

## Tables

**Table 1:** Benchmark parameter values.

Parameter	Value	Interpretation/comment
$T$	90	Last period of life
$\underline{B}$	15	Period of life when agents become economically and reproductively active
$\overline{B}$	49	Last period of life being reproductively active
$R$	70	Last period of life being economically active
$\alpha$	.4	Land share of output; same as Hansen and Prescott (2002)
$\delta$	.15	Gives fertility-wage elasticity of .13; similar to Klemp and Møller (2016), Lagerlöf (2015)
$\kappa$	.01	Gives mortality-wage elasticity of $-.2$ ; similar to Klemp and Møller (2016), Lagerlöf (2015)
$\phi$	.01	Expected death rate from disease is about 1% per year
$\gamma_j$	See Table 3	To match age-fertility profile to Swedish data in Figure 2
$\beta_j$	See Table 3	To match age-income profile to Swedish data in Figure 2
$\rho$	.9	Close to perfect substitutability between age cohorts when determining effective labor
$\mu_t$	$.0125(t/500)^2$ ; $t = 0$ in 1300	Mean annual productivity growth rate rises at accelerating rate from 0 to 1.25 percent from 1300-1800; set to match population data in Figure 3
$\sigma_A$	.07	Standard deviation in permanent shock; set to match moments in the data
$\sigma_X$	.07	Standard deviation in temporary shock; set to match moments in the data

**Table 2:** Age-specific survival probabilities, in Swedish data and in the model. The model values are the expected survival rate from age and disease, but disregarding starvation.

Ages ( $j - 1$ )	Survival rate in the data	$E[s_t^d]s_j^{\text{age}}$
0	.797	.797
1-2	.947	.947
3-4	.972	.972
5-9	.987	.990
10-14	.993	.990
15-19	.993	.990
20-24	.992	.990
25-29	.990	.990
30-34	.988	.988
35-39	.988	.988
40-44	.984	.984
45-49	.982	.982
50-54	.978	.978
55-59	.973	.973
60-64	.959	.959
65-69	.941	.941
70-74	.908	.908
75-79	.870	.870
80-88	.775	.775
89	NA	0

**Table 3:** Values for  $\gamma_j$  and  $\beta_j$  for three select age groups.

$j$	$\beta_j$	$\gamma_j$
18	0.0181	0.0104
32	0.0208	0.1128
40	0.0192	0.0468

**Table 4:** Fraction of the years in which log GDP per capita fell below the 5th percentile, and above the 95th percentile, across 1000 simulated economies. The results are shown by country and for all country-years together.

Country	Fraction years below 5th percentile	Fraction years above 95th percentile
England	.024	0
Netherlands	0	.097
Sweden	.004	0
Italy	0	.026
Portugal	.29	0
All	.046	.029

**Table 5:** Comparing moments in the data to the simulation results for the benchmark calibration and when changing some of the parameter values.

**Panel A:** Moments in log GDP/capita time-series data

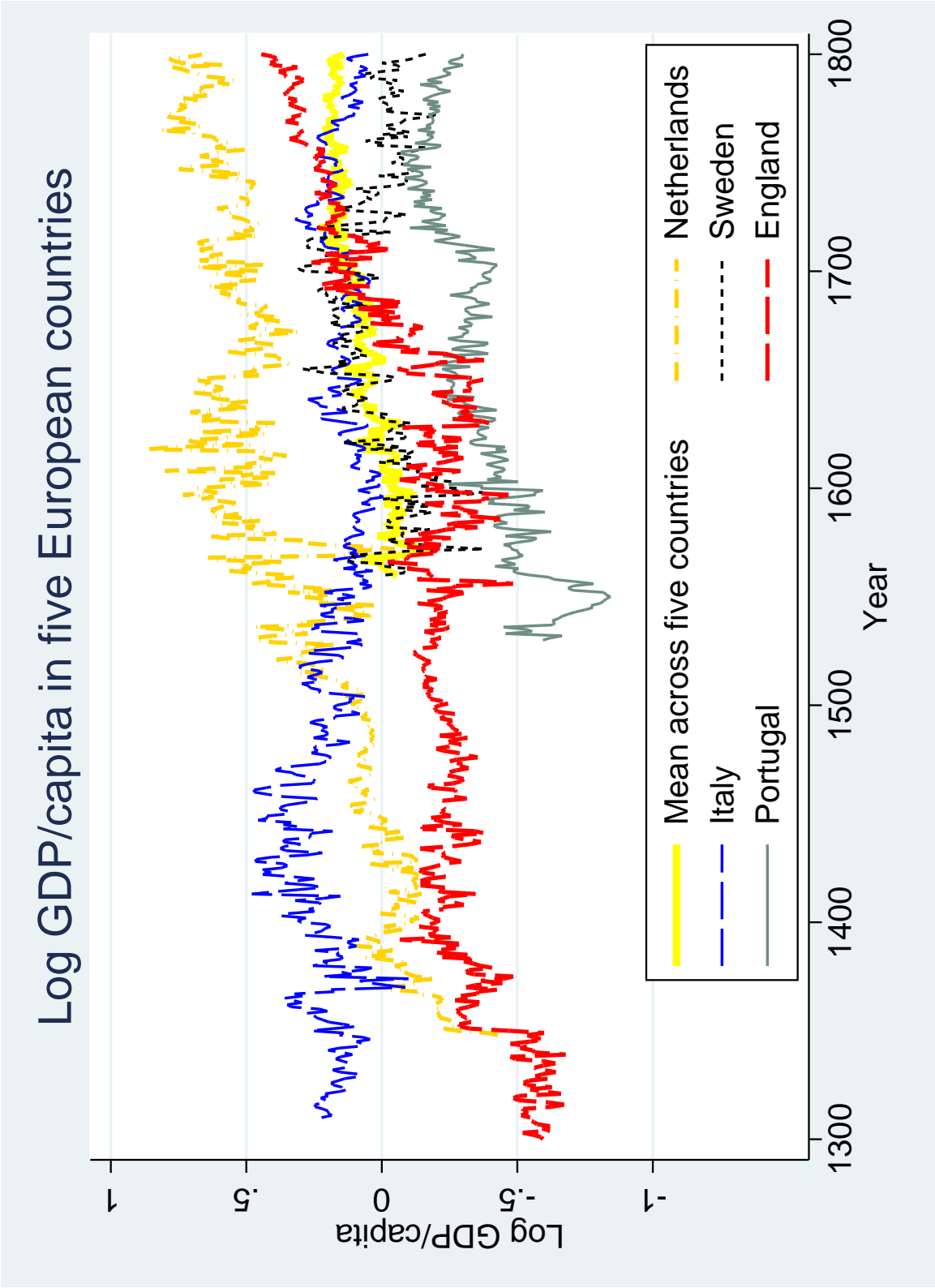
Country	Mean	Standard deviation	1-year lag correlation	2-year lag correlation
England	−.16	.25	.96	.95
Netherlands	.31	.3	.96	.94
Italy	.18	.097	.85	.74
Sweden	.015	.13	.86	.74
Portugal	−.35	.17	.94	.92
Mean across five countries	.00	.19	.91	.86

