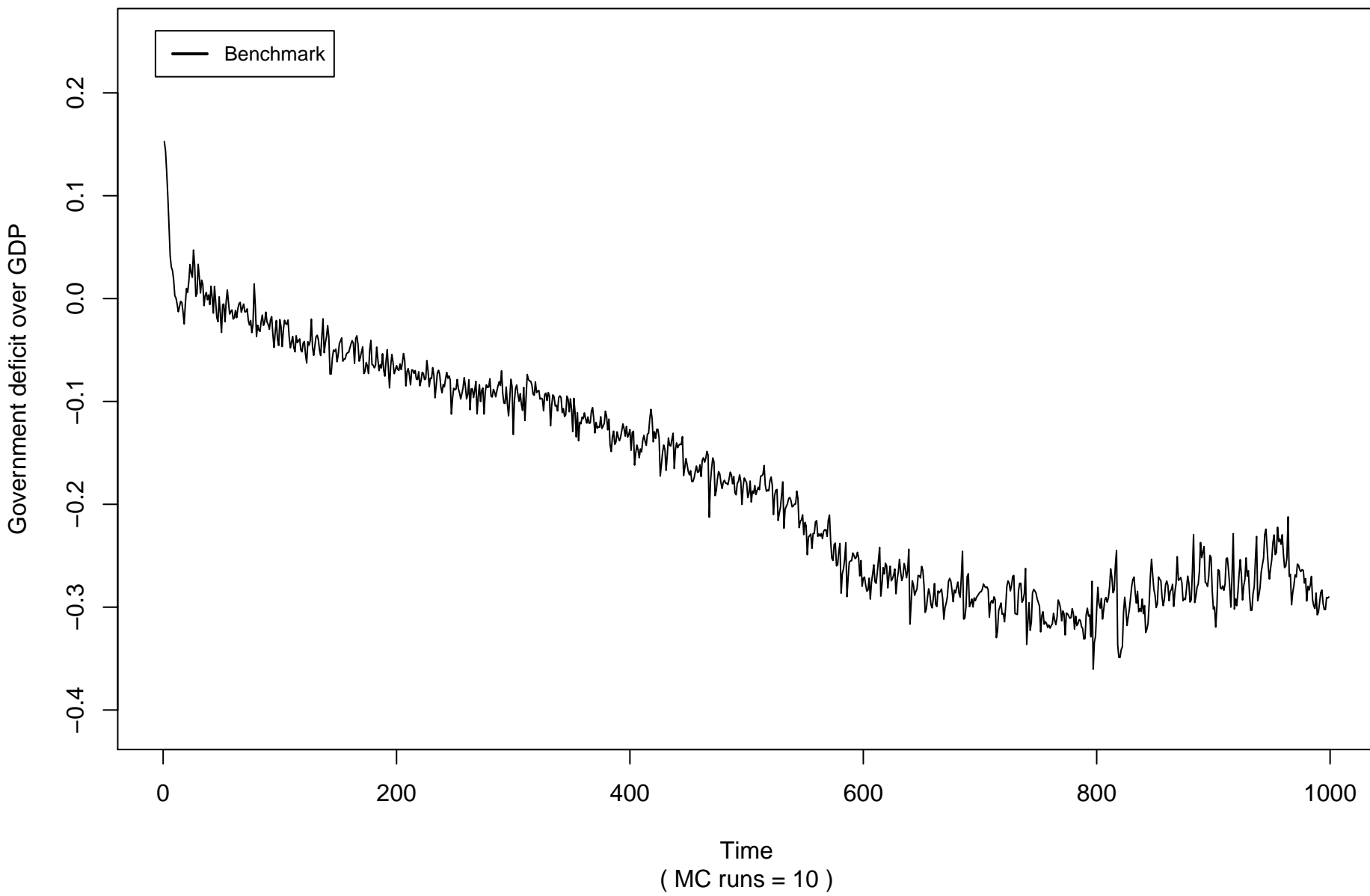
Time
(MC runs = 10)

Government deficit on GDP (Benchmark)
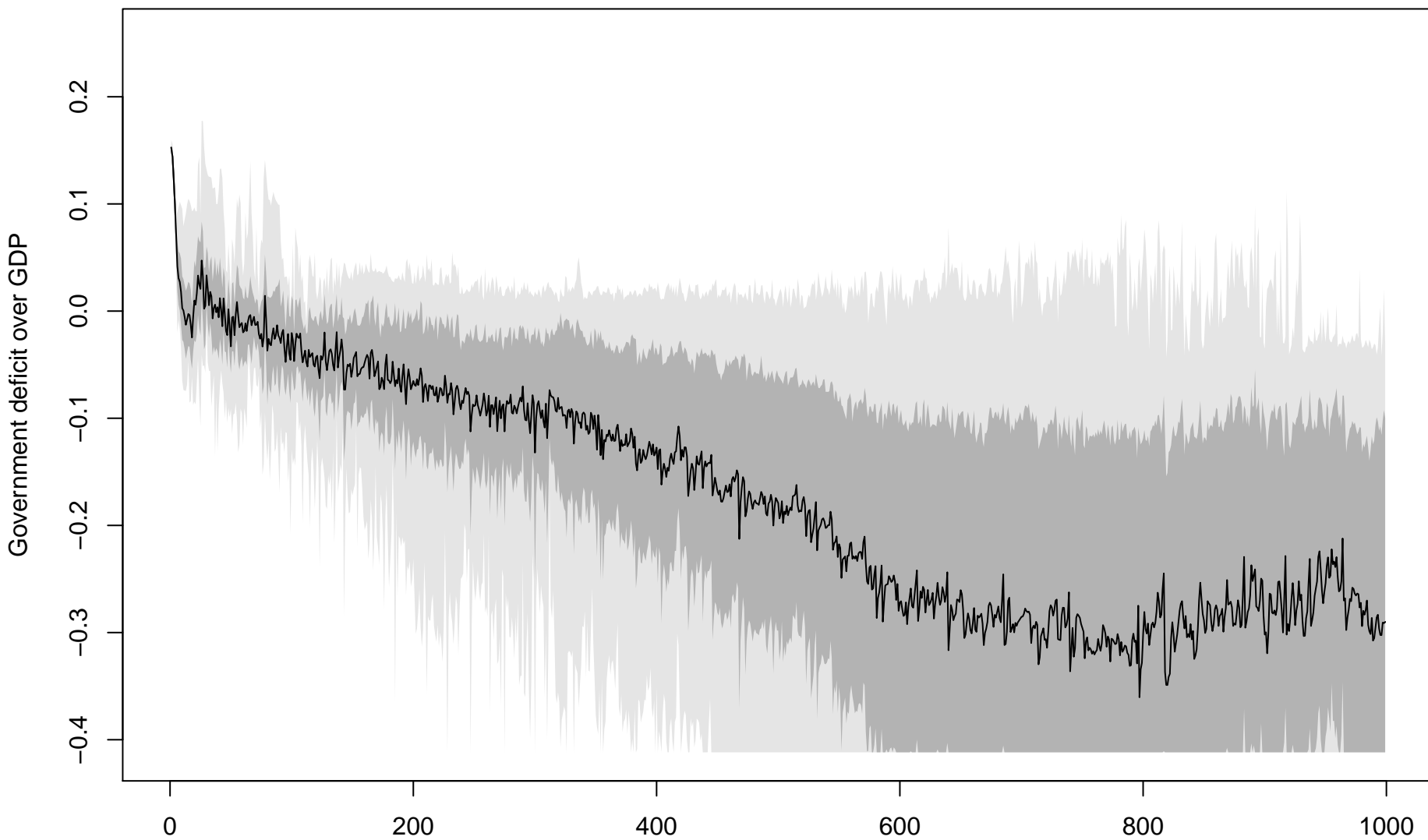
Government deficit over GDP

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 10)

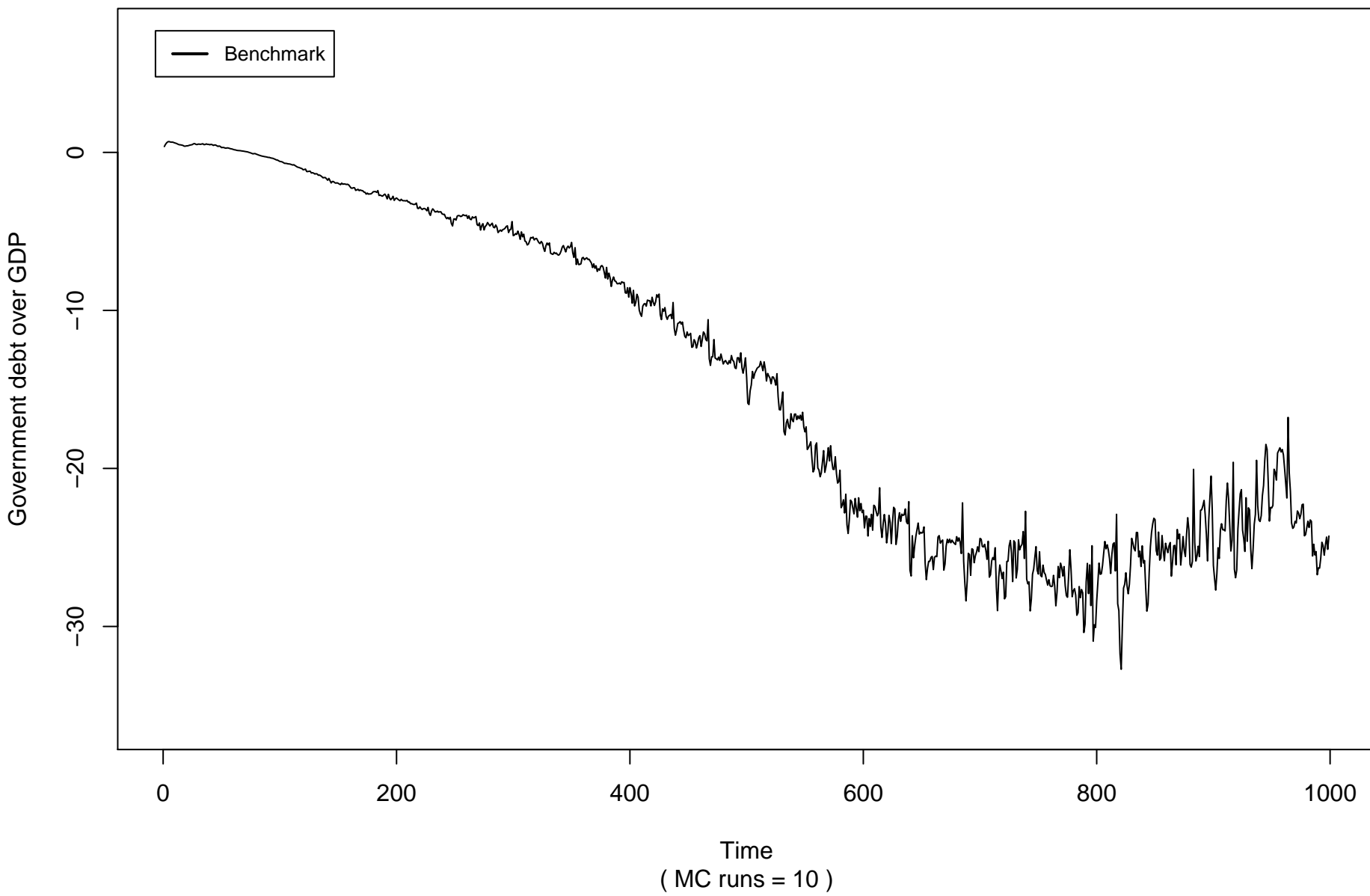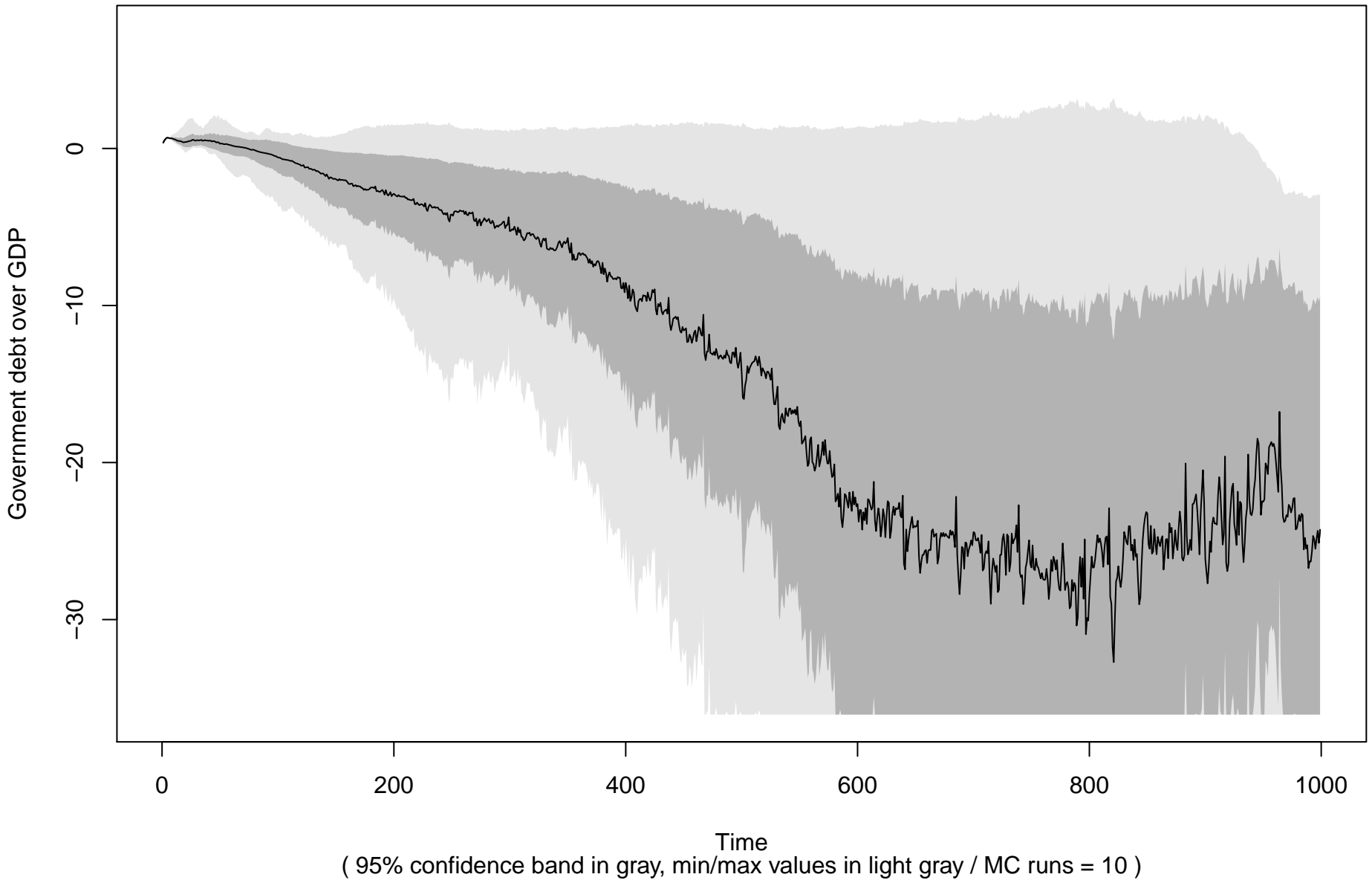# Government debt on GDP (all experiments)

Government debt over GDP

Benchmark

Time
(MC runs = 10)

Government debt on GDP (Benchmark)

Government debt over GDP

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 10)

Unemployment and vacancy rates (all experiments)

Benchmark

Unemployment

Vacancy

Rate

0.0   0.1   0.2   0.3   0.4   0.5   0.6

0   200   400   600   800   1000

Time
(MC runs = 10)
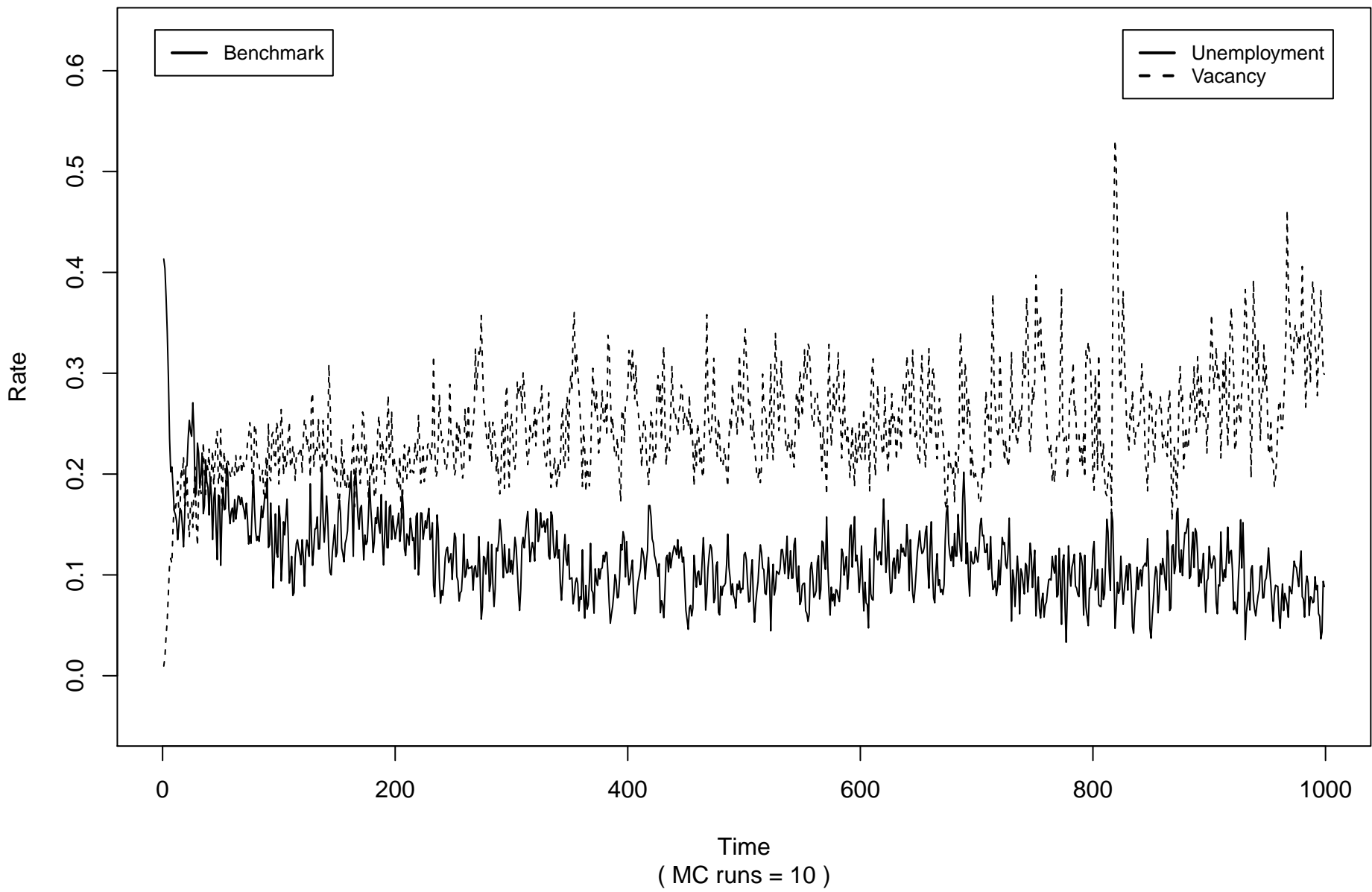
Unemployment and vacancy rates (Benchmark)

Rate

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 10)
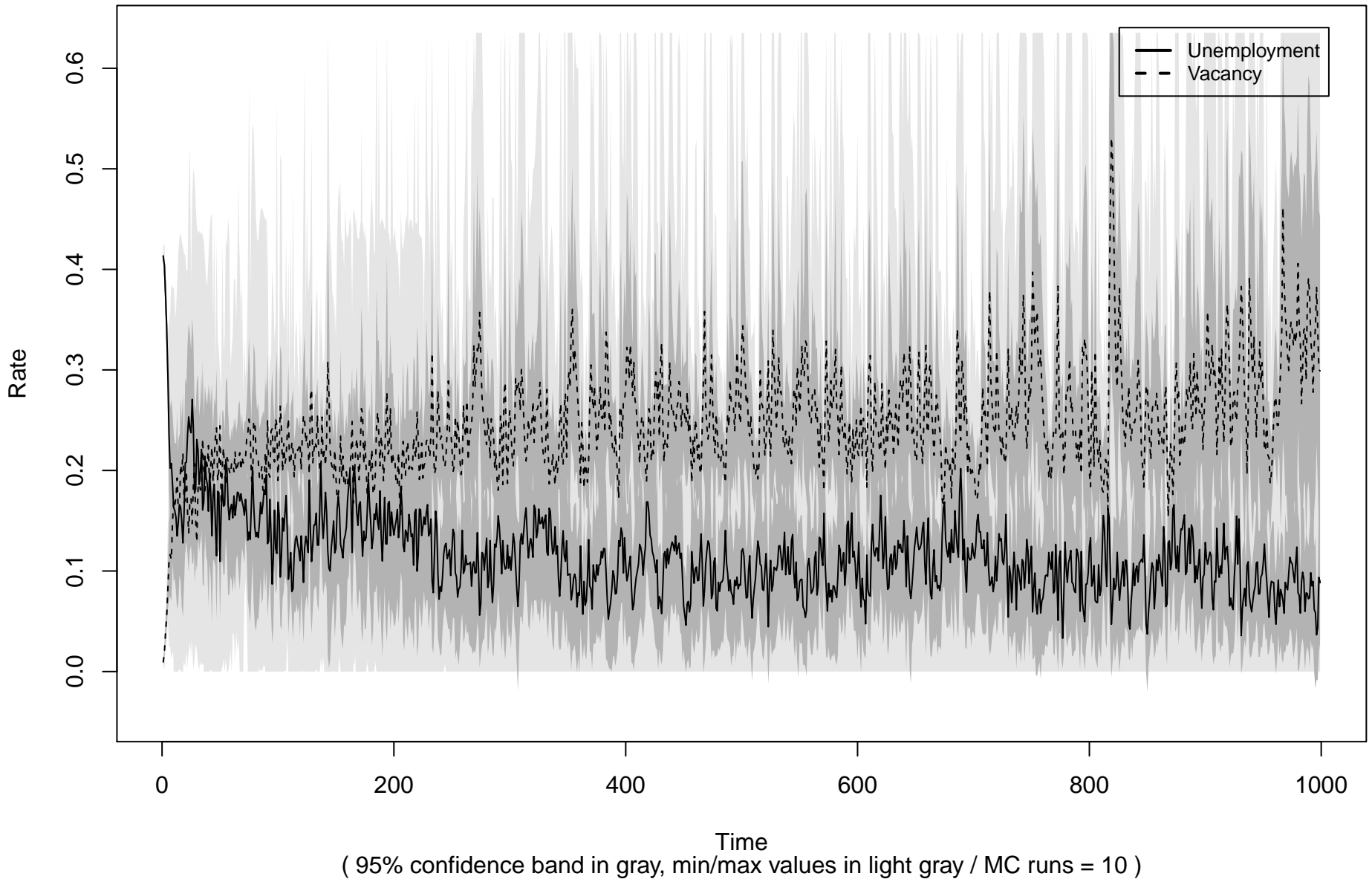
Real wages average (all experiments)

Log wages

Benchmark

Time
(MC runs = 10)
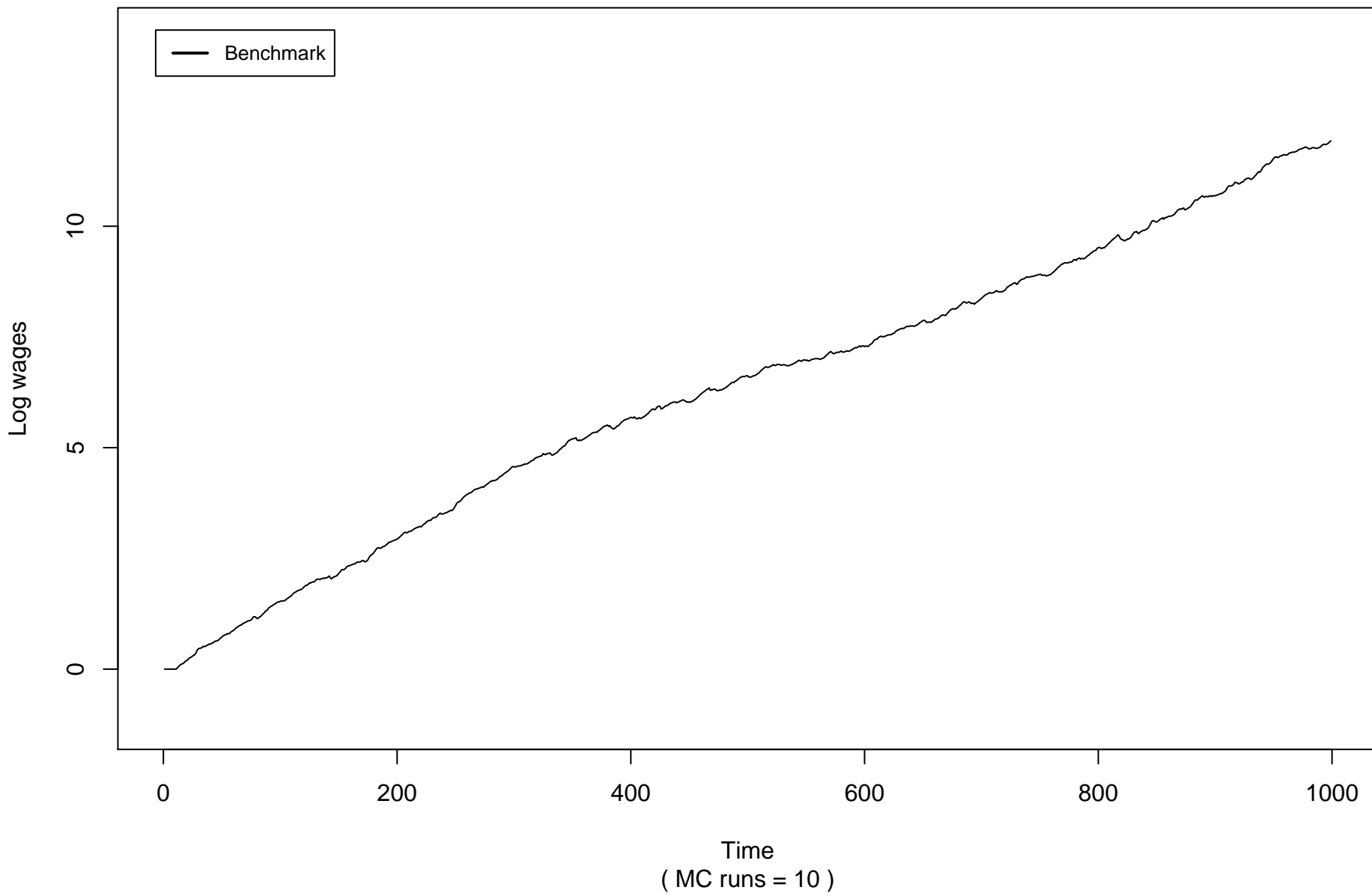
Real wages average (Benchmark)

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 10)
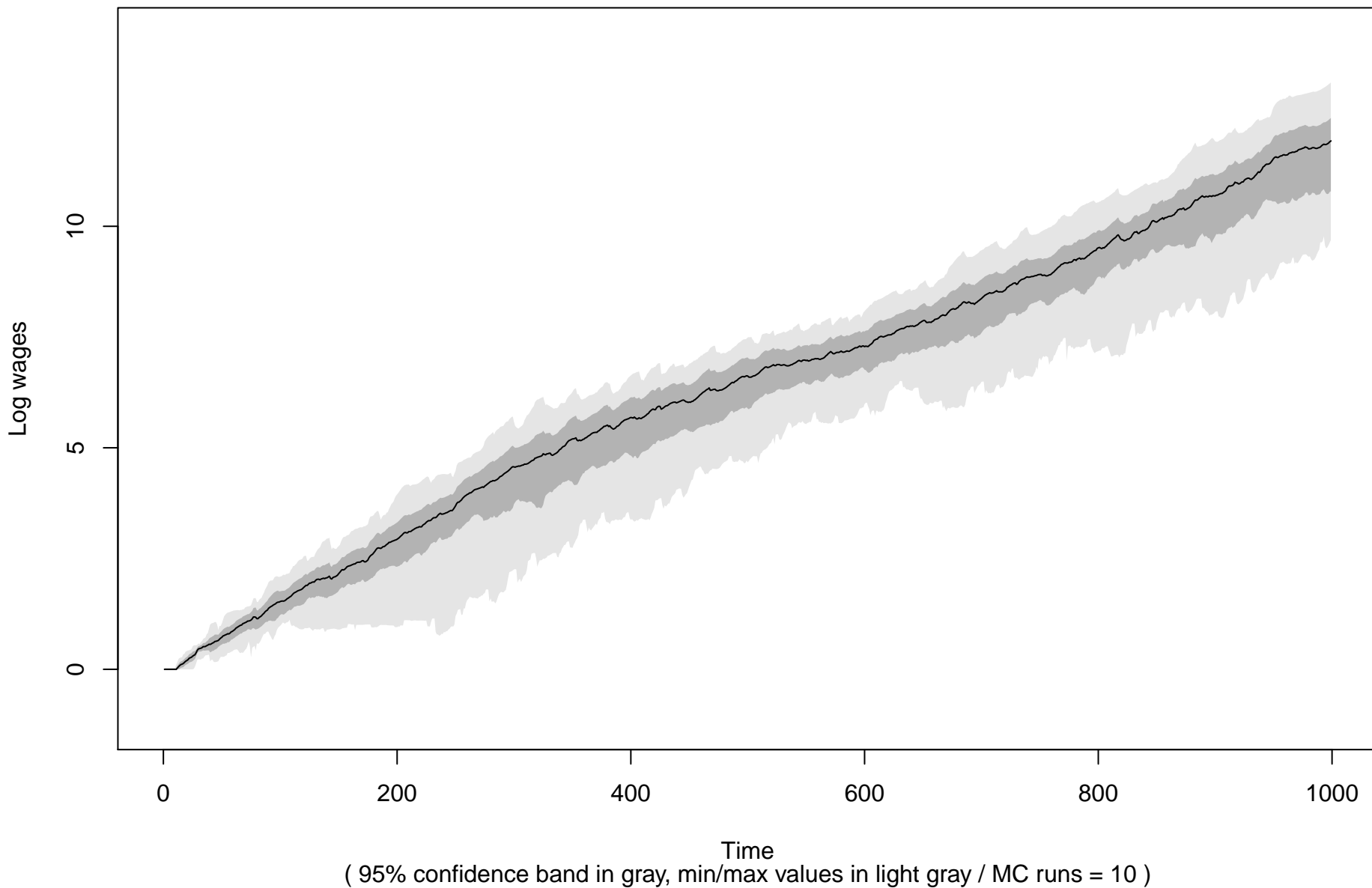
Wage share (all experiments)

Total real wages on GDP

Time
(MC runs = 10)

Benchmark

Wage share (Benchmark)

Time
(95% confidence band in gray, min/max values in light gray / MC runs = 10)
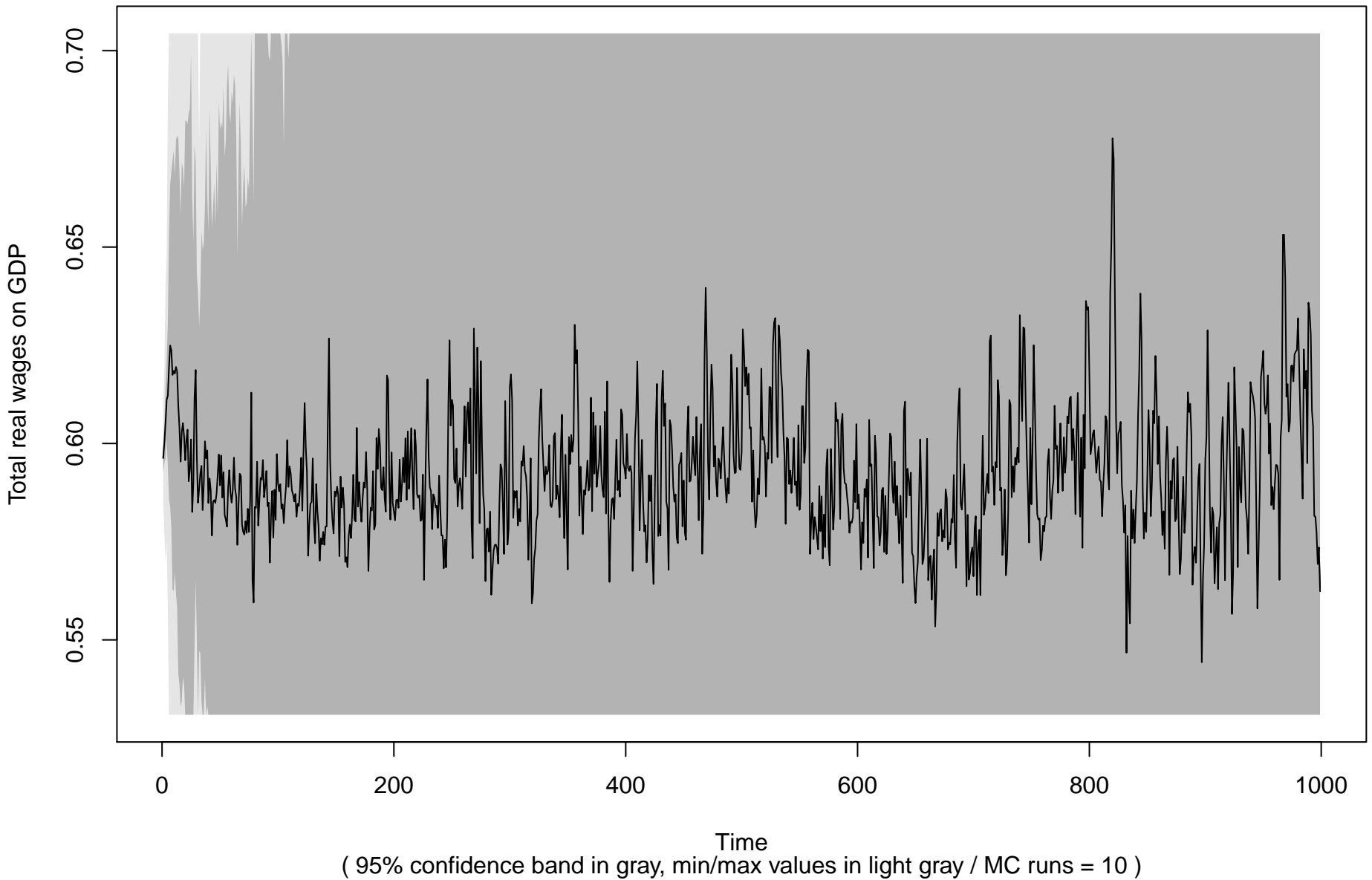
Innovation and imitation (all experiments)

Share of innovating and imitating firms

Benchmark

Innovation
Imitation

Time
(sector 1 only / MC runs = 10)
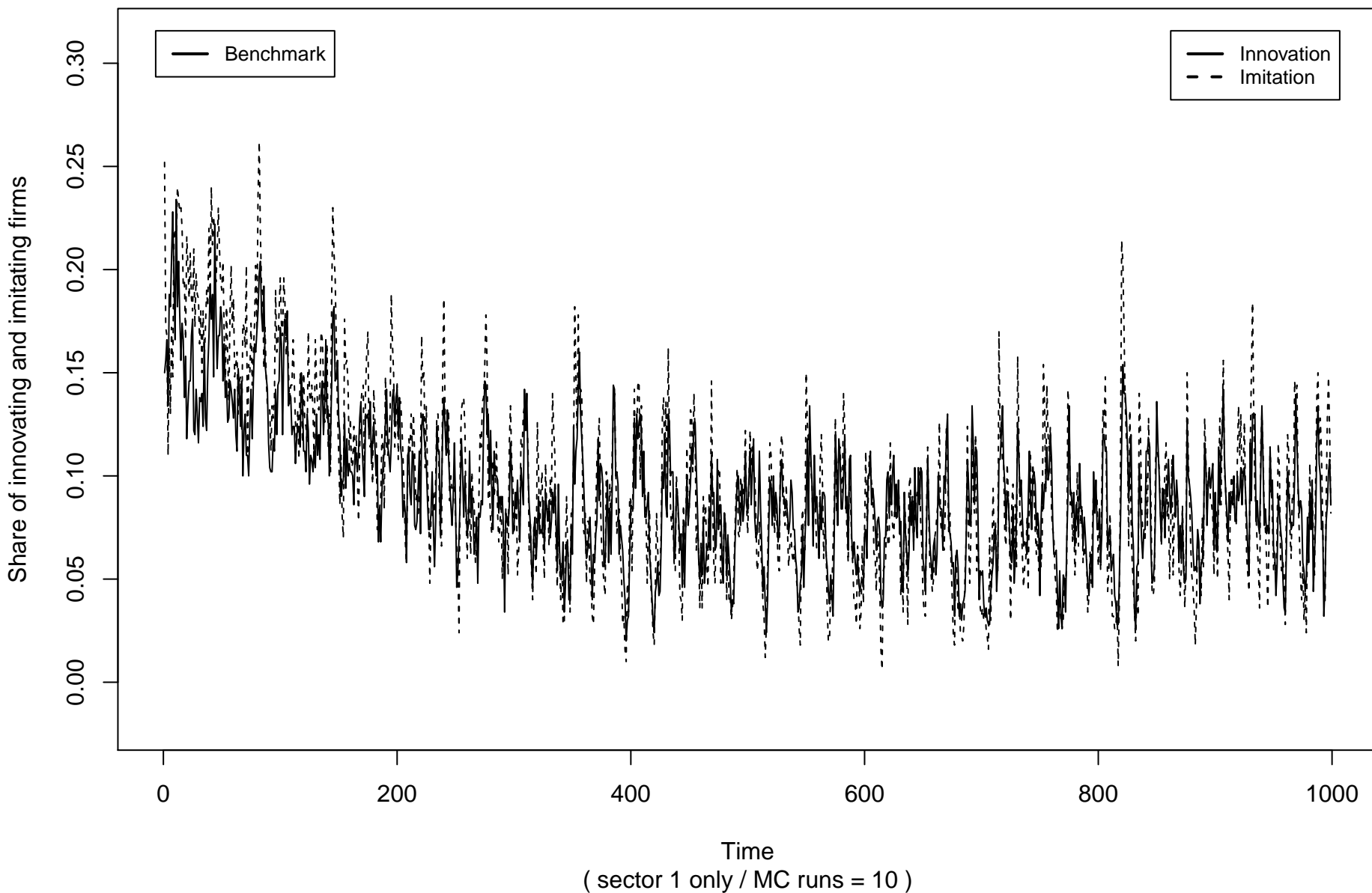
Innovation and imitation (Benchmark)