**Panel B:** Moments in simulations [5th percentile, 95th percentile]

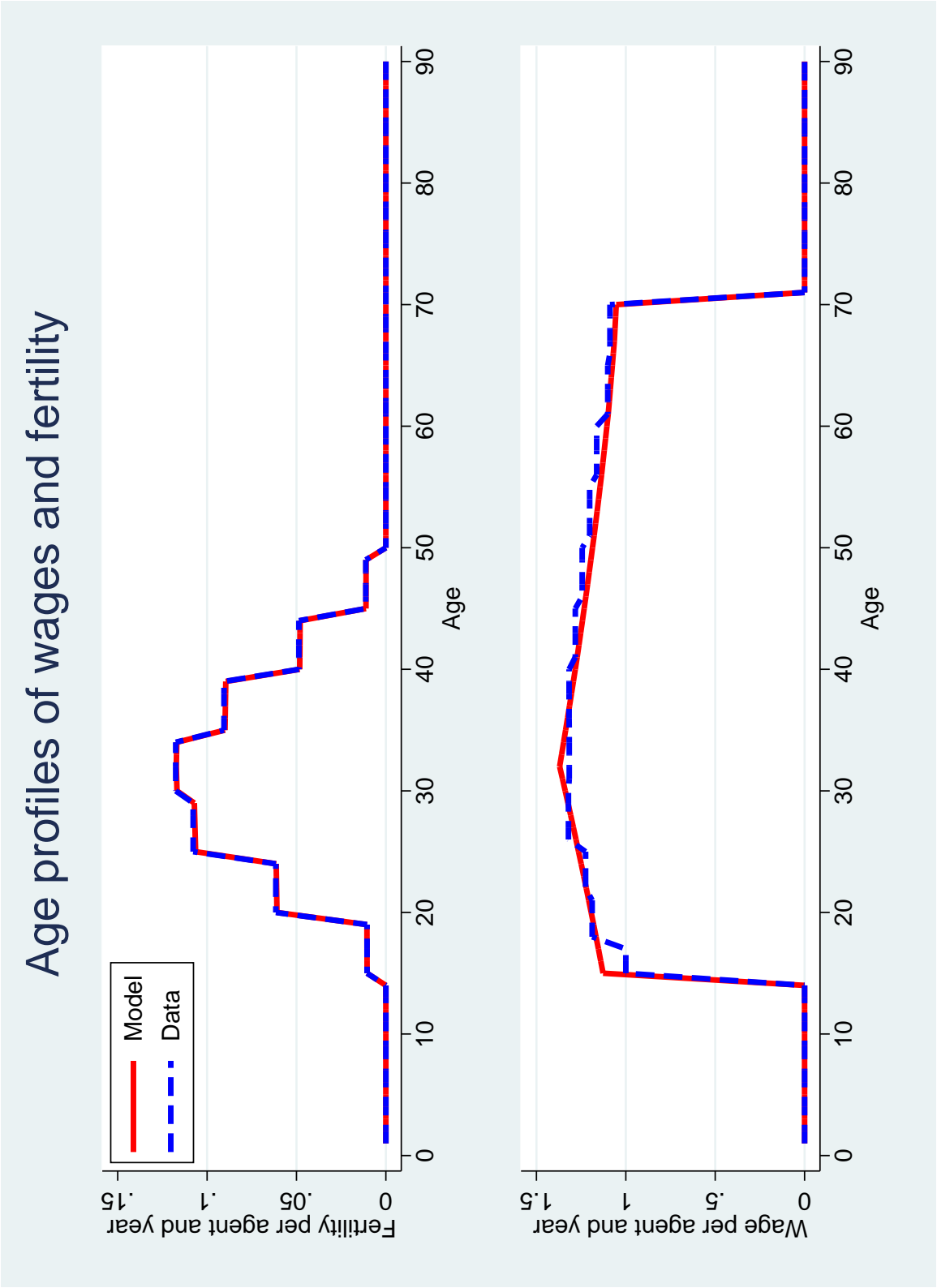
Benchmark	[−.34, .41]	[.12, .43]	[.92, .99]	[.9, .99]
$\sigma_A = 0, \sigma_X = .35$	[−.063, .068]	[.18, .24]	[.37, .66]	[.37, .66]
Start year 1560	[−.41, .51]	[.098, .35]	[.87, .99]	[.83, .99]
$\delta = .3$	[−.28, .31]	[.12, .39]	[.92, .99]	[.89, .99]
$\kappa = .02$	[−.27, .36]	[.12, .41]	[.92, .99]	[.89, .99]
$\phi = .02$	[−.57, .62]	[.15, .55]	[.94, 0.996]	[.92, .99]
$\alpha = .02$	[−.26, .29]	[.065, .23]	[.93, .99]	[.91, .99]

## Figures

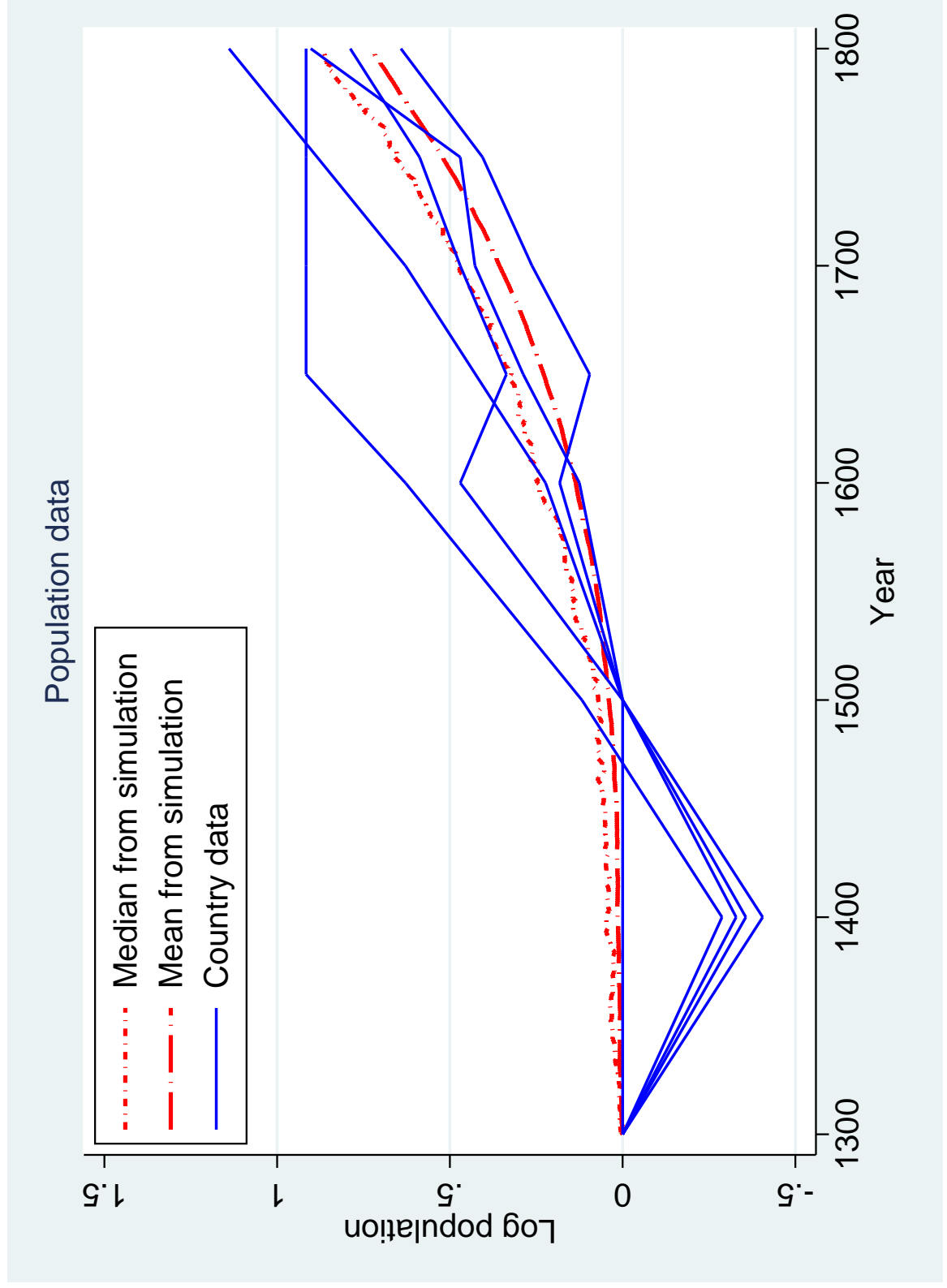
**Figure 1:** Data over log GDP per capita. The series are normalized to equal zero when averaged first over time for each country, and then across all countries.



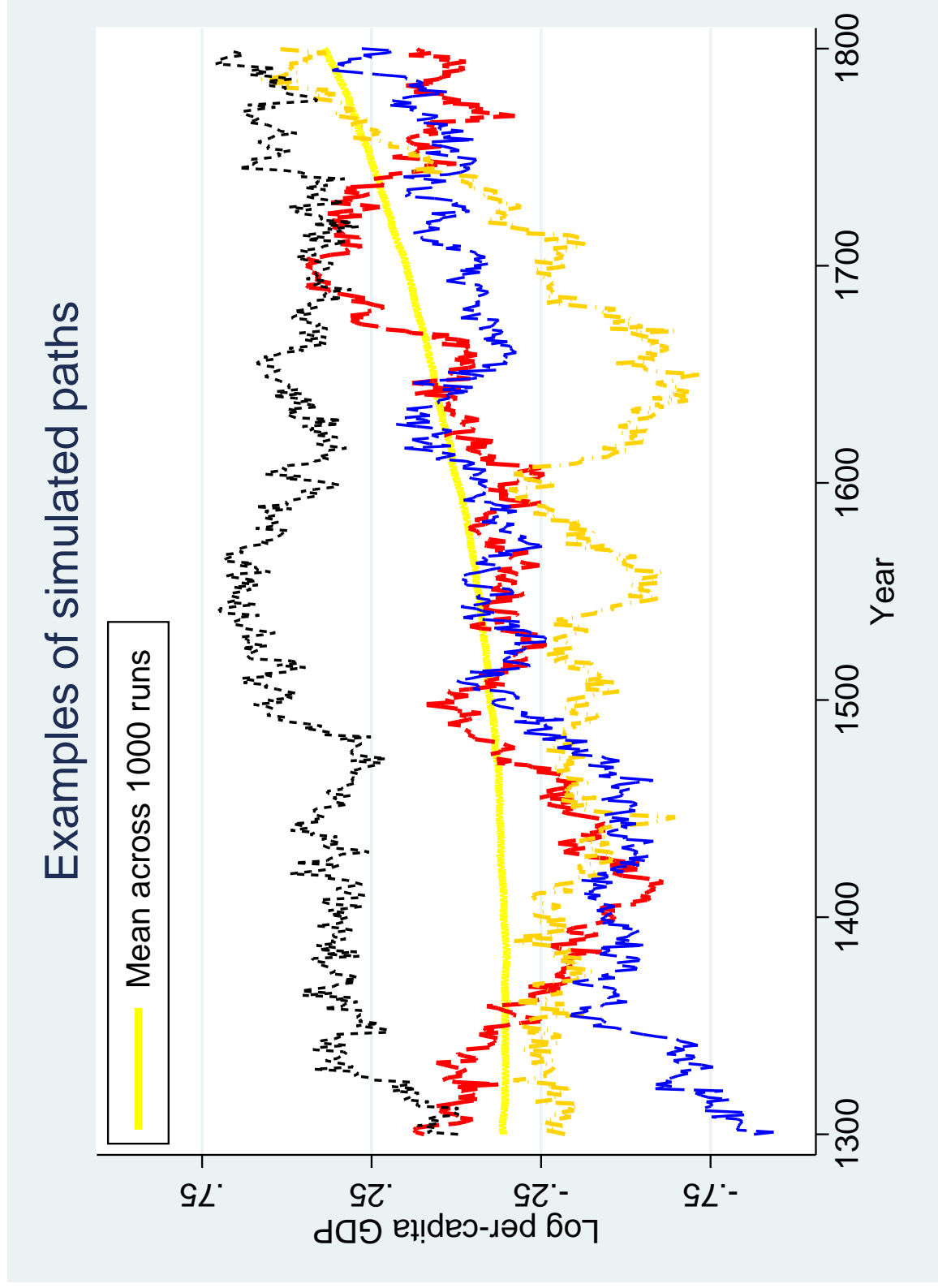
**Figure 2:** Fertility and wages by age group, in the data and in the model, guiding how  $\gamma_j$ ,  $\beta_j$  and  $\rho$  are set. The data are from Sweden. Fertility rates are averages 1751-1800, and wages refer to rural Swedish workers in 1940, the earliest year available. The model-generated profiles are averages over 1000 runs for the last 50 years of the simulation, corresponding to the years 1751-1800.



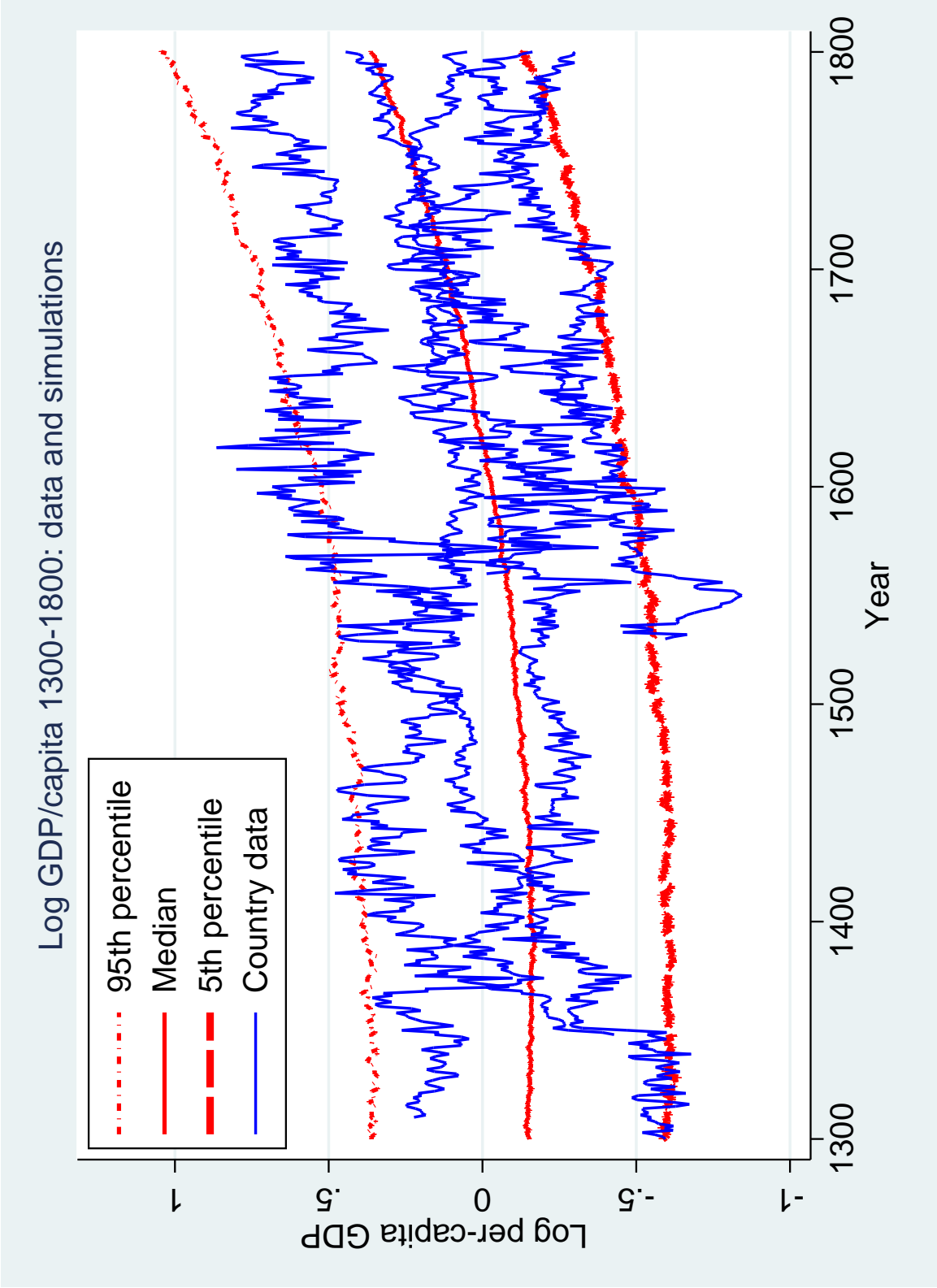
**Figure 3:** Population level data for the five countries from McEvedy and Jones (1978), and the mean and median population levels across 1000 simulated economies.