Time
(95% confidence band in gray, min/max values in light gray / sector 1 only / MC runs = 10)
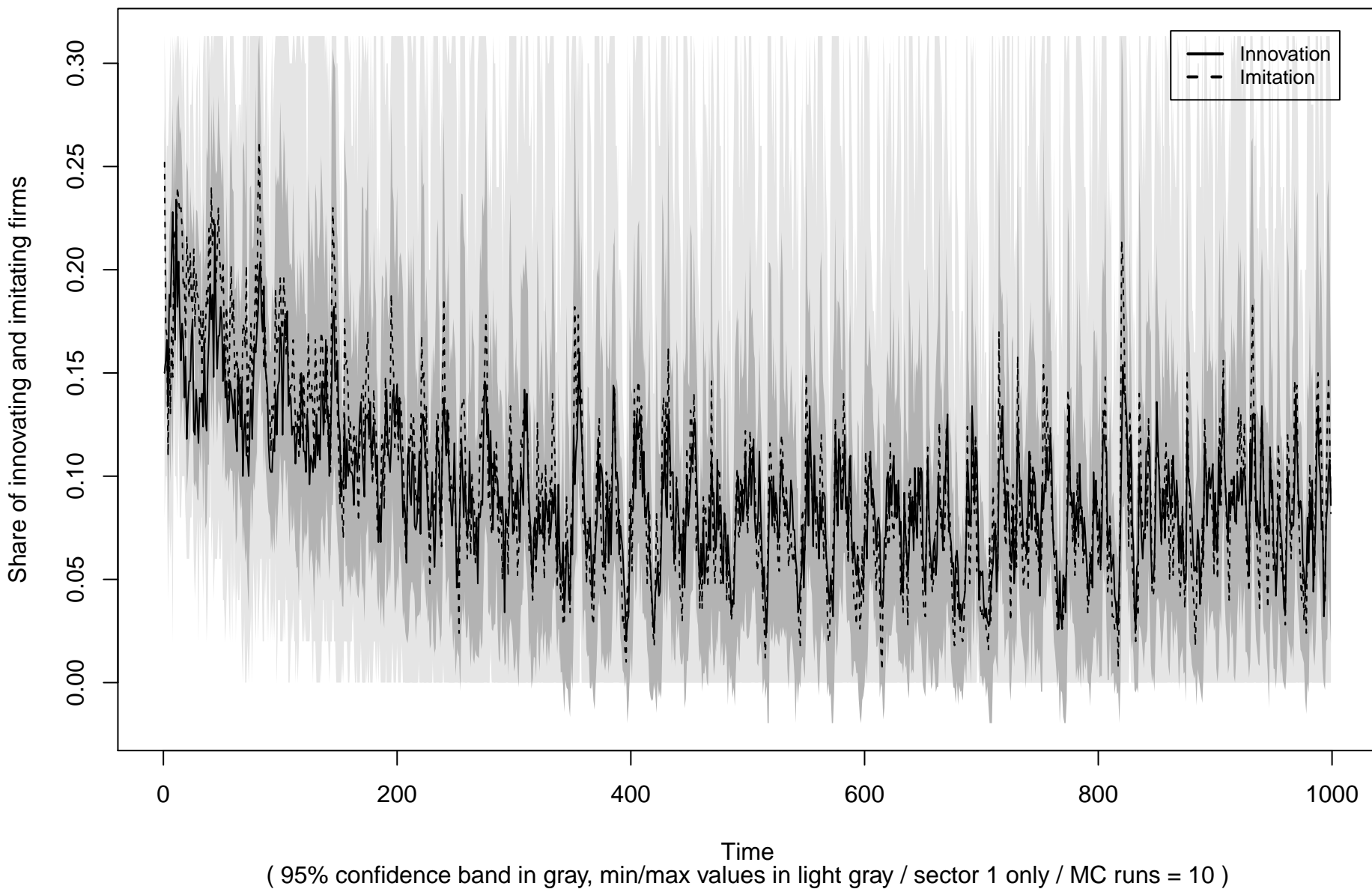
Market concentration (all experiments)

Standardized Herfindahl–Hirschman index

Benchmark

Time
(Sector 2 only / MC runs = 10)
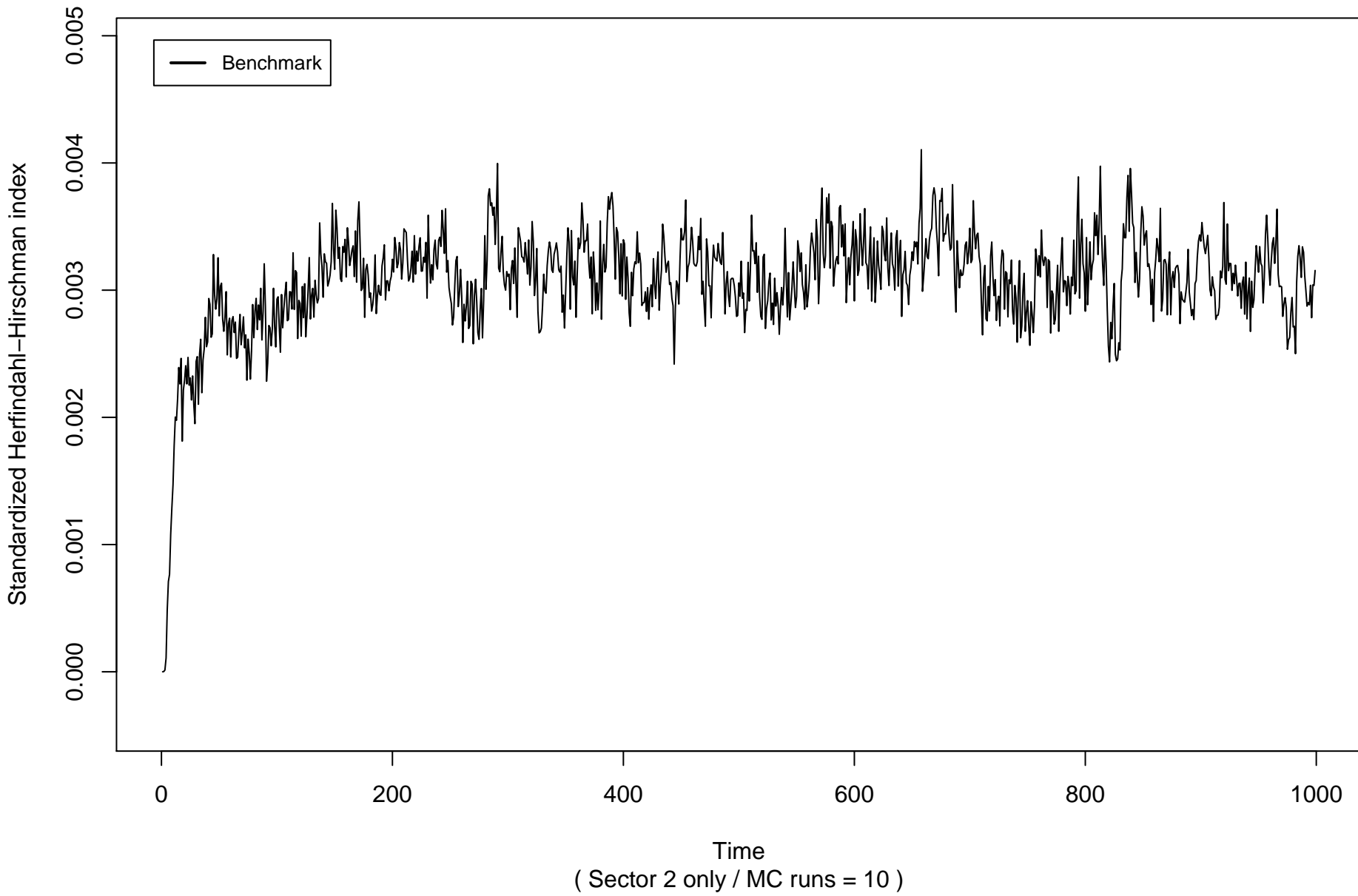
Market concentration (Benchmark)

Standardized Herfindahl–Hirschman index

Time
(95% confidence band in gray, min/max values in light gray / Sector 2 only / MC runs = 10)
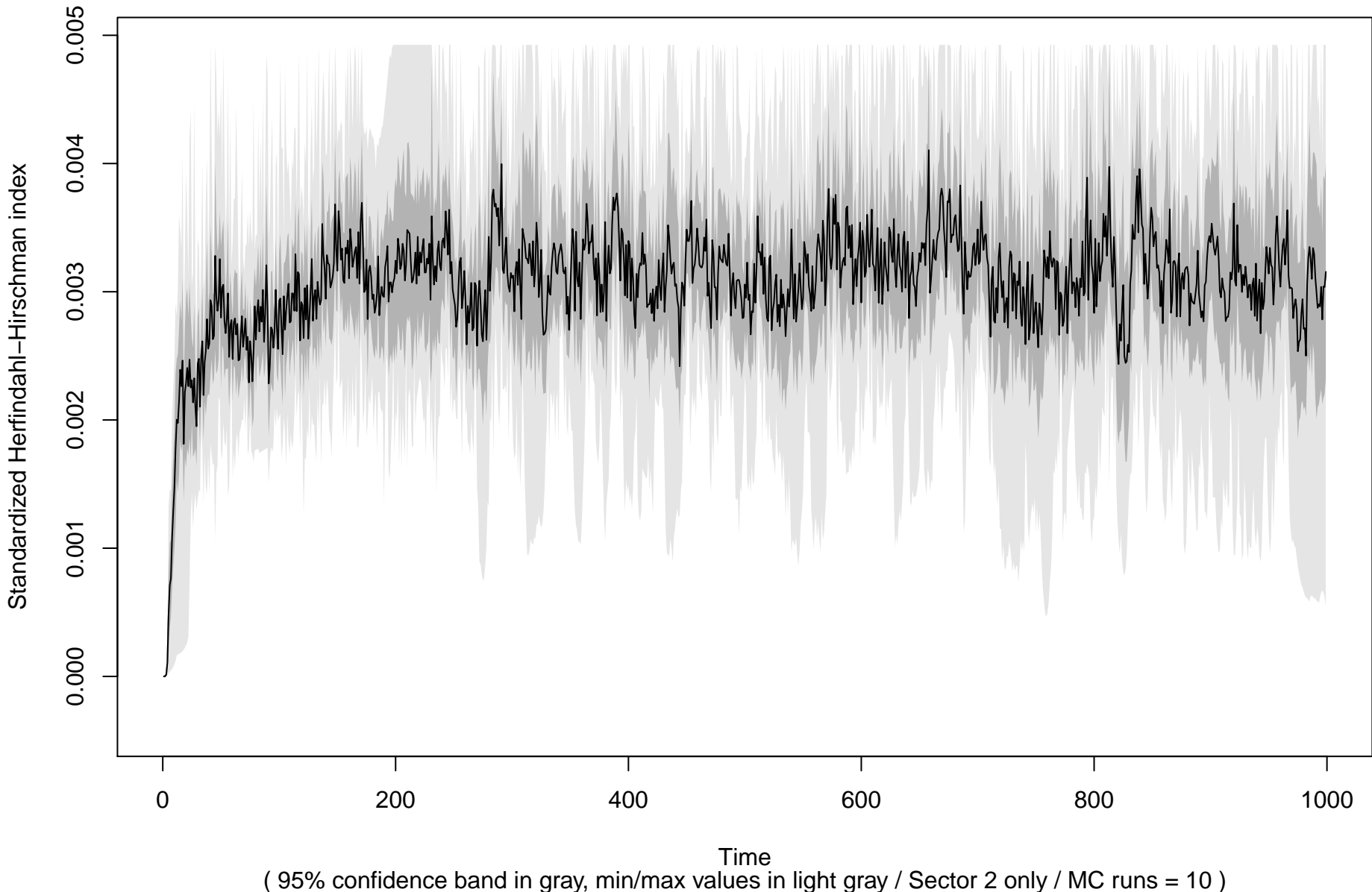
Mark−up average (all experiments)

Weighted average mark−up rate

Time

(Sector 2 only / MC runs = 10)
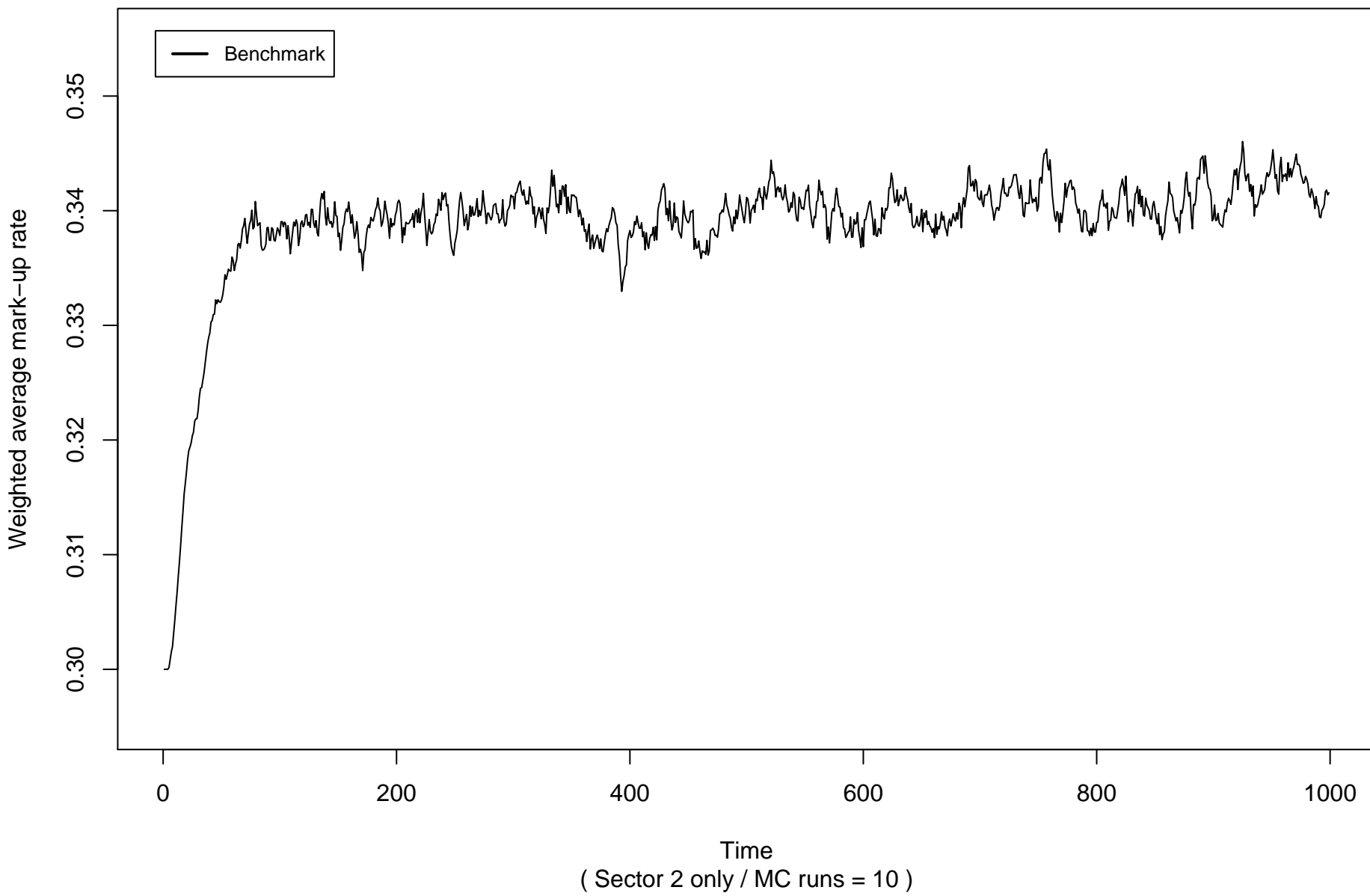
Mark–up average (Benchmark)

Weighted average mark–up rate

Time
(95% confidence band in gray, min/max values in light gray / Sector 2 only / MC runs = 10)

GDP cycles (Benchmark)

Filtered series

Time
(Baxter−King bandpass−filtered, low = 6Q / high = 32Q / order = 12 / MC runs = 10)

Legend:
- GDP
- Consumption
- Investment
- Productivity
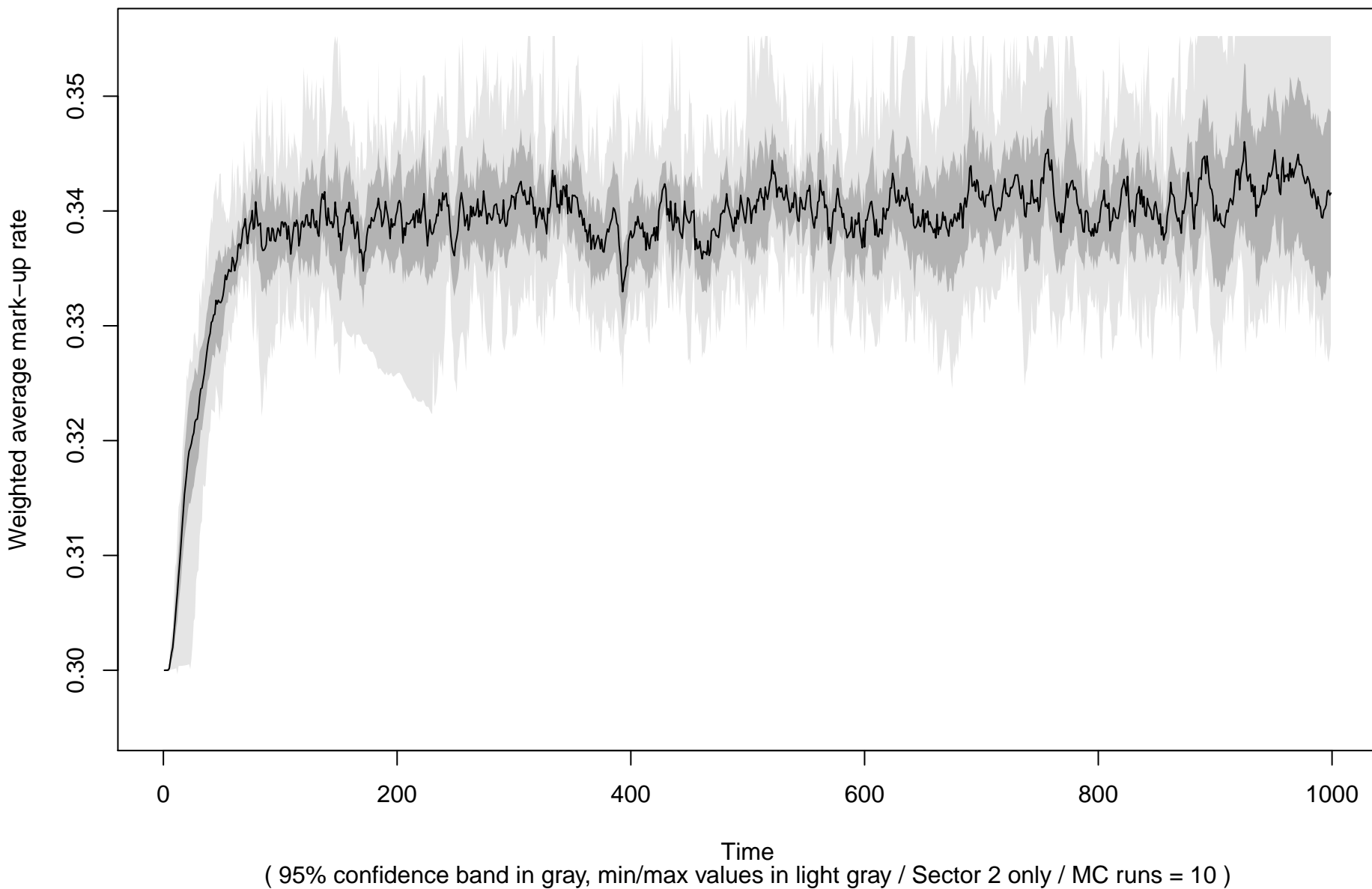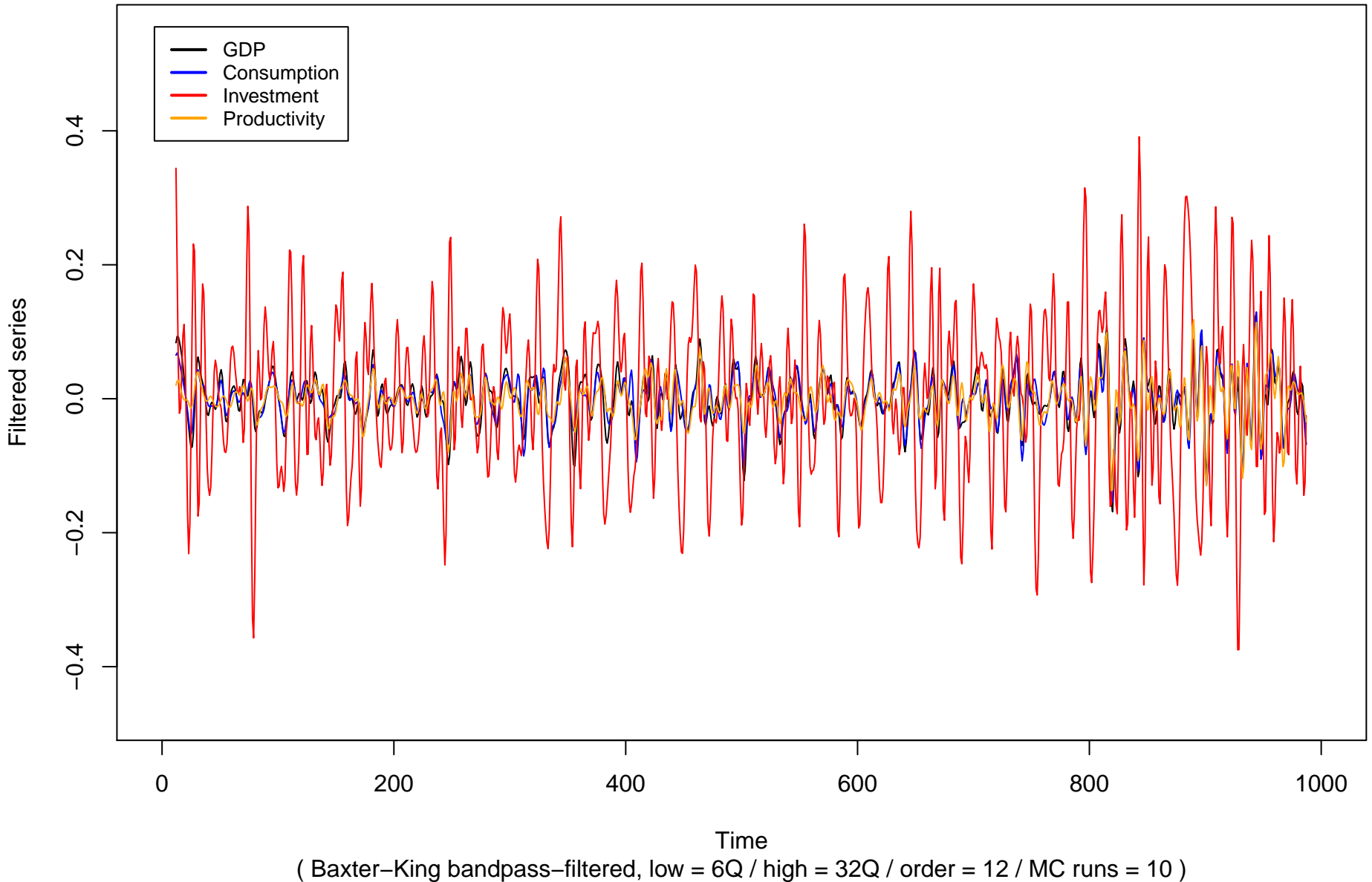
Shimer puzzle (Benchmark)

(Baxter−King bandpass−filtered, low = 6Q / high = 32Q / order = 12 / MC runs = 10)
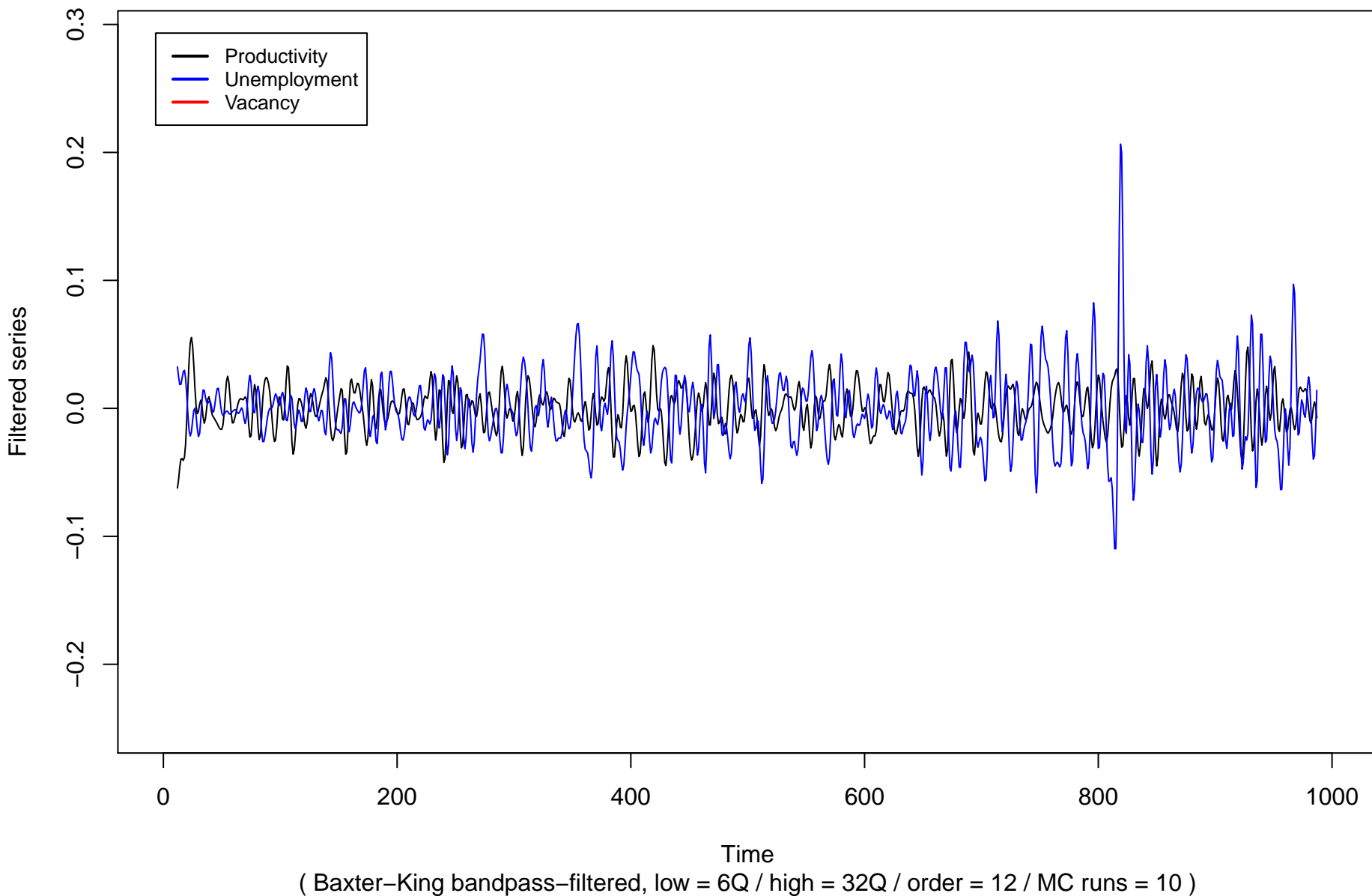
Key statistics and unit roots tests for cycles (Benchmark)

	GDP (output)	Consumption	Investment	Product.	Real wage
avg. growth rate	0.01203	0.01193	0.0132	0.01169	0.01141
(s.e.)	0.0003621	0.0003673	0.0003834	0.0003171	0.0003605
ADF test (logs)	−2.452	−2.267	−10.7	−2.294	−2.223
(s.e.)	0.1624	0.172	0.4137	0.1596	0.1565
(p−val.)	0.4007	0.475	0.01	0.4599	0.4854
(s.e.)	0.05862	0.06544	0	0.06294	0.06519
ADF test (bpf)	−11.19	−10.88	−15.55	−11.18	−10.64
(s.e.)	0.1495	0.2283	0.3189	0.2543	0.2139
(p−val.)	0.01	0.01	0.01	0.01	0.01
(s.e.)	0	0	0	0	0
s.d. (bpf)	0.09655	0.08074	1.692	0.07133	0.07842
(s.e.)	0.002868	0.002822	0.06766	0.003064	0.003647
relative s.d. (GDP)	1	0.8362	17.53	0.7388	0.8122

(bpf: Baxter−King bandpass−filtered series, low = 6Q / high = 32Q / order = 12 / MC runs = 10 / period = 2 − 1000)
(ADF test H0: there are unit roots / non−stationary at 5% level)

Correlation structure for GDP (Benchmark)

	−4	−3	−2	−1	0	1	2	3	4
GDP (output)	−0.0503	0.2295	0.5816	0.8813	1	0.8813	0.5816	0.2295	−0.0503
(s.e.)	0.01939	0.0193	0.01232	0.00377	3.096e−17	0.00377	0.01232	0.0193	0.01939
(p−val.)	0.6241	5.74e−06	5.89e−12	2.35e−18	NA	2.35e−18	5.89e−12	5.74e−06	0.6241
Consumption	0.06381	0.3121	0.6073	0.852	0.944	0.8345	0.565	0.2385	−0.03827
(s.e.)	0.0381	0.03569	0.02232	0.007318	0.004263	0.003968	0.01292	0.02147	0.02093
(p−val.)	0.002112	3.133e−05	7.711e−10	1.273e−15	3.66e−18	6.327e−18	1.212e−11	8.897e−06	0.726
Investment	−0.2493	−0.3858	−0.4607	−0.395	−0.174	0.1282	0.3874	0.5026	0.4546
(s.e.)	0.01814	0.01577	0.01012	0.01222	0.0207	0.02926	0.03574	0.03544	0.02519
(p−val.)	1.363e−06	3.597e−09	1.085e−11	2.93e−10	0.0002132	0.02337	3.881e−06	2.842e−07	4.046e−08
Net investment	−0.1854	−0.312	−0.3916	−0.3461	−0.1556	0.1145	0.3494	0.4526	0.4037
(s.e.)	0.01876	0.01544	0.01123	0.01462	0.02405	0.03508	0.04358	0.0429	0.02968
(p−val.)	5.085e−05	2.891e−08	1.512e−10	5.851e−09	0.001825	0.03233	4.992e−05	3.885e−06	5.472e−07
Change in inventories	−0.2076	−0.1767	−0.05323	0.1066	0.2213	0.2357	0.1603	0.05372	−0.02036
(s.e.)	0.02198	0.02416	0.02035	0.01469	0.0127	0.01301	0.01321	0.01403	0.01382
(p−val.)	4.835e−05	0.0005231	0.4573	0.007064	2.639e−07	1.537e−07	1.951e−05	0.4876	0.9876
Unemployment rate	0.1392	0.2252	0.2335	0.1507	0.01471	−0.1051	−0.1567	−0.1312	−0.06411
(s.e.)	0.03557	0.02995	0.02426	0.01913	0.01929	0.02824	0.03893	0.04239	0.03472
(p−val.)	0.003407	0.000203	2.936e−05	0.0006132	0.8474	0.04176	0.01072	0.01428	0.04052
Productivity	0.05501	0.2777	0.5422	0.7635	0.8514	0.7629	0.5323	0.2486	0.004518
(s.e.)	0.05271	0.05255	0.03491	0.01415	0.00987	0.01336	0.02879	0.04334	0.04192
(p−val.)	0.002794	0.0006007	1.194e−07	1.381e−12	1.891e−14	8.343e−13	2.679e−08	0.0007358	0.1421
Mark−up (sector 2)	0.1815	0.1073	0.008824	−0.09264	−0.1712	−0.2079	−0.2001	−0.16	−0.1055
(s.e.)	0.04242	0.02741	0.02044	0.02678	0.03159	0.03136	0.02916	0.02671	0.02349
(p−val.)	0.01008	0.06649	0.7841	0.01352	0.002094	0.0005354	0.0005324	0.001781	0.01785
Total firm debt	0.2497	0.1341	0.0009593	−0.1163	−0.1938	−0.2265	−0.227	−0.2134	−0.1973
(s.e.)	0.02457	0.02719	0.03124	0.03199	0.02628	0.01767	0.0201	0.02962	0.03374
(p−val.)	1.596e−05	0.01321	0.02672	0.043	0.0003616	3.238e−06	8.986e−06	0.0002628	0.0002565
Liquidity−to−sales ratio	0.1438	−0.05795	−0.2923	−0.4919	−0.595	−0.5727	−0.454	−0.2953	−0.1511
(s.e.)	0.03353	0.02203	0.02051	0.02767	0.02889	0.02859	0.0337	0.03609	0.03034
(p−val.)	0.01681	0.2452	6.767e−07	4.145e−08	9.227e−09	1.226e−08	5.014e−07	5.795e−05	0.001186
Bankruptcy rate	0.4322	0.4711	0.381	0.187	−0.03061	−0.1855	−0.236	−0.2039	−0.1461
(s.e.)	0.01161	0.03088	0.04791	0.05154	0.04074	0.02476	0.0197	0.02212	0.02164
(p−val.)	7.179e−11	1.652e−07	4.641e−05	0.01616	0.004709	0.0003755	4.969e−06	6.132e−05	0.00184

(non−rate/ratio series are Baxter−King bandpass−filtered, low = 6Q / high = 32Q / order = 12 / MC runs = 10 / period = 2 − 1000)
(test H0: lag coefficient is not significant at 5% level)

Correlation structure for GDP (Benchmark)