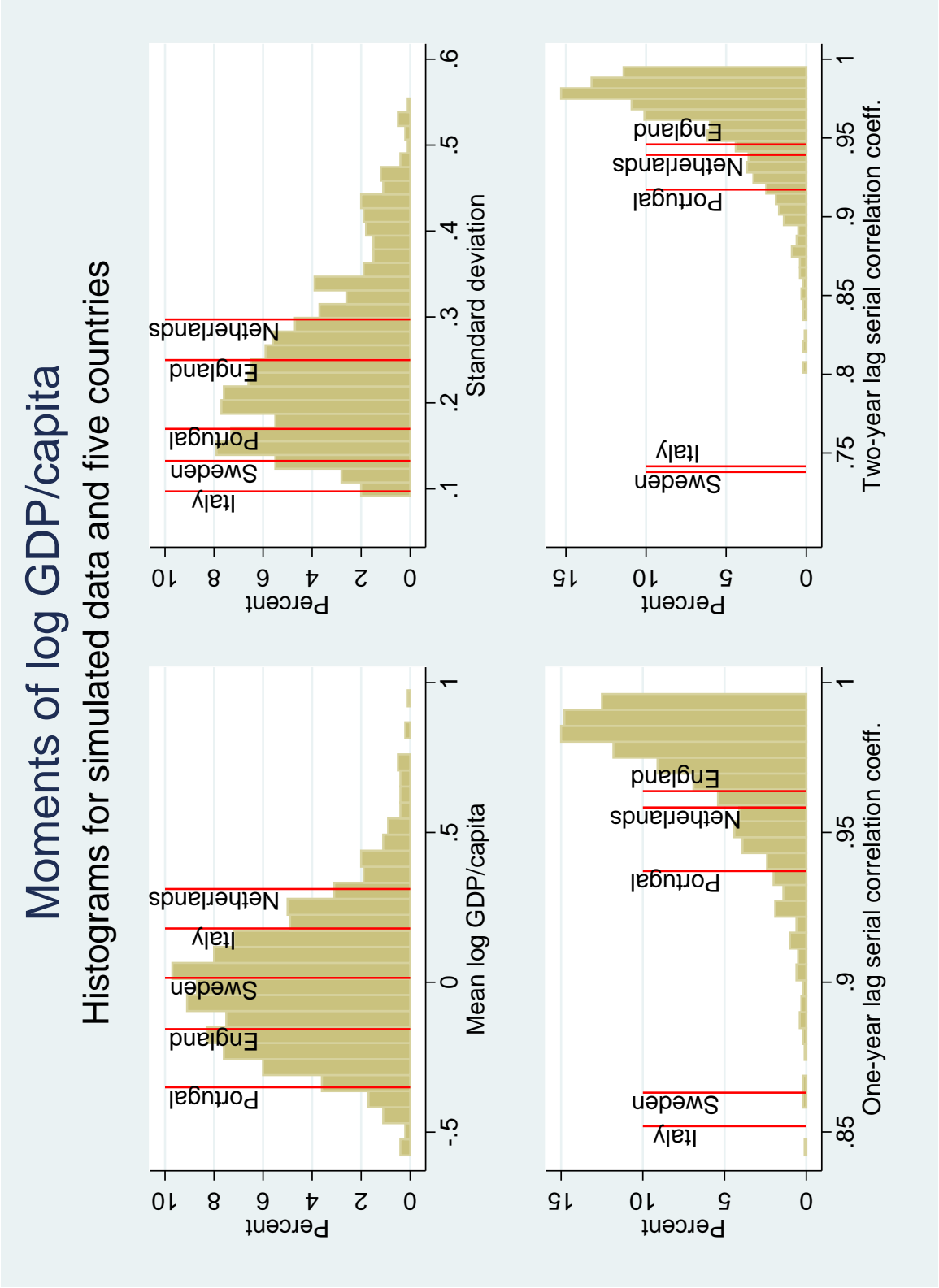
**Figure 4:** Examples of paths of log GDP per capita for four different simulated economies, and the average across 1000 runs (including the ones shown).



**Figure 5:** This figure compares the time paths in log GDP per capita for the five countries in Figure 1 to the median across 1000 runs by year, and the associated 5th and 95th percentiles for each year.



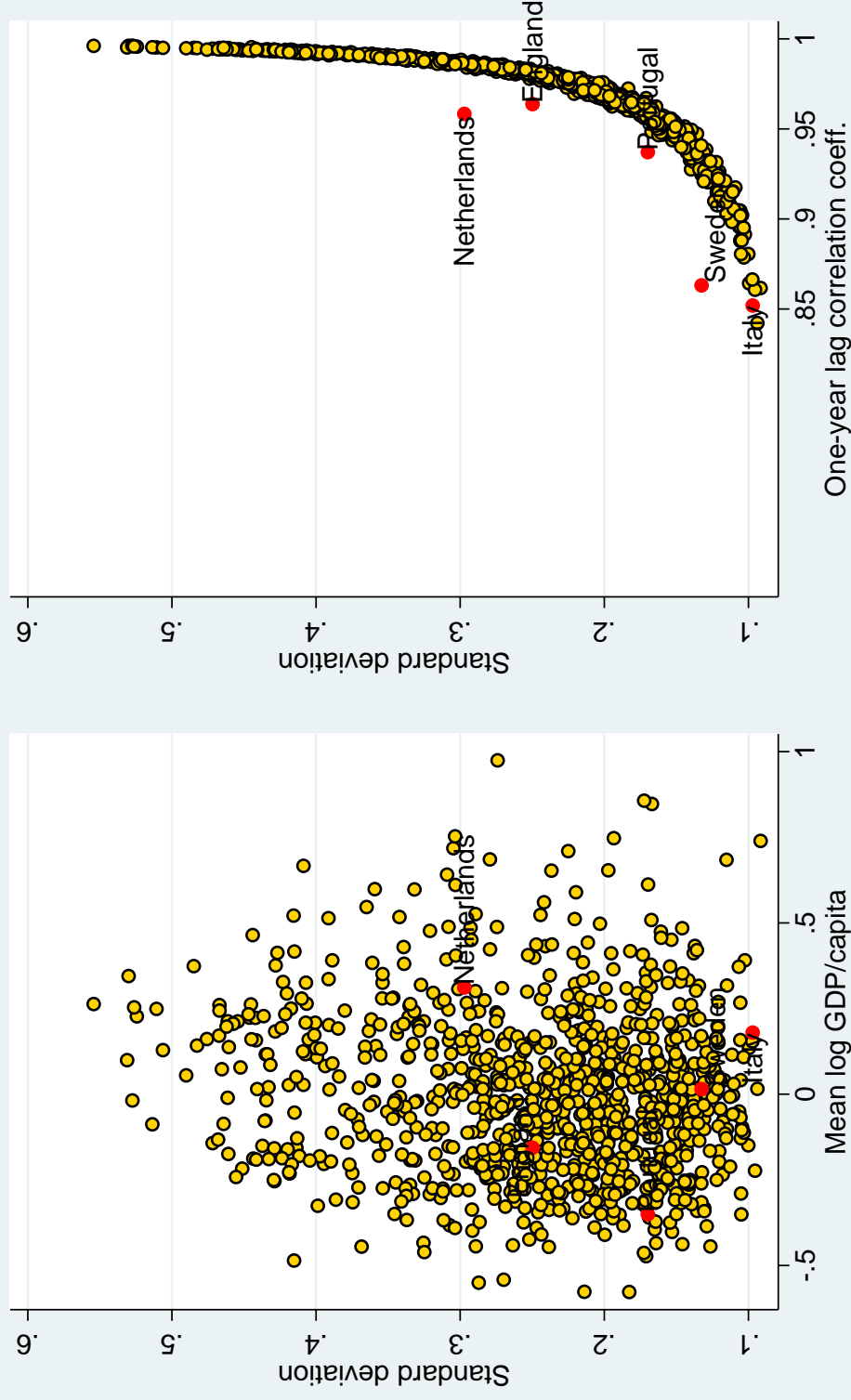
**Figure 6:** For each of the 1000 simulated economies, the means, standard deviations, and serial correlation coefficients (at one and two year lags) were calculated. This figure shows how these moments were distributed, as well as the corresponding values for the five countries.



**Figure 7:** The same data as in Figure 6 presented in two plots.

## Moments of log GDP/capita

Scatter plots for simulated data and five countries



## Online Appendix tables

**Table A.1:** Regressions based on simulated data: the benchmark model.

	Dependent variable:							
	Log birth rate year $t$				Log death rate year $t$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log wage $t$	0.130*** (0.000)			0.038*** (0.001)	-0.192*** (0.007)			-0.280*** (0.035)
Log wage $t - 1$		0.132*** (0.000)		0.113*** (0.002)		-0.184*** (0.007)		0.013 (0.040)
Log wage $t - 2$			0.129*** (0.000)	-0.018*** (0.001)			-0.180*** (0.007)	0.078*** (0.035)
R <sup>2</sup>	0.91	0.92	0.90	0.92	0.05	0.05	0.05	0.05
Number of obs.	50100	50000	49900	49900	50100	50000	49900	49900

*Notes:* Ordinary least squares regressions with standard errors in parentheses, based on 100 cases and 500 years of data from the benchmark simulation. All specifications include year and case fixed effects. \* indicates  $p < 0.10$ , \*\*  $p < 0.05$ , and \*\*\*  $p < 0.01$ .

**Table A.2:** Fraction of the years in which log GDP per capita fell outside the 5th and 95th percentiles across 1000 simulated economies when extending the model horizon to 2010. The results refer to all country-years over the periods 1300-1800, 1800-2010, and 1300-1800.