	−4	−3	−2	−1	0	1	2	3	4
GDP (output)	−0.0503	0.2295	0.5816	0.8813	1	0.8813	0.5816	0.2295	−0.0503
(s.e.)	0.01939	0.0193	0.01232	0.00377	3.096e−17	0.00377	0.01232	0.0193	0.01939
(p−val.)	0.6241	5.74e−06	5.89e−12	2.35e−18	NA	2.35e−18	5.89e−12	5.74e−06	0.6241
Consumption	0.06381	0.3121	0.6073	0.852	0.944	0.8345	0.565	0.2385	−0.03827
(s.e.)	0.0381	0.03569	0.02232	0.007318	0.004263	0.003968	0.01292	0.02147	0.02093
(p−val.)	0.002112	3.133e−05	7.711e−10	1.273e−15	3.66e−18	6.327e−18	1.212e−11	8.897e−06	0.726
Investment	−0.2493	−0.3858	−0.4607	−0.395	−0.174	0.1282	0.3874	0.5026	0.4546
(s.e.)	0.01814	0.01577	0.01012	0.01222	0.0207	0.02926	0.03574	0.03544	0.02519
(p−val.)	1.363e−06	3.597e−09	1.085e−11	2.93e−10	0.0002132	0.02337	3.881e−06	2.842e−07	4.046e−08
Productivity	0.05501	0.2777	0.5422	0.7635	0.8514	0.7629	0.5323	0.2486	0.004518
(s.e.)	0.05271	0.05255	0.03491	0.01415	0.00987	0.01336	0.02879	0.04334	0.04192
(p−val.)	0.002794	0.0006007	1.194e−07	1.381e−12	1.891e−14	8.343e−13	2.679e−08	0.0007358	0.1421
Entry	−0.1895	−0.01445	0.2124	0.4303	0.5673	0.578	0.4706	0.2979	0.1269
(s.e.)	0.03156	0.03626	0.03692	0.03351	0.02675	0.01861	0.01319	0.01418	0.01695
(p−val.)	0.001465	0.06716	0.001392	8.099e−07	7.504e−09	2.505e−10	9.315e−11	2.285e−08	0.002013
Wage	0.2815	0.5054	0.691	0.7781	0.734	0.572	0.3456	0.1194	−0.06132
(s.e.)	0.04068	0.03014	0.01924	0.02106	0.03341	0.04235	0.04283	0.03502	0.02315
(p−val.)	0.0002173	6.669e−08	5.768e−11	4.059e−11	4.314e−09	3.73e−07	4.835e−05	0.01022	0.2166
Unemployment rate	0.1392	0.2252	0.2335	0.1507	0.01471	−0.1051	−0.1567	−0.1312	−0.06411
(s.e.)	0.03557	0.02995	0.02426	0.01913	0.01929	0.02824	0.03893	0.04239	0.03472
(p−val.)	0.003407	0.000203	2.936e−05	0.0006132	0.8474	0.04176	0.01072	0.01428	0.04052
Vacancy rate	0.3595	0.1388	−0.1644	−0.4355	−0.5685	−0.5285	−0.3678	−0.1857	−0.06434
(s.e.)	0.02148	0.01807	0.02408	0.03939	0.04851	0.04357	0.02884	0.02299	0.02936
(p−val.)	1.126e−07	0.001069	0.001066	2.783e−06	1.248e−06	1.011e−06	1.098e−06	0.0002214	0.06556

(non−rate/ratio series are Baxter−King bandpass−filtered, low = 6Q / high = 32Q / order = 12 / MC runs = 10 / period = 2 − 1000)
(test H0: lag coefficient is not significant at 5% level)

# Stationarity, i.i.d. and ergodicity tests (Benchmark)

	avg.ADF	rej.ADF	avg.PP	rej.PP	avg.KPSS	rej.KPSS	avg.BDS	rej.BDS	avg.KS	rej.KS	AD	V
dGDP	0.01	1.00	0.01	1.00	0.10	0.00	0.02	0.80	0.30	0.22	0.00	C
dA	0.01	1.00	0.01	1.00	0.09	0.20	0.00	1.00	0.09	0.80	0.00	C
dw	0.01	1.00	0.01	1.00	0.10	0.00	0.00	1.00	0.09	0.80	0.00	C
V	0.01	1.00	0.01	1.00	0.05	0.60	0.00	1.00	0.05	0.84	0.00	C
U	0.01	1.00	0.01	1.00	0.01	0.90	0.00	1.00	0.00	0.96	0.00	C
mu2avg	0.01	1.00	0.01	1.00	0.01	1.00	0.00	1.00	0.01	0.93	0.00	C
HH1	0.01	1.00	0.01	1.00	0.09	0.10	0.00	1.00	0.11	0.73	0.00	C
HH2	0.01	1.00	0.01	1.00	0.01	1.00	0.00	1.00	0.07	0.78	0.00	C

(average p−values for testing H0 and rate of rejection of H0 / MC runs = 10 / period = 2 − 1000)
(ADF/PP H0: non−stationary, KPSS H0: stationary, BDS H0: i.i.d., KS/AD/WW H0: ergodic)
(significance = 0.05)

GDP growth
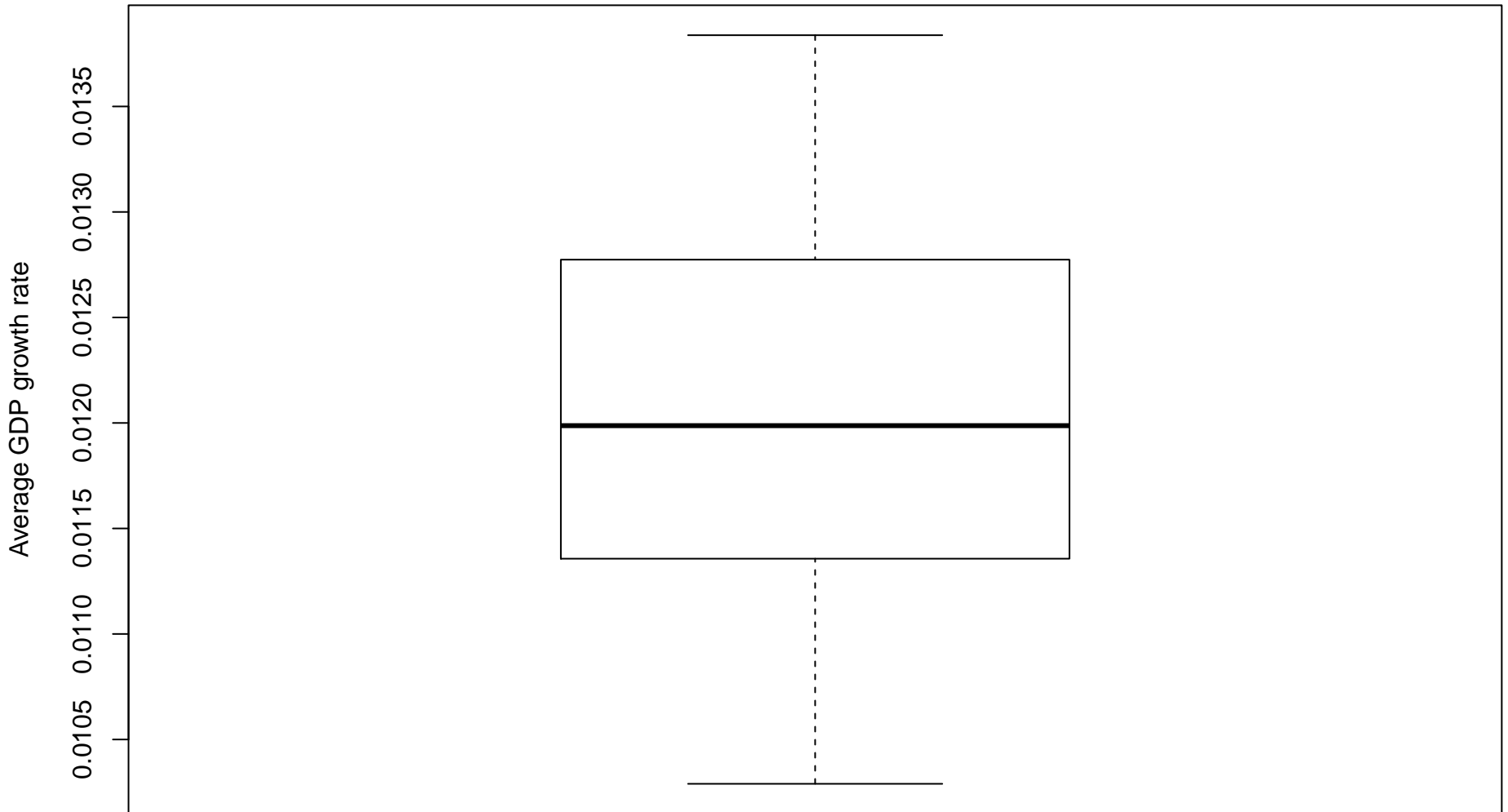
(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 – 1000)

Volatility of GDP growth
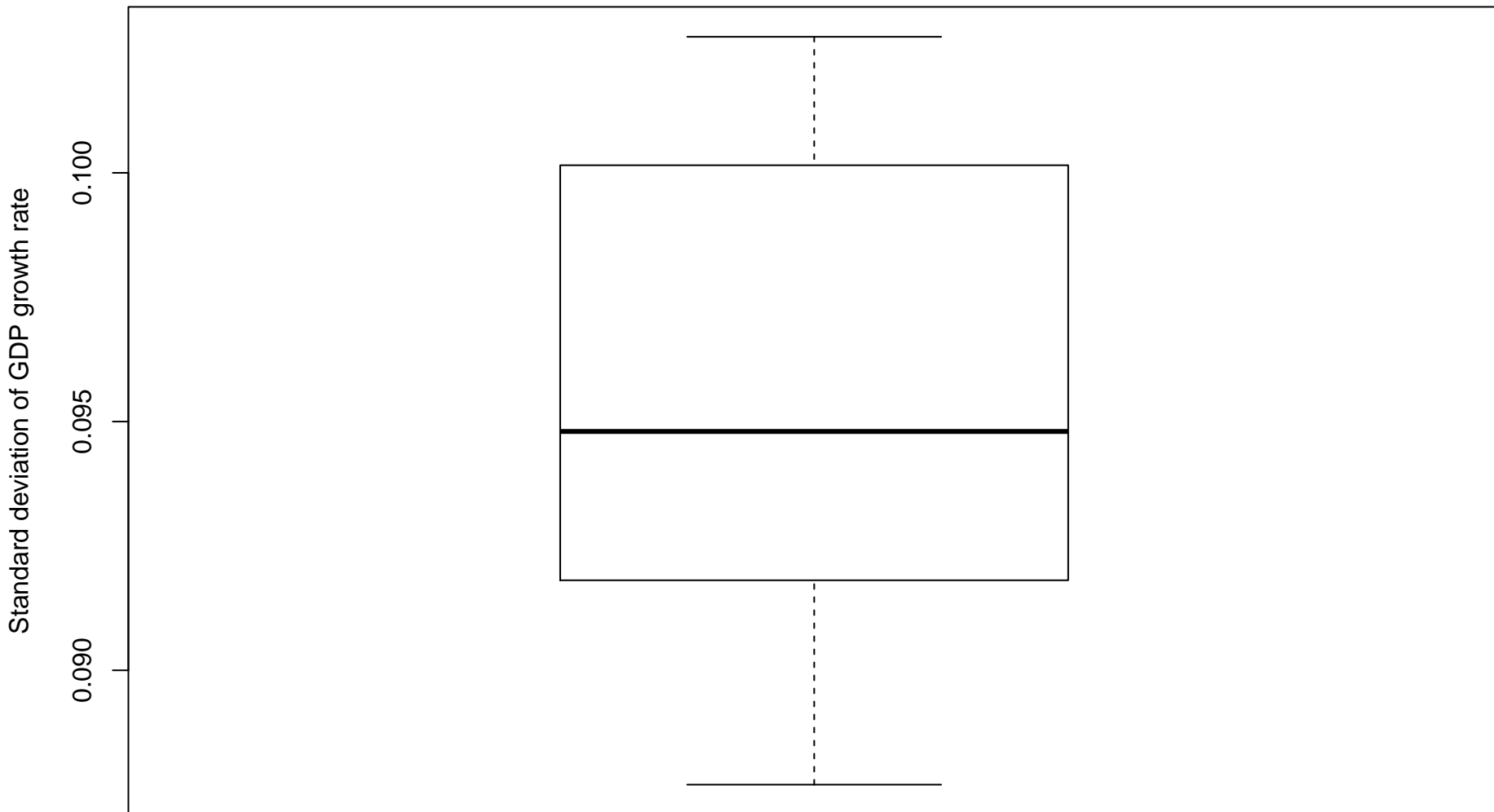
(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 – 1000)
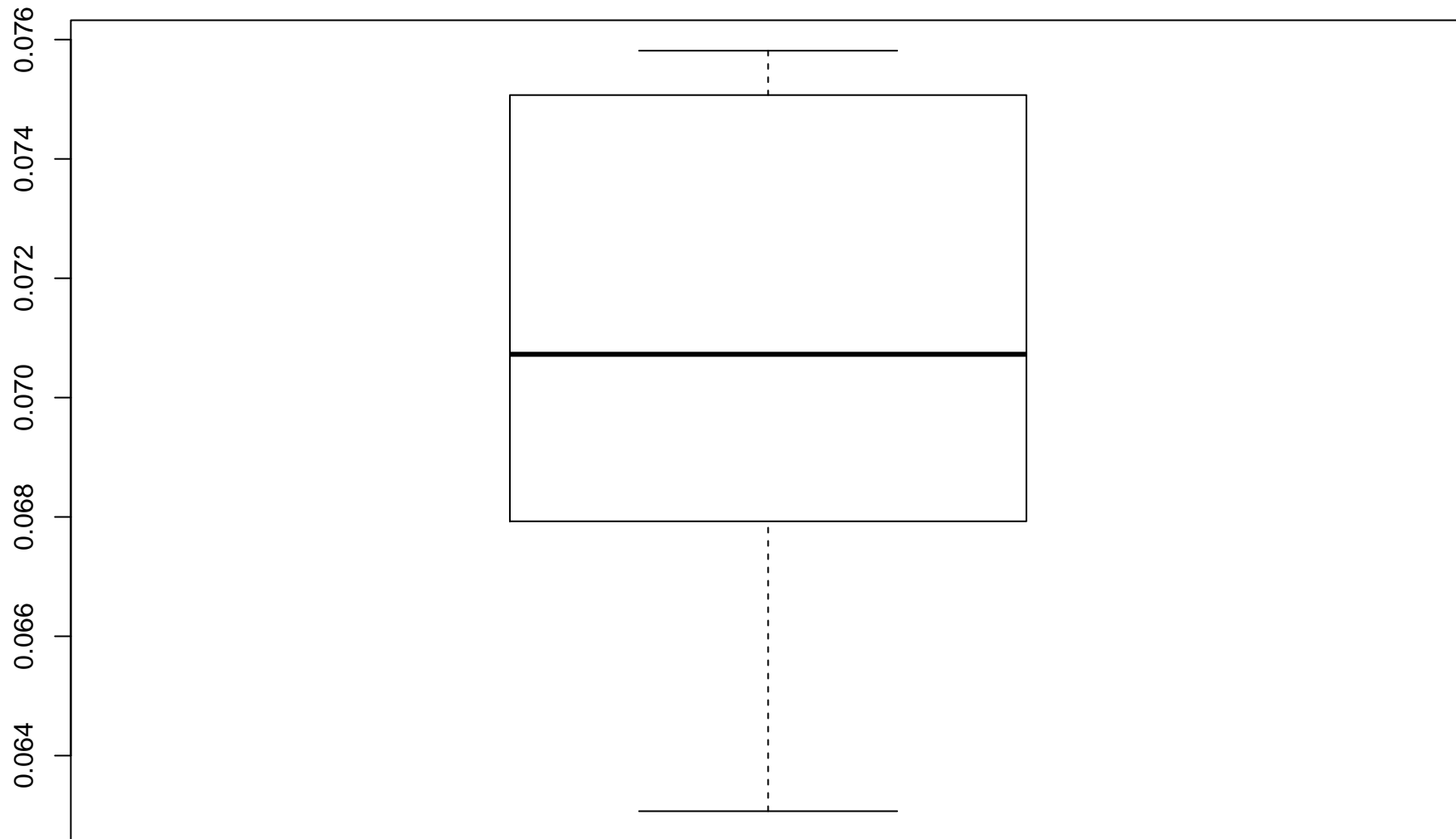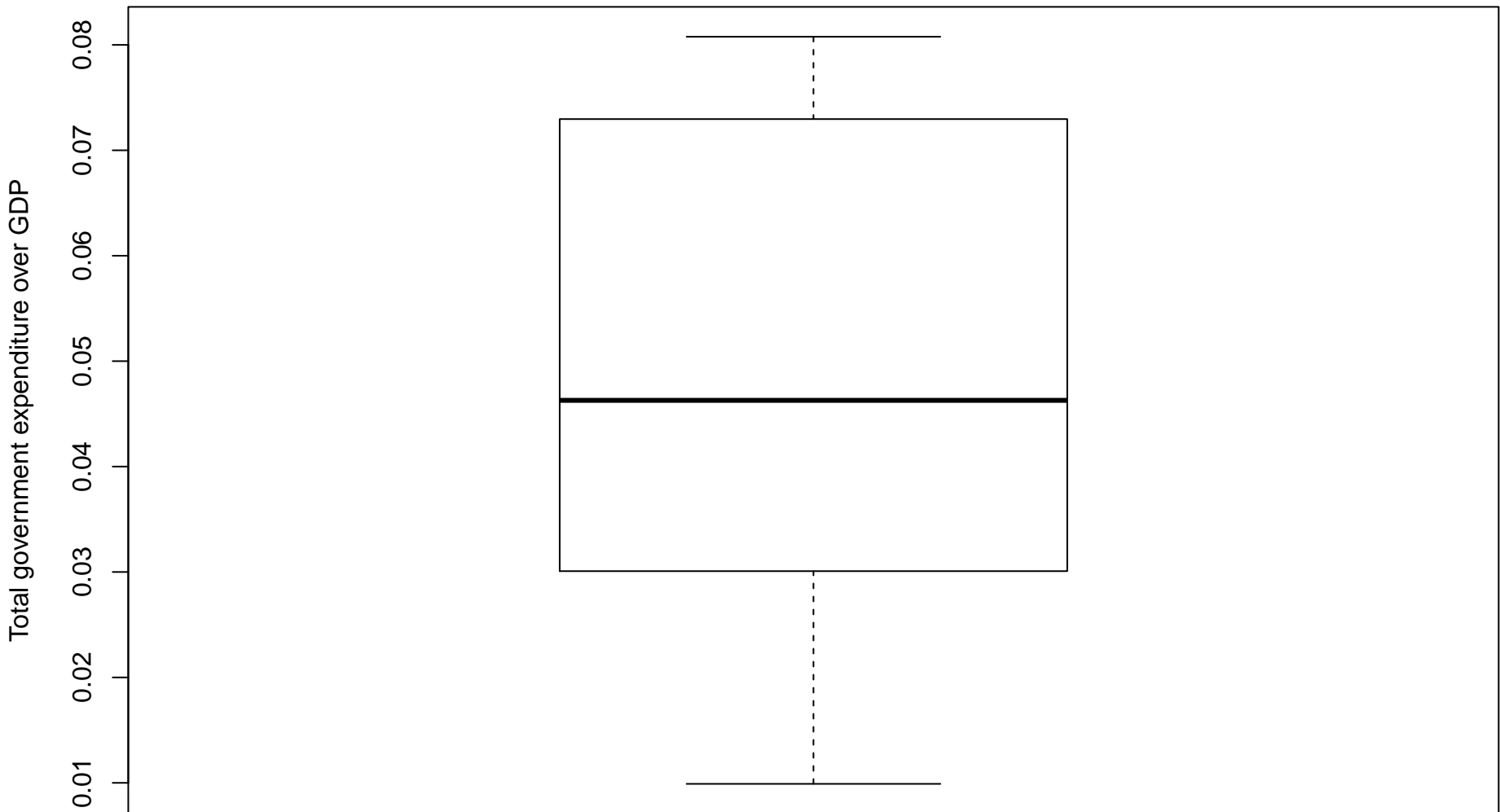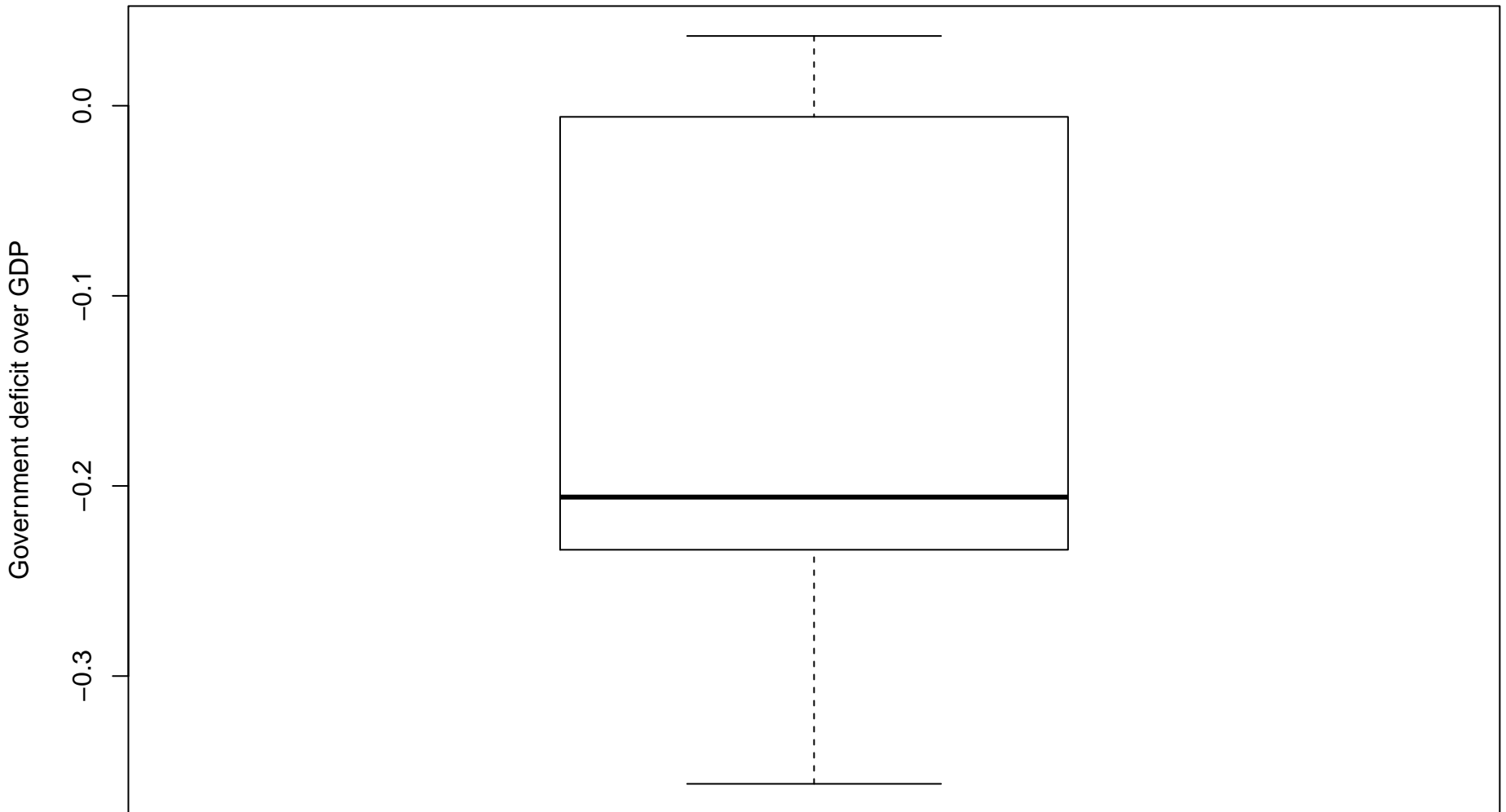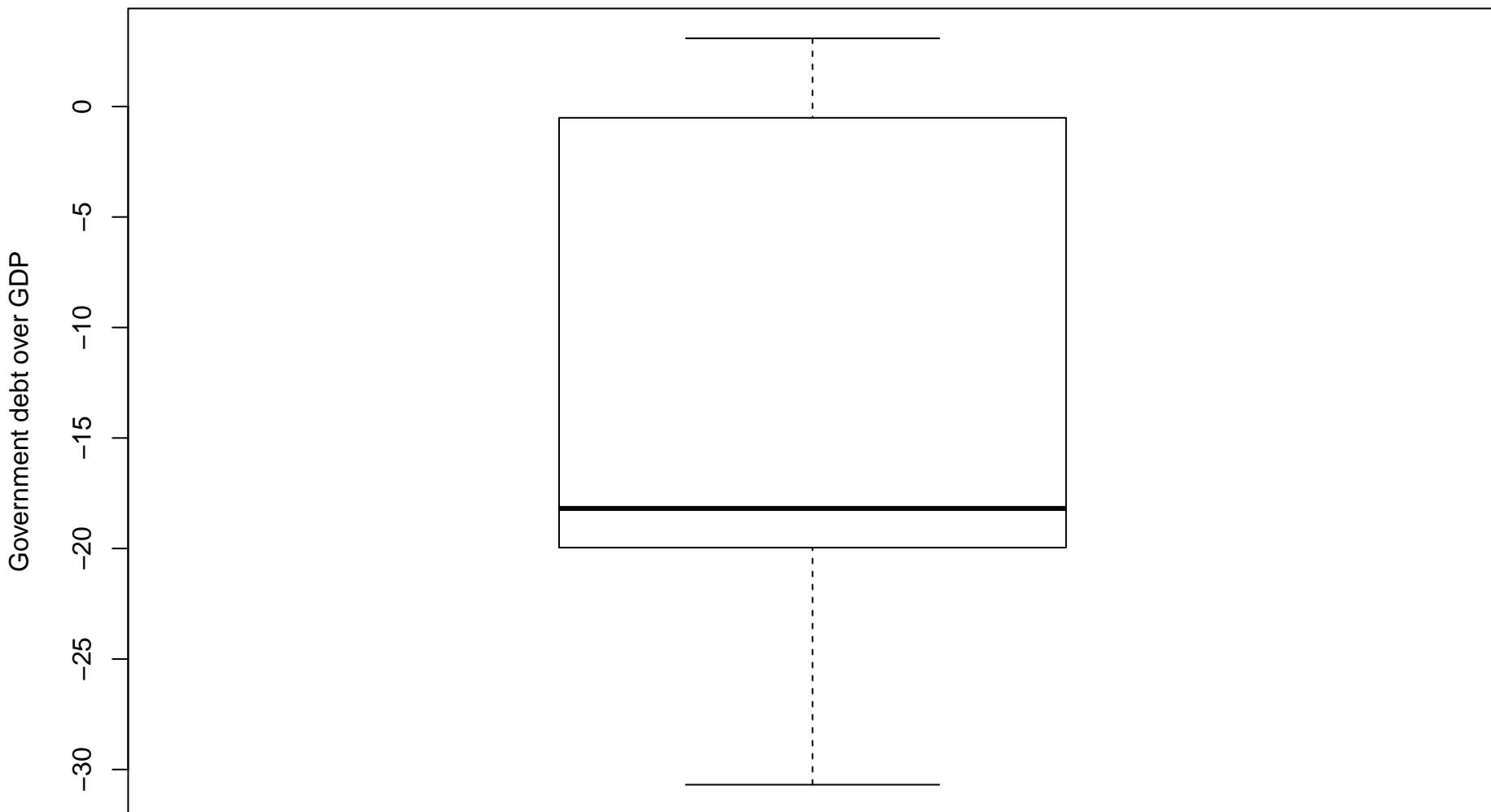
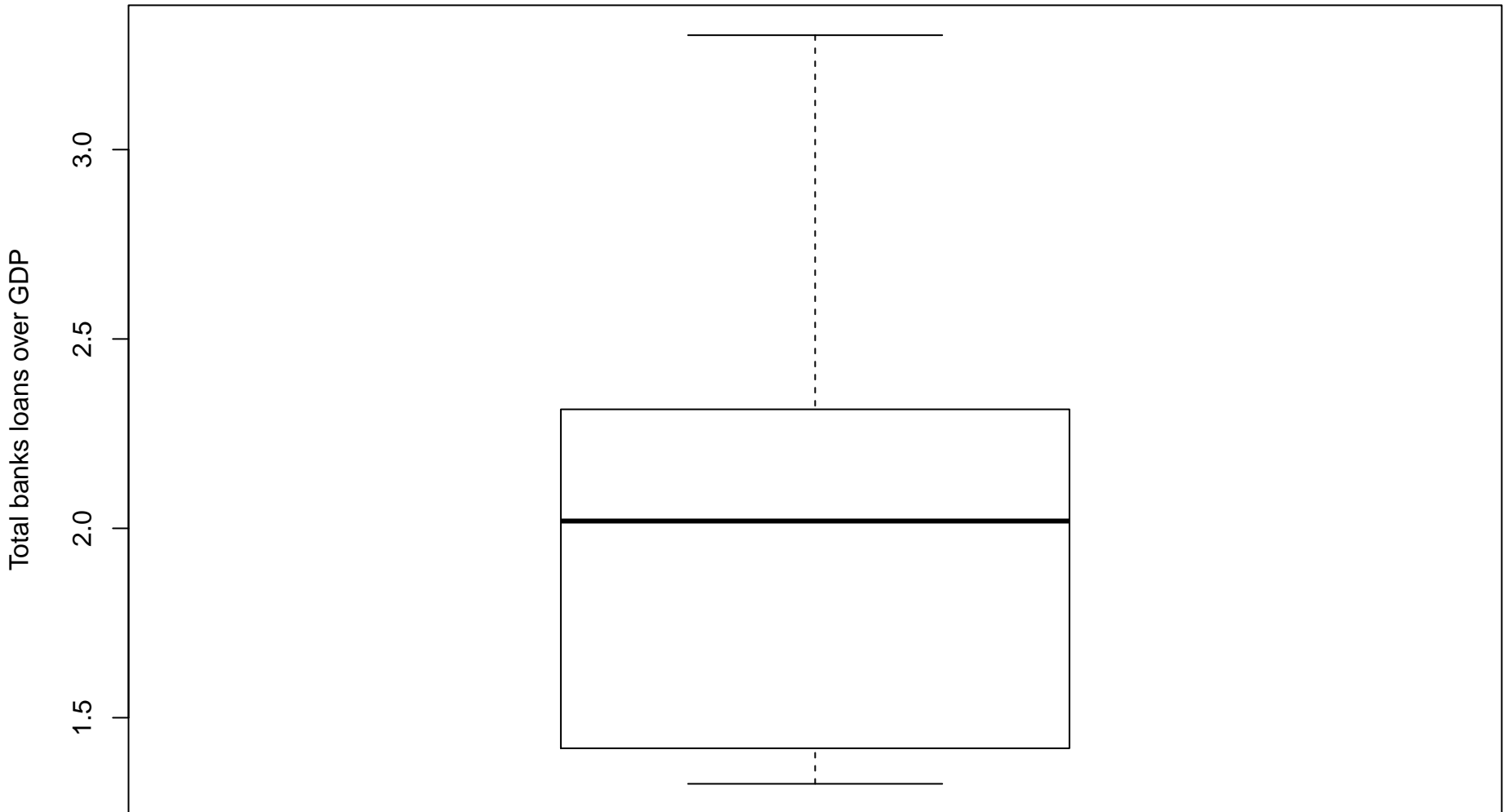**Likelihood of GDP crises**

Likelihood (probability) of GDP crises
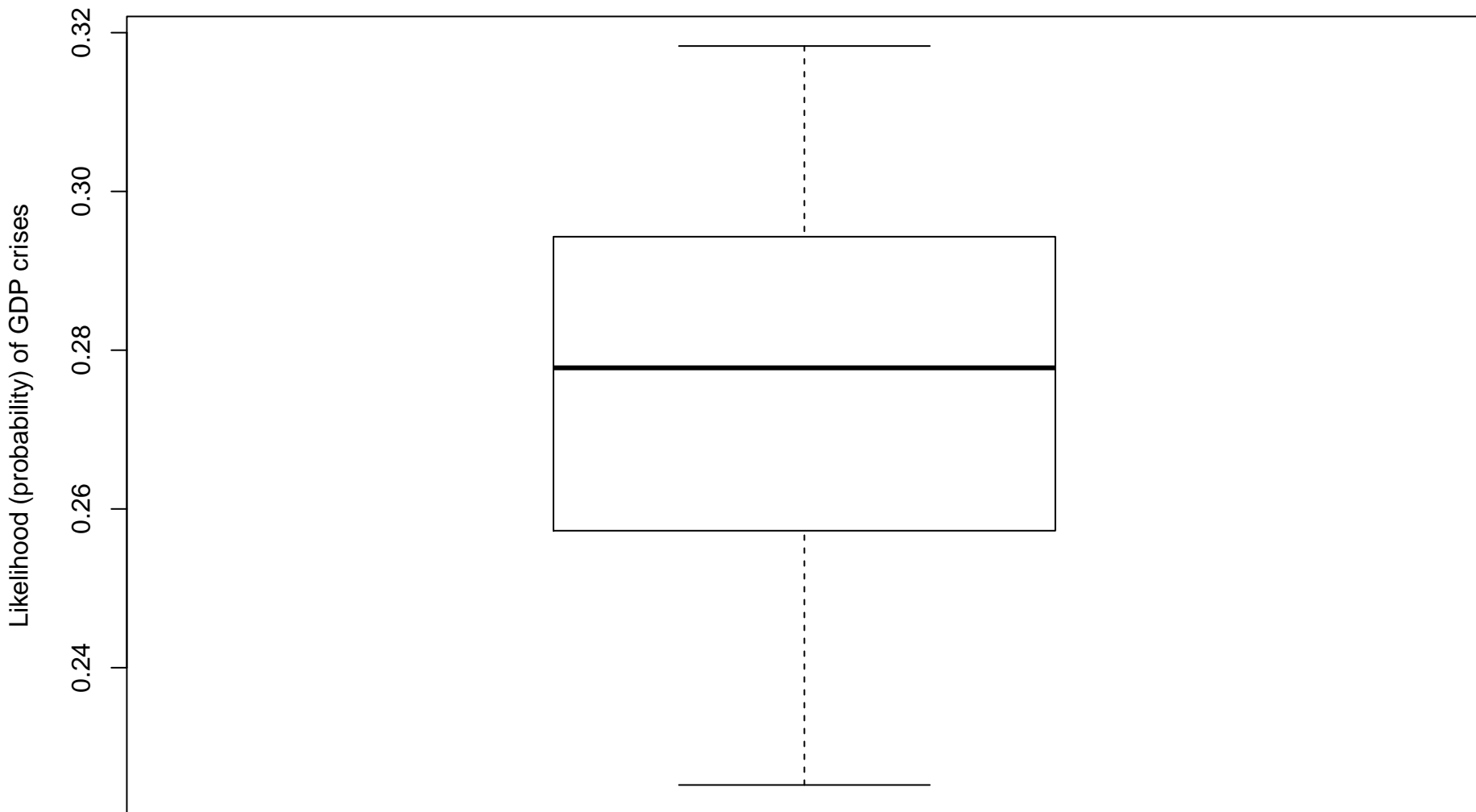
(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 10 / period = 2 − 1000)

Inflation
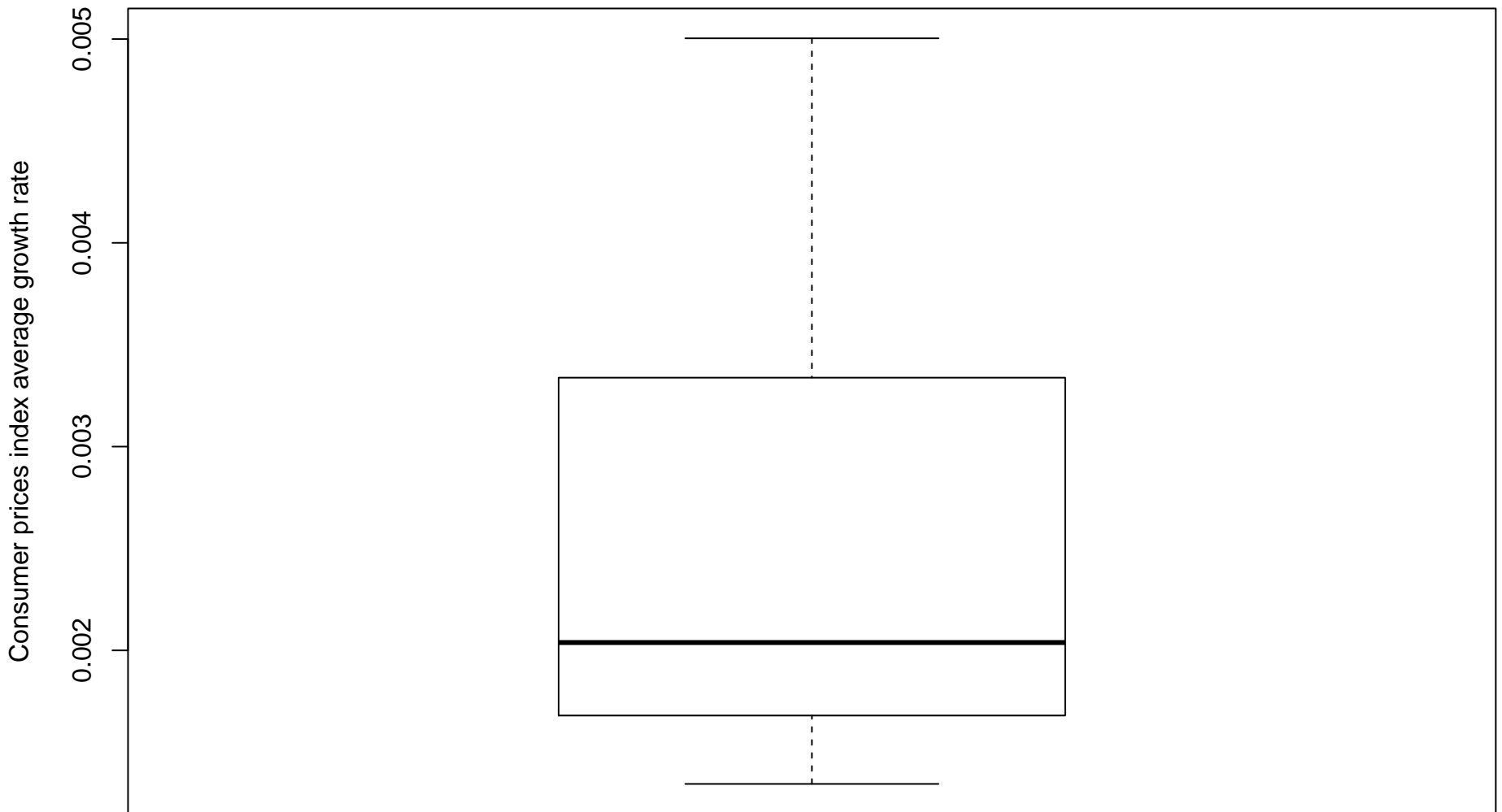
(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 – 1000)