Period	Fraction years below 5th percentile	Fraction years above 95th percentile
1300-2010	.17	.096
1801-2010	.2	.28
1300-1800	.16	.0051

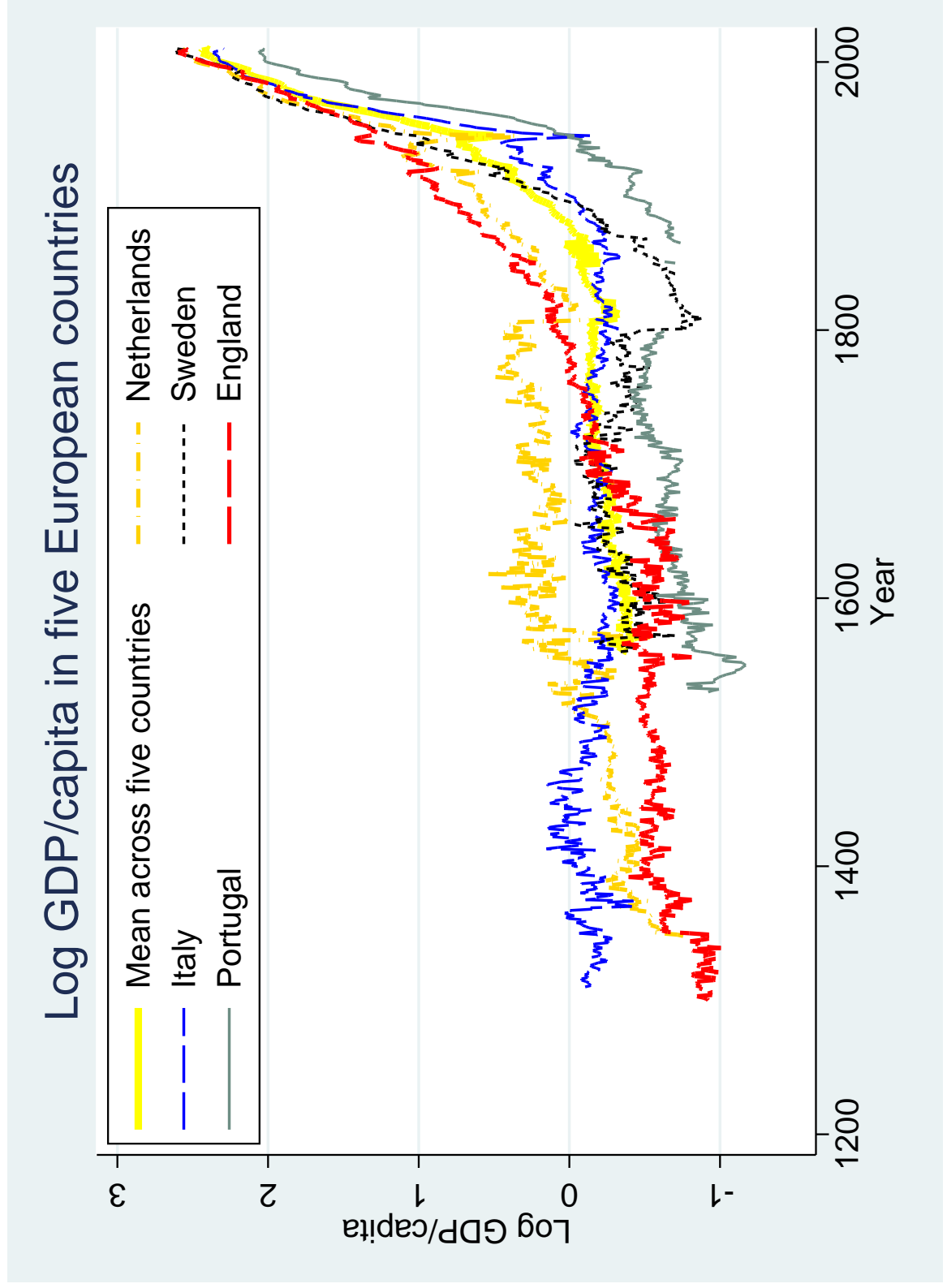
**Table A.3:** Regressions based on simulated data: the model extension with marriage.

	Dependent variable:											
	Log birth rate year $t$			Log death rate year $t$			Log marriage rate year $t$					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Log wage $t$	0.176*** (0.002)			0.036*** (0.009)	-0.194*** (0.008)			-0.281*** (0.035)	0.061*** (0.021)			0.235*** (0.097)
Log wage $t - 1$		0.178*** (0.002)		0.121*** (0.010)		-0.186*** (0.008)		0.013 (0.041)		0.053*** (0.021)		-0.038 (0.113)
Log wage $t - 2$			0.175*** (0.002)	0.023*** (0.009)			-0.182*** (0.008)	0.077*** (0.035)			0.050*** (0.021)	-0.140 (0.097)
R <sup>2</sup>	0.33	0.33	0.33	0.34	0.05	0.05	0.04	0.05	0.01	0.01	0.01	0.01
Number of obs.	50100	50000	49900	49900	50100	50000	49900	49900	50100	50000	49900	49900

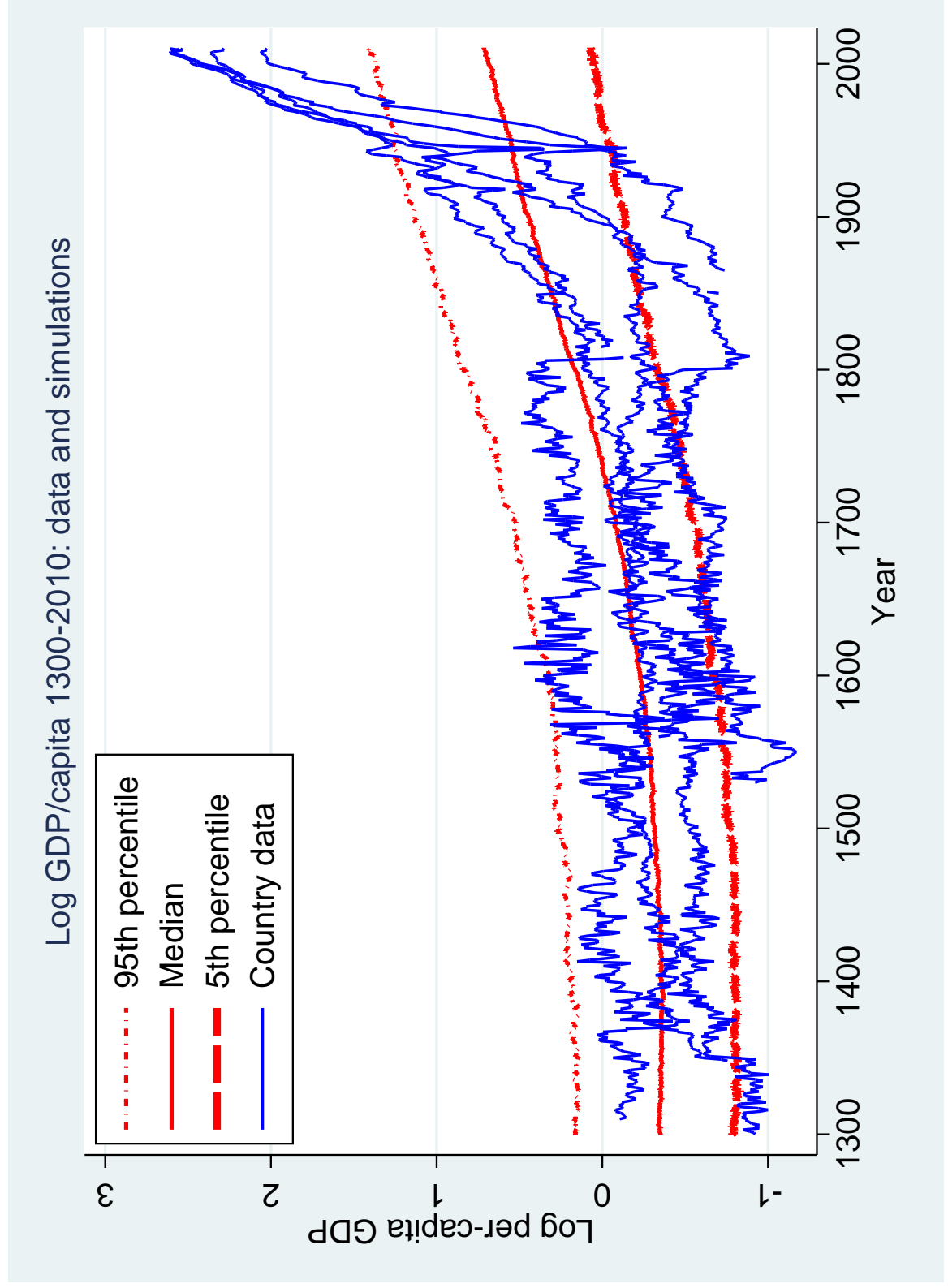
*Notes:* Ordinary least squares regressions with standard errors in parentheses, based on 100 cases and 500 years of data from the simulation with marriage. All specifications include year and case fixed effects. \* indicates  $p < 0.10$ , \*\*  $p < 0.05$ , and \*\*\*  $p < 0.01$ .