Tax

Government tax income over GDP

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 – 1000)

Government total expenditure
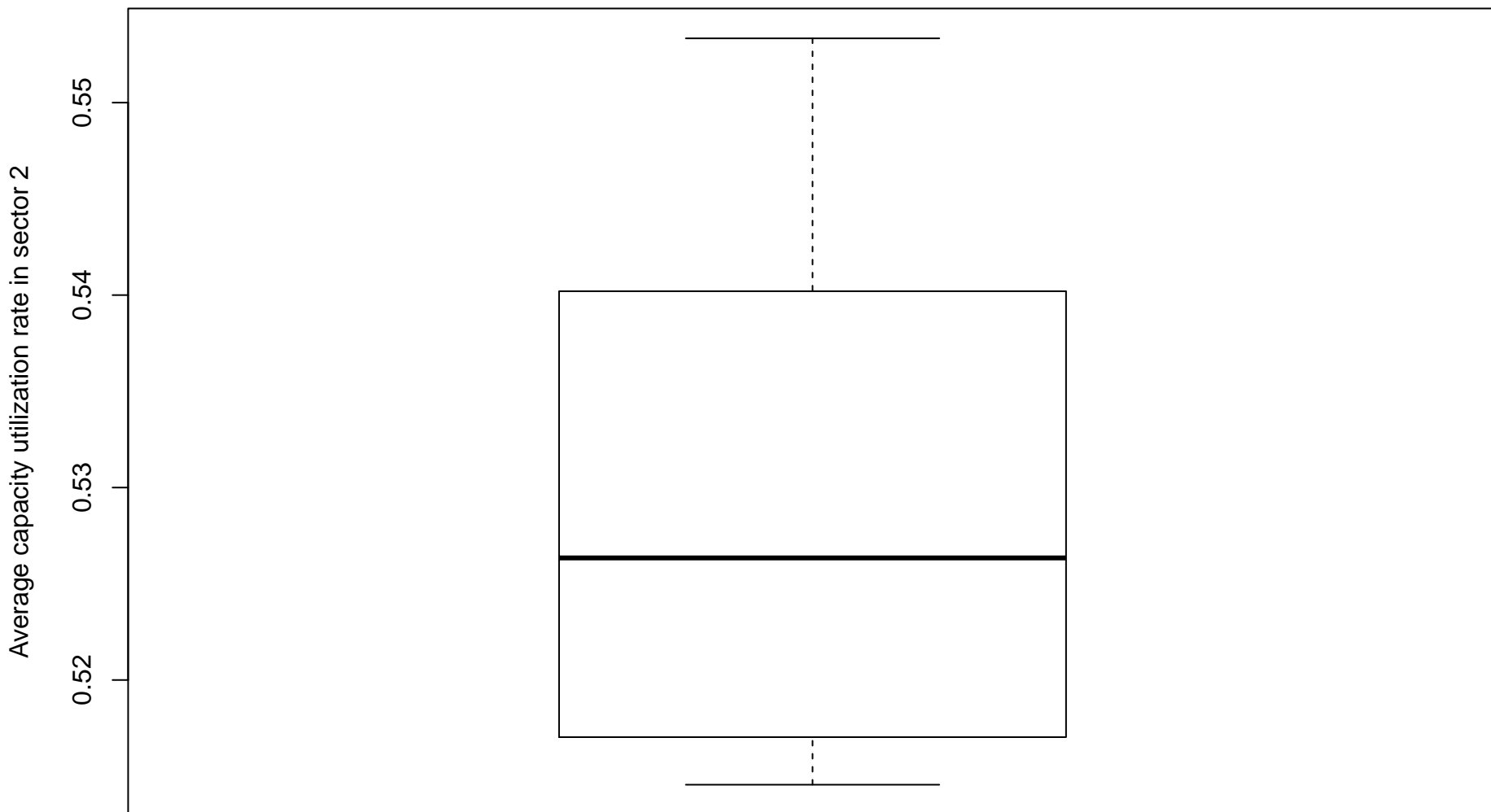

Total government expenditure over GDP

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 10 / period = 2 − 1000)

Government deficit

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 – 1000)

Government debt

Government debt over GDP

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 – 1000)

Loans

Total banks loans over GDP

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 – 1000)
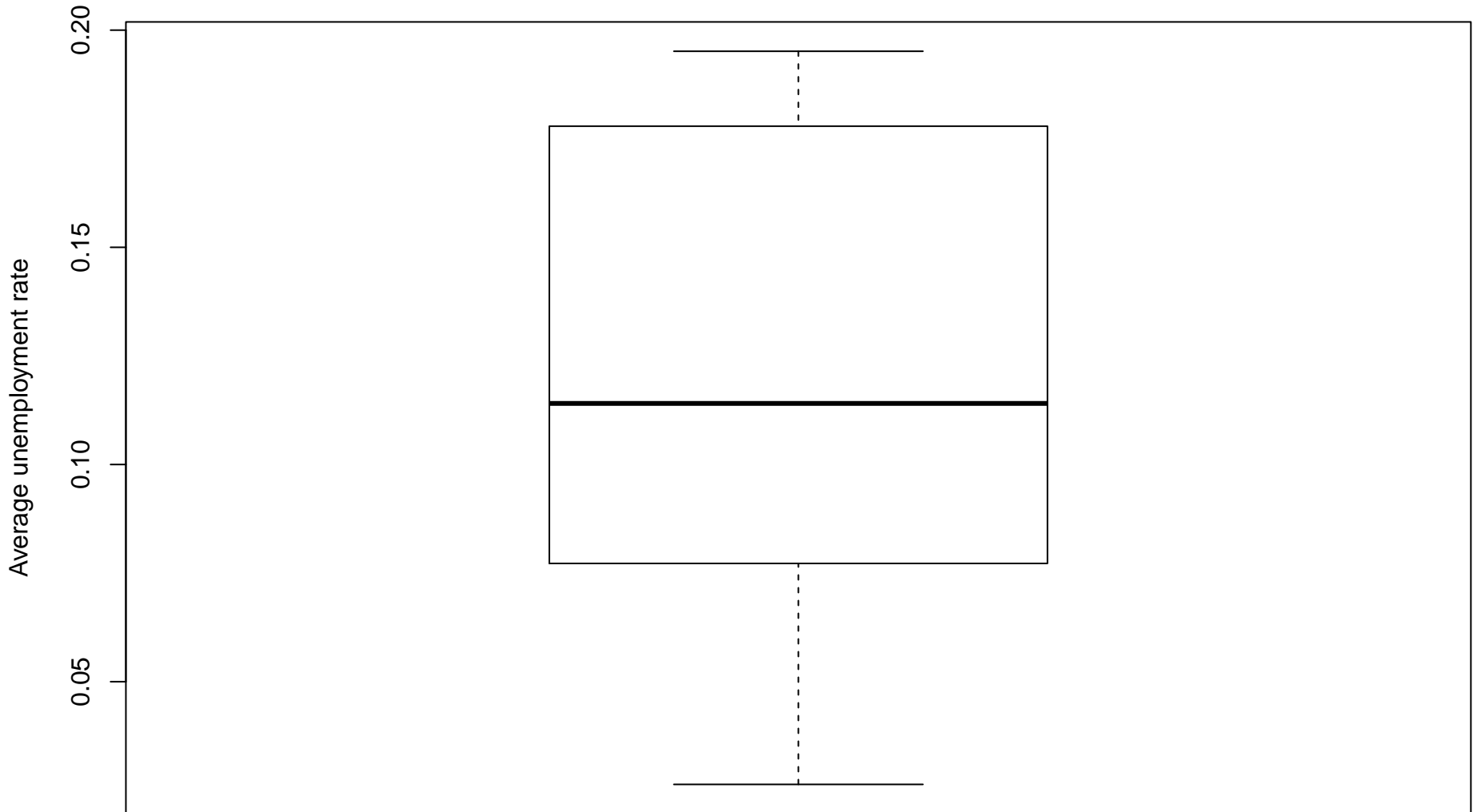
Capacity utilization

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 10 / period = 2 − 1000)
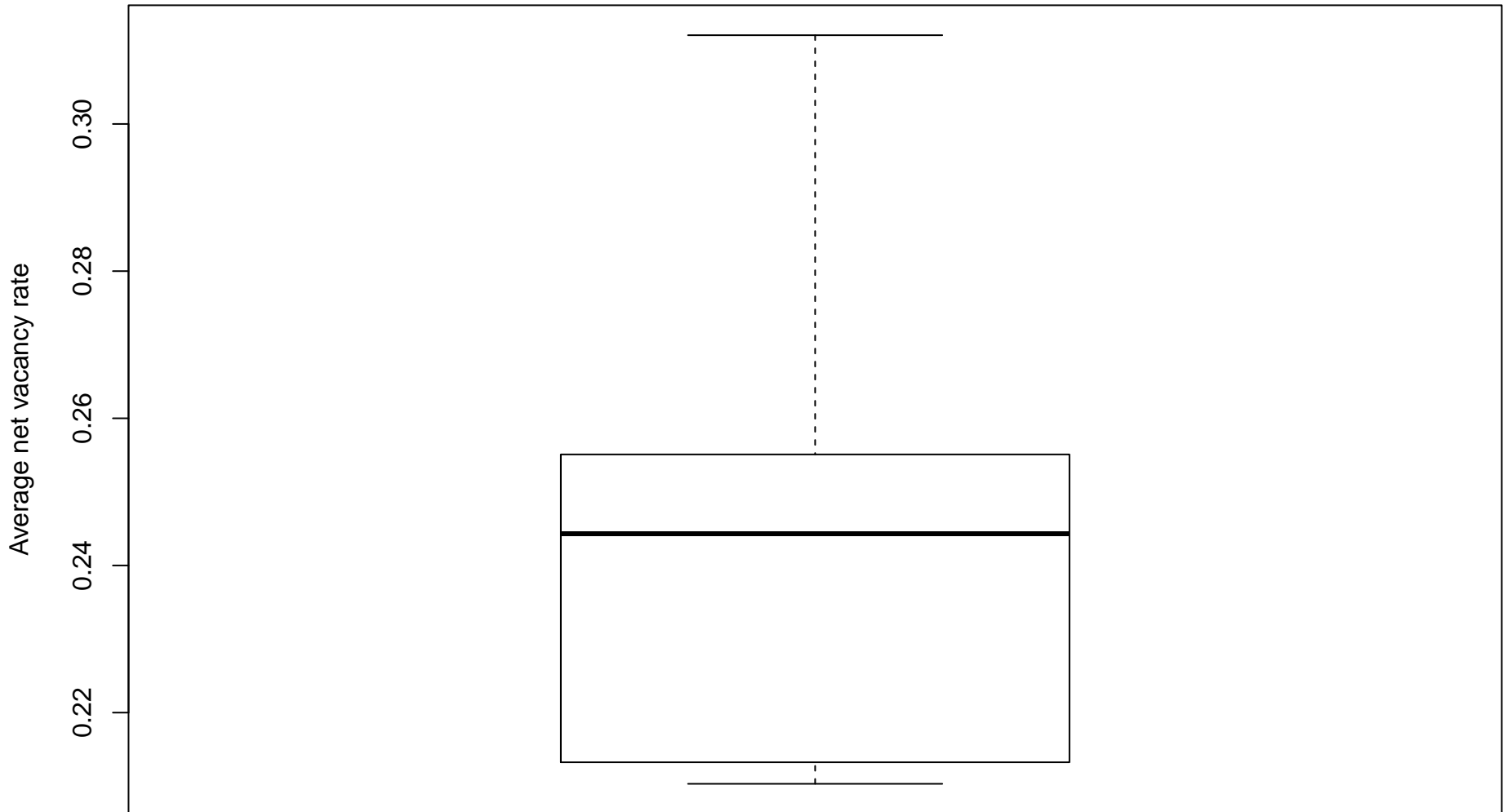
Full employment frequency
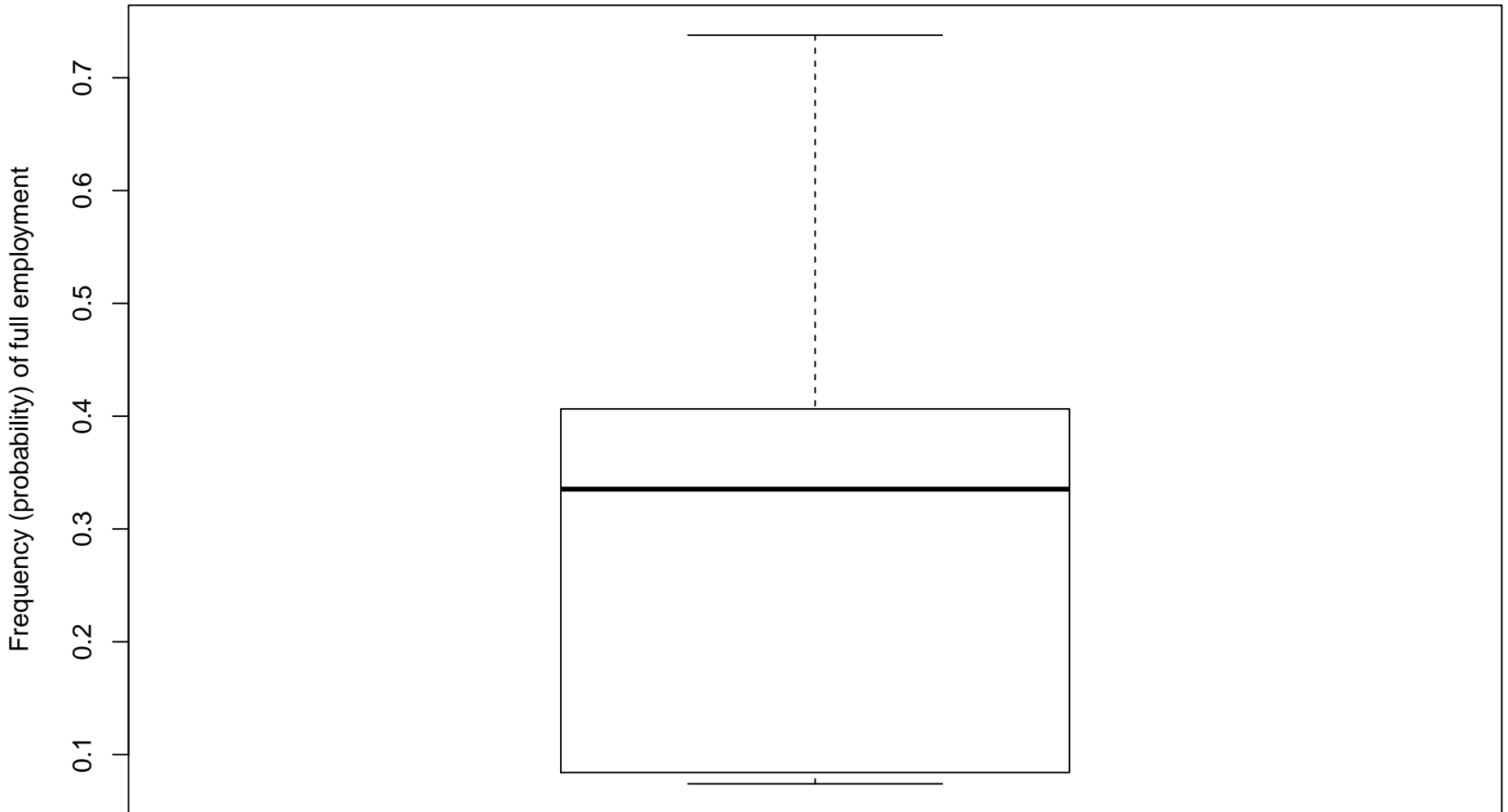
(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 – 1000)
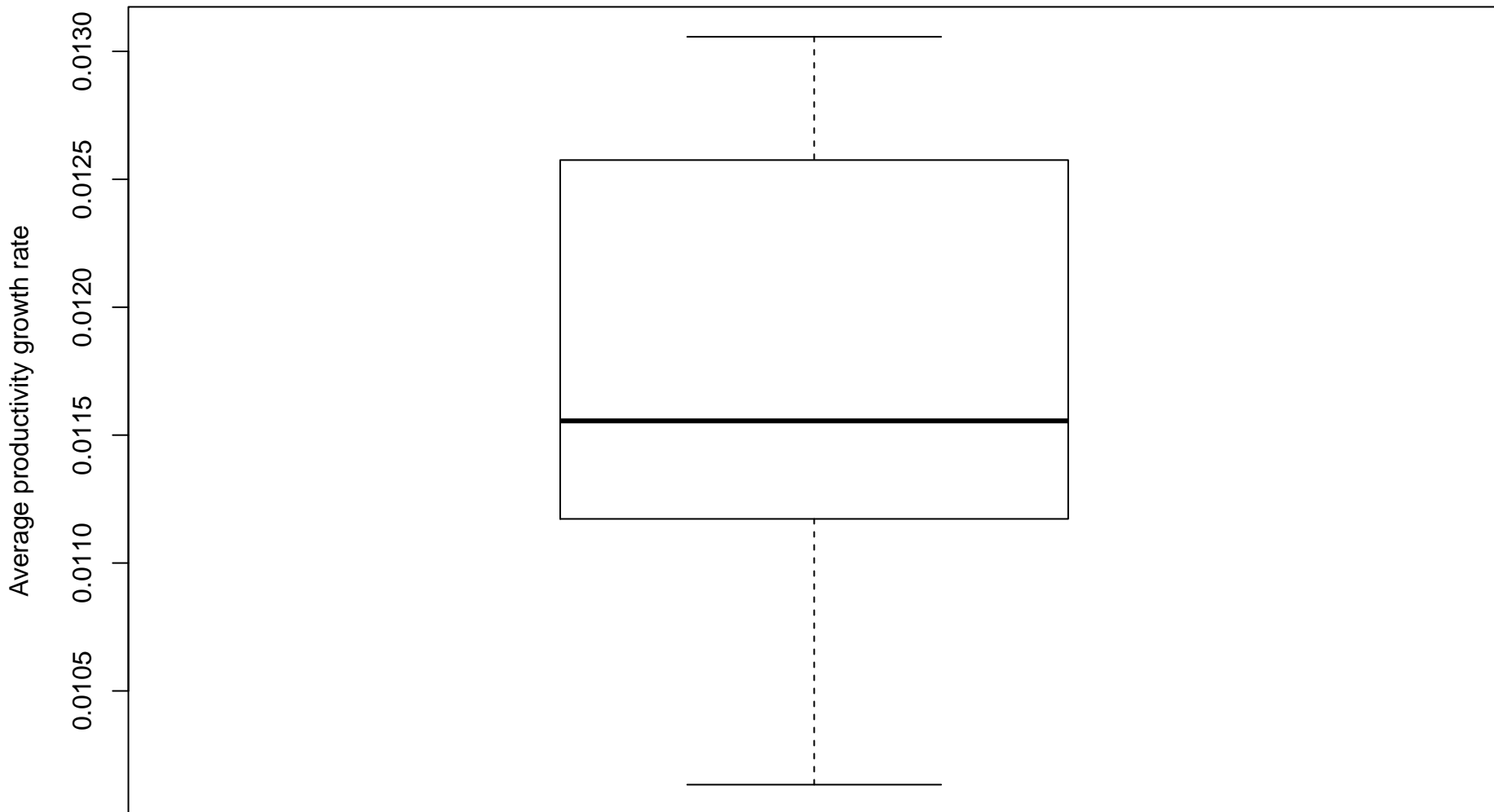
Unemployment

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 10 / period = 2 − 1000)
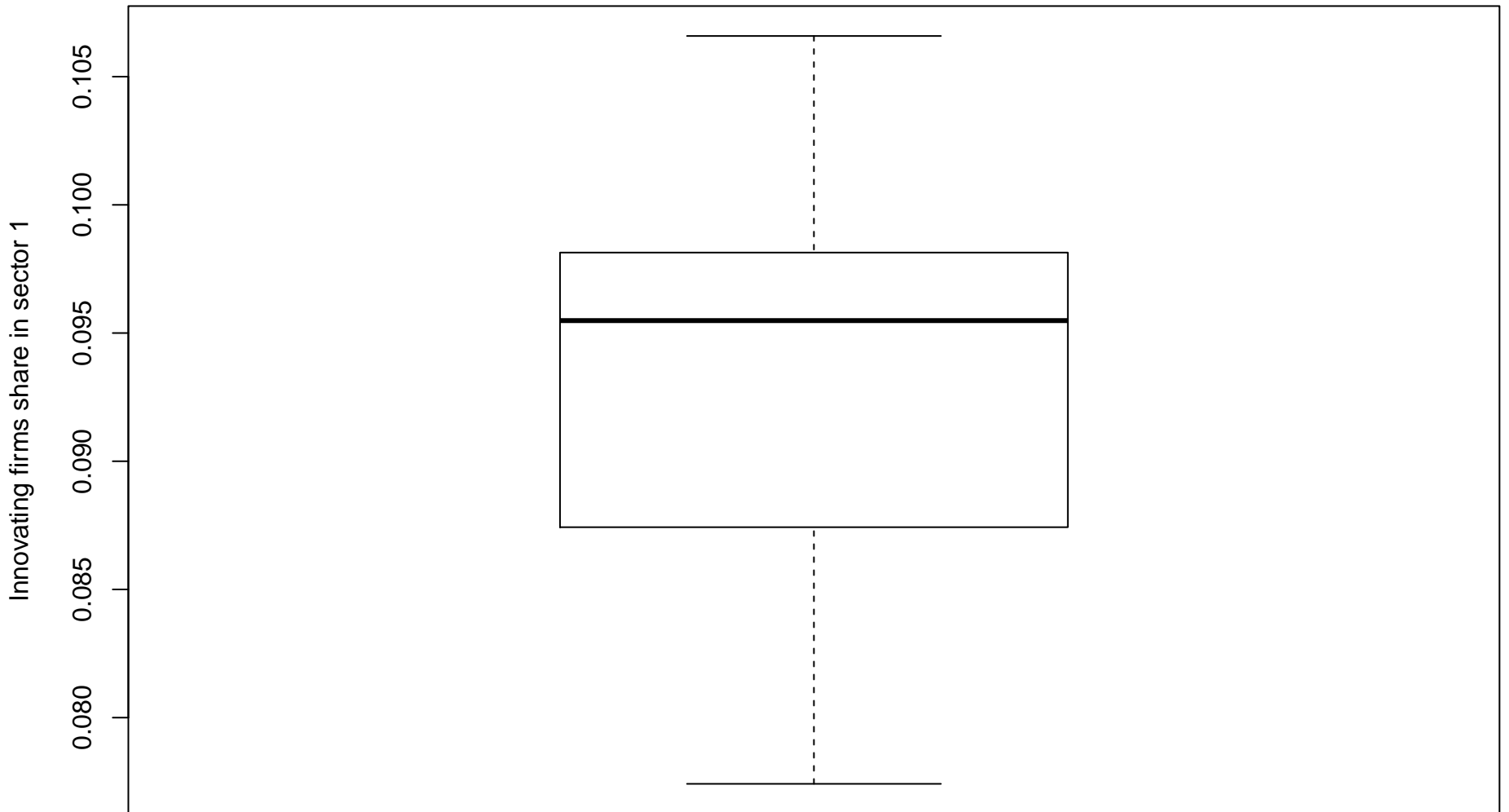
Vacancy

Average net vacancy rate

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 – 1000)
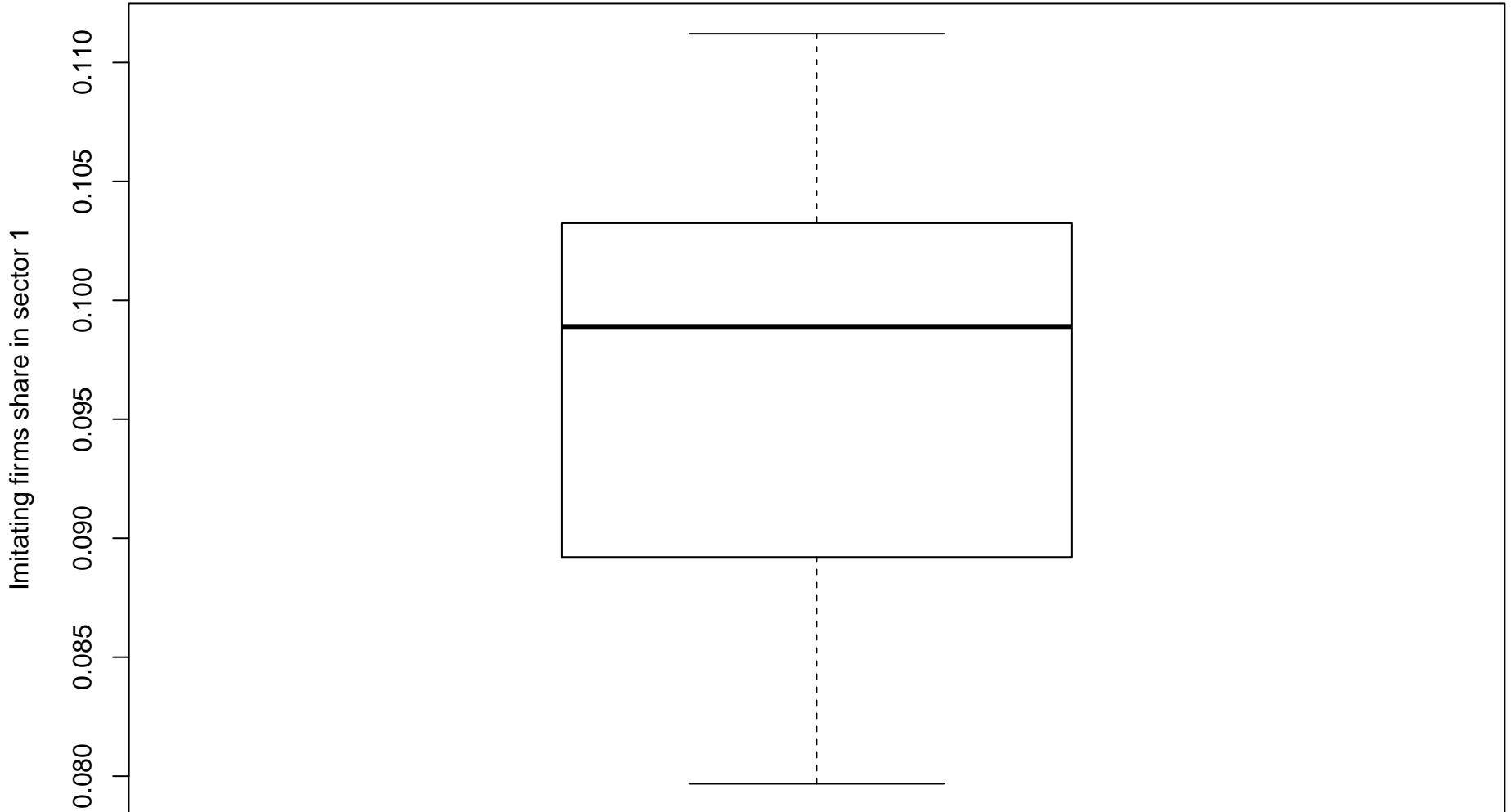
Productivity growth

Average productivity growth rate

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 – 1000)
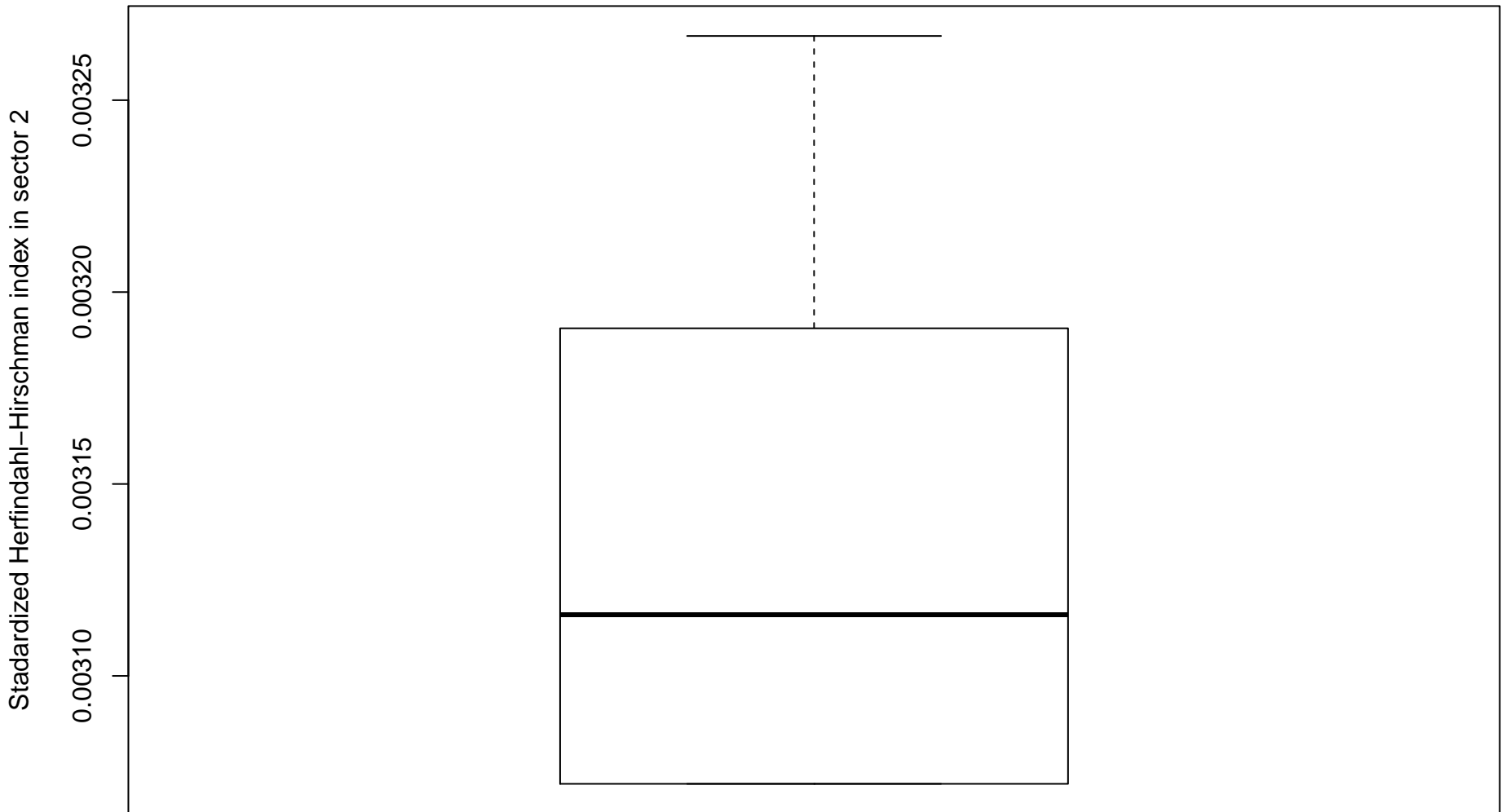
Innovation

Innovating firms share in sector 1

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 − 1000)
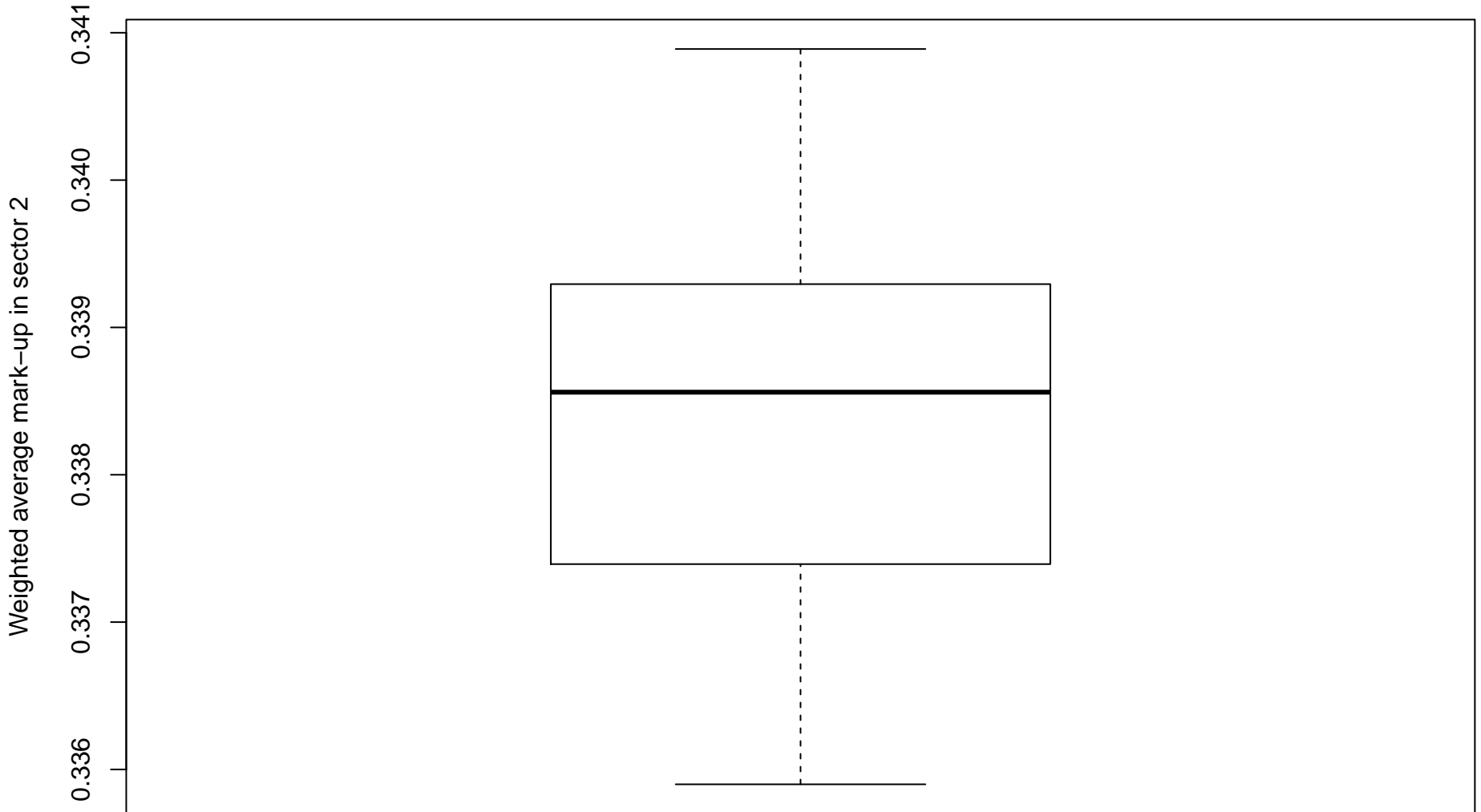
Imitation

Imitating firms share in sector 1

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 10 / period = 2 − 1000)

Market concentration

(bar: median / box: 2nd–3rd quartile / whiskers: max–min / points: outliers / MC runs = 10 / period = 2 − 1000)

Mark−ups

Weighted average mark−up in sector 2

(bar: median / box: 2nd−3rd quartile / whiskers: max−min / points: outliers / MC runs = 10 / period = 2 − 1000)

Monte Carlo descriptive statistics (all experiments)

	Avg[1]	SD[1]	Min[1]	Max[1]
GDP growth	0.01202	0.001144	0.01029	0.01384
Volatility of GDP growth	0.09572	0.00504	0.0877	0.1027
Likelihood of GDP crises	0.2758	0.02807	0.2252	0.3183
Inflation	0.00244	0.001149	0.001344	0.005004
Tax	0.07049	0.004461	0.06307	0.07581
Government total expenditure	0.04723	0.02599	0.009902	0.08077
Government deficit	−0.1645	0.131	−0.3567	0.03669
Government debt	−14.35	11.54	−30.69	3.084
Loans	2.076	0.7253	1.325	3.302
Capacity utilization	0.5296	0.01404	0.5146	0.5533
Full employment frequency	0.3239	0.2312	0.07407	0.7377
Unemployment	0.1159	0.06069	0.02635	0.1951
Vacancy	0.2464	0.03501	0.2103	0.3121
Productivity growth	0.01169	0.001002	0.01013	0.01306
Innovation	0.09232	0.009289	0.07742	0.1066
Imitation	0.09644	0.01062	0.07968	0.1112
Market concentration	0.003076	0.0001734	0.002741	0.003267
Mark−ups	0.3388	0.002613	0.3359	0.345

Experiments: [1] Benchmark
(numbers in brackets indicate the experiment number / MC runs = 10 / period = 2 − 1000)