## Online Appendix figures

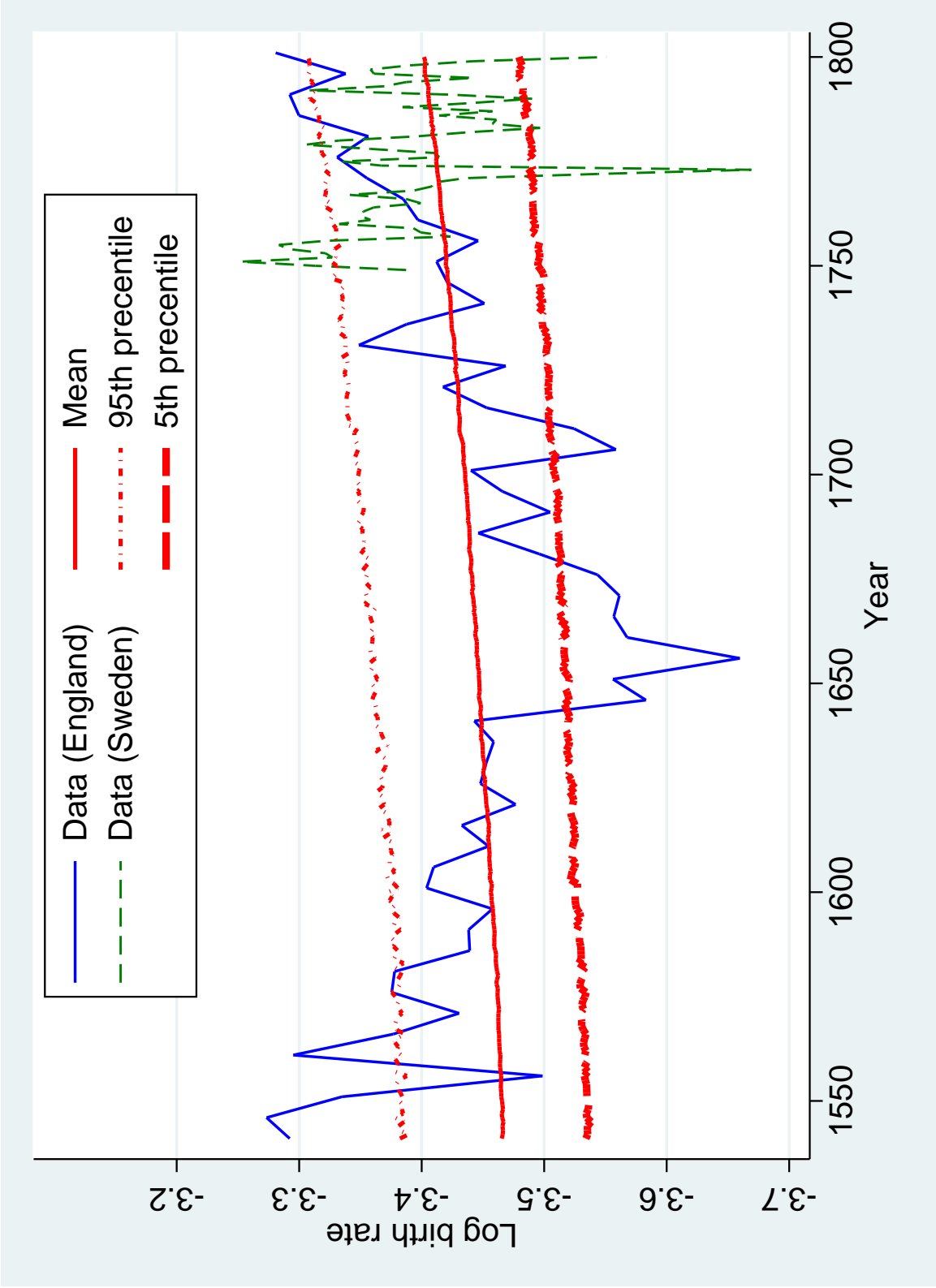
**Figure A.1:** Data over log GDP per capita 1300-2010, using data from both Fouquet and Broadberry (2015) and Bolt and van Zanden (2014). The series are normalized to zero when averaged over time and across countries.



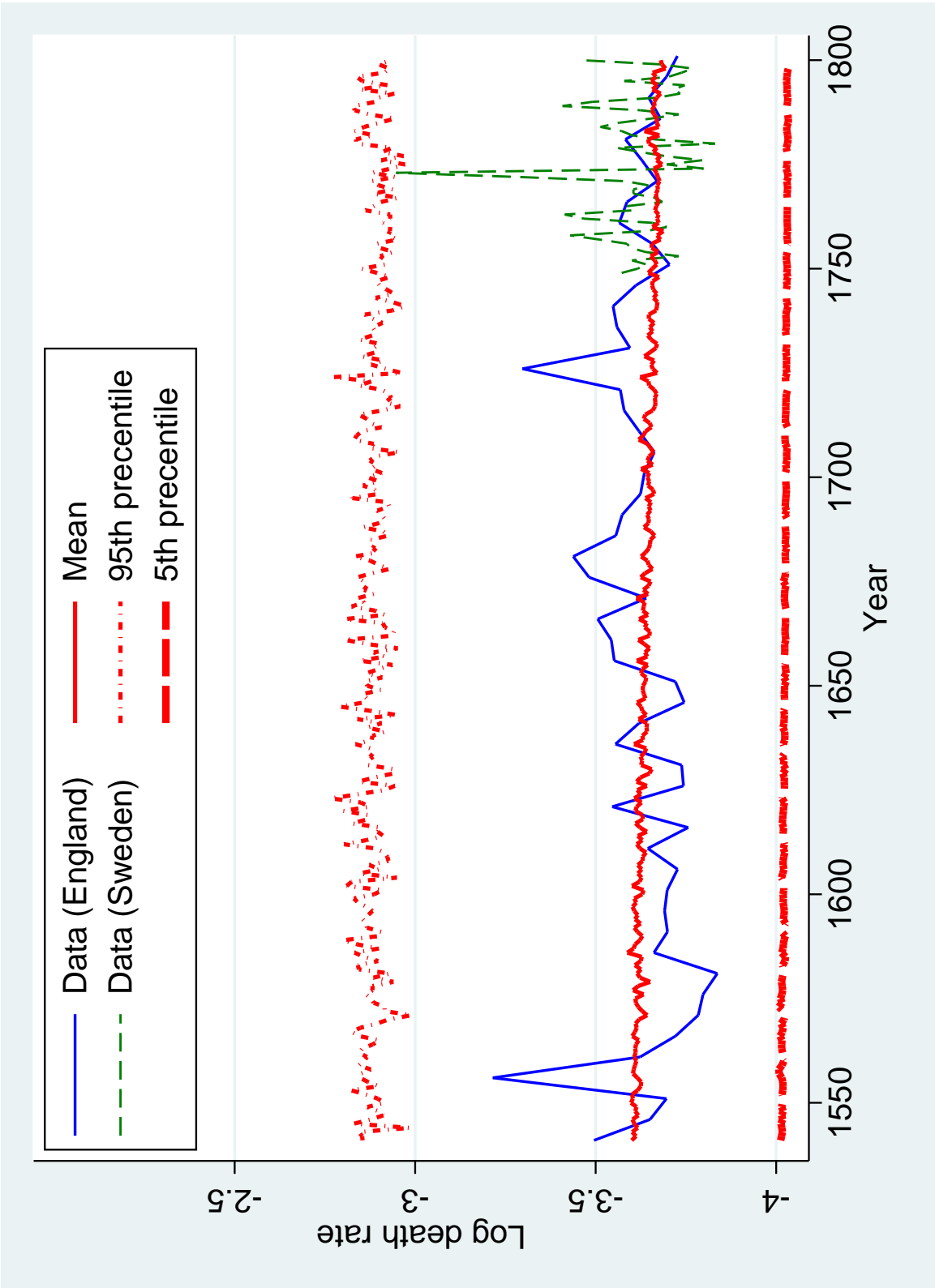
**Figure A.2:** This figure compares the GDP per capita data in Figure A.1 to the median and 5th and 95th percentiles for each year when extending the model horizon to 2010.



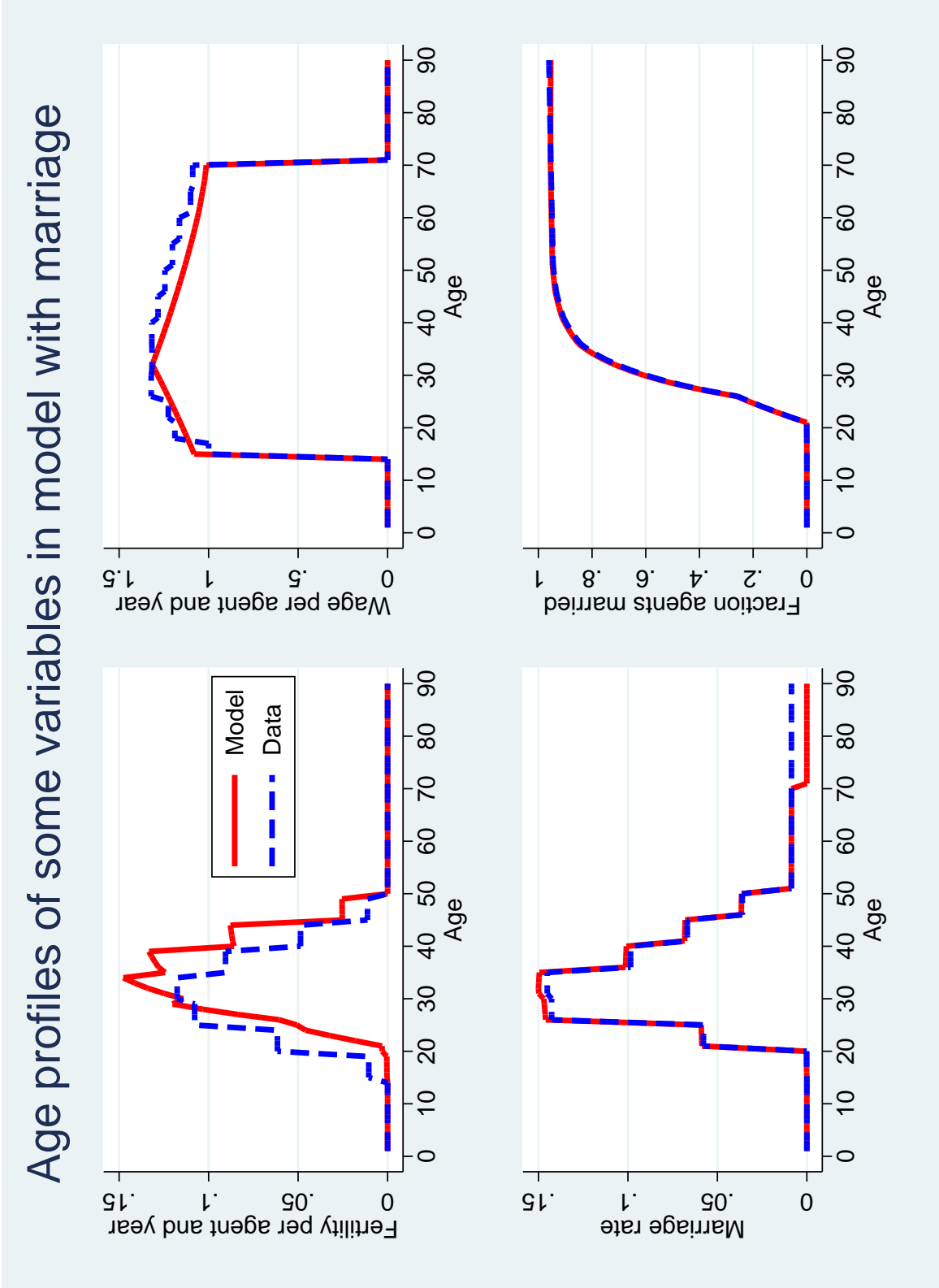
**Figure A.3:** Time paths for log of the Crude Birth Rate in data for England and Sweden, and the corresponding 5th and 95th percentiles from the benchmark simulation.



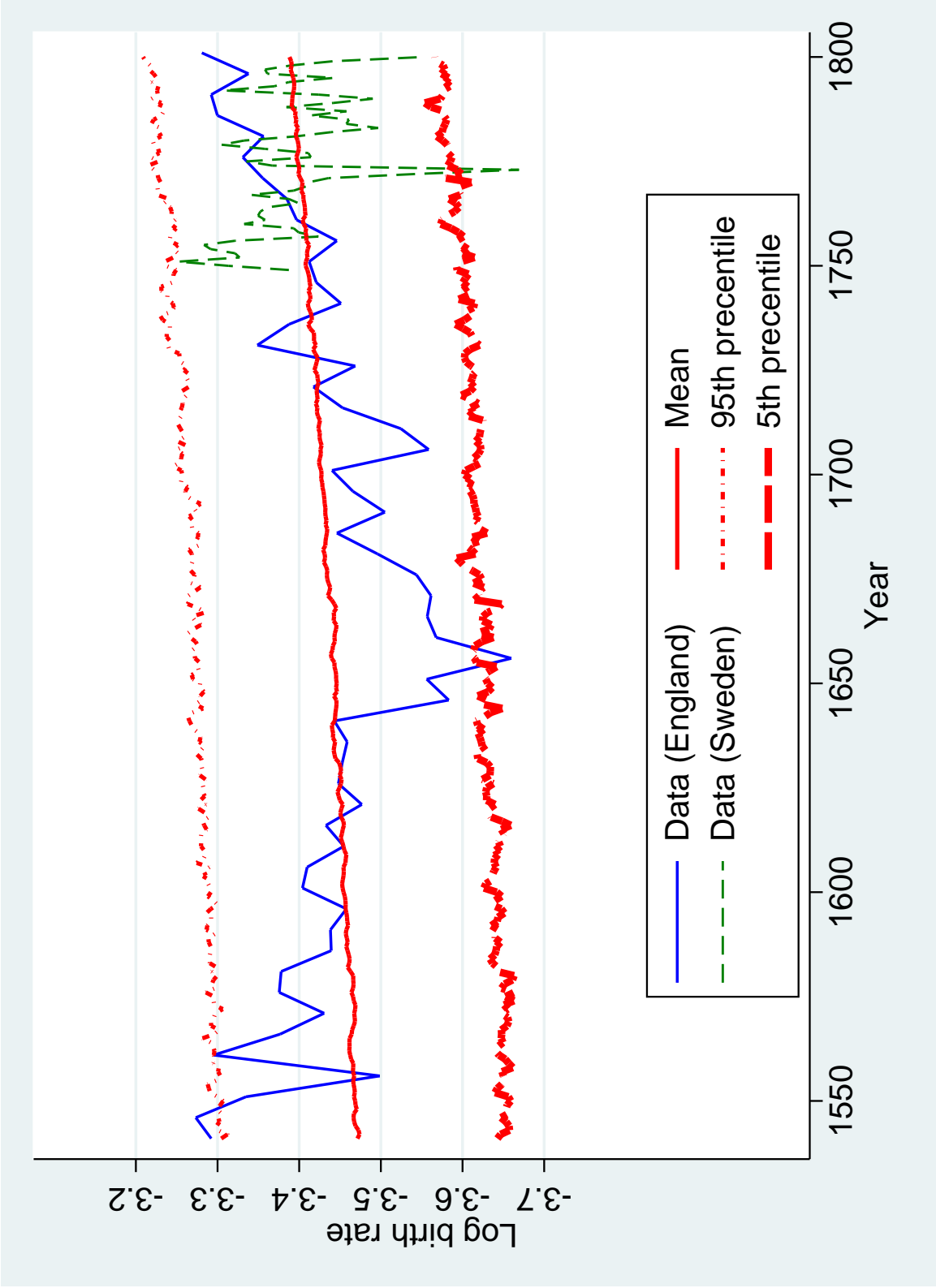
**Figure A.4:** Time paths for log of the Crude Death Rate in data for England and Sweden, and the corresponding 5th and 95th percentiles from the benchmark simulation.



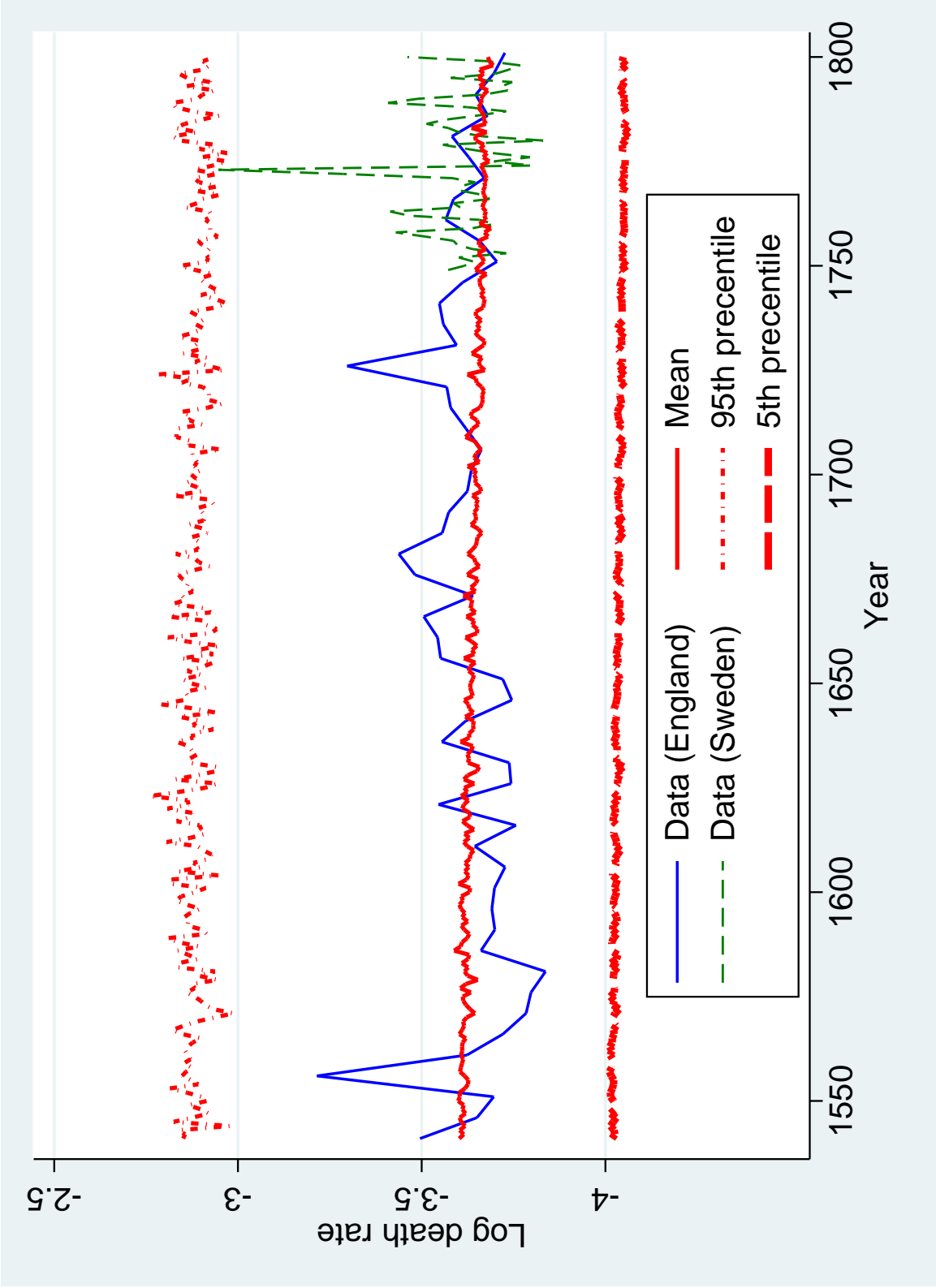
**Figure A.5:** Fertility, marriage, and wages by age group, when allowing for marriage. The top two figures correspond to those in Figure 2 in the paper. We have chosen  $v_j^{\text{marr}}$  and  $v_j^{\text{unmarr}}$  to match these profiles as closely as possible to Swedish data; see text. The model-generated profiles are averages over 1000 runs for the last 50 years of the simulation, corresponding to 1751-1800 in the data.



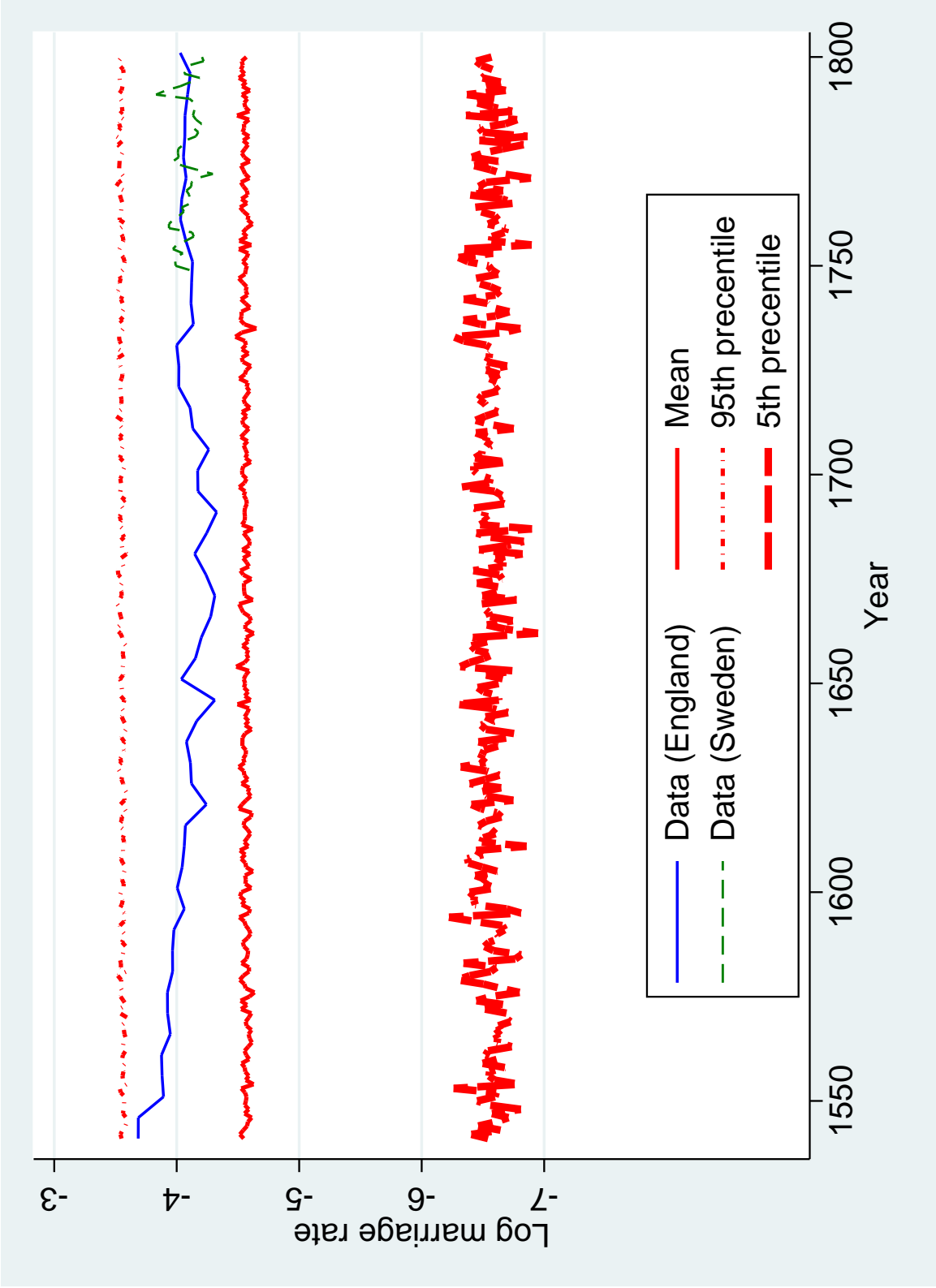
**Figure A.6:** Time paths for log of the Crude Birth Rate in data for England and Sweden, and the corresponding 5th and 95th percentiles from the simulation when allowing for marriage.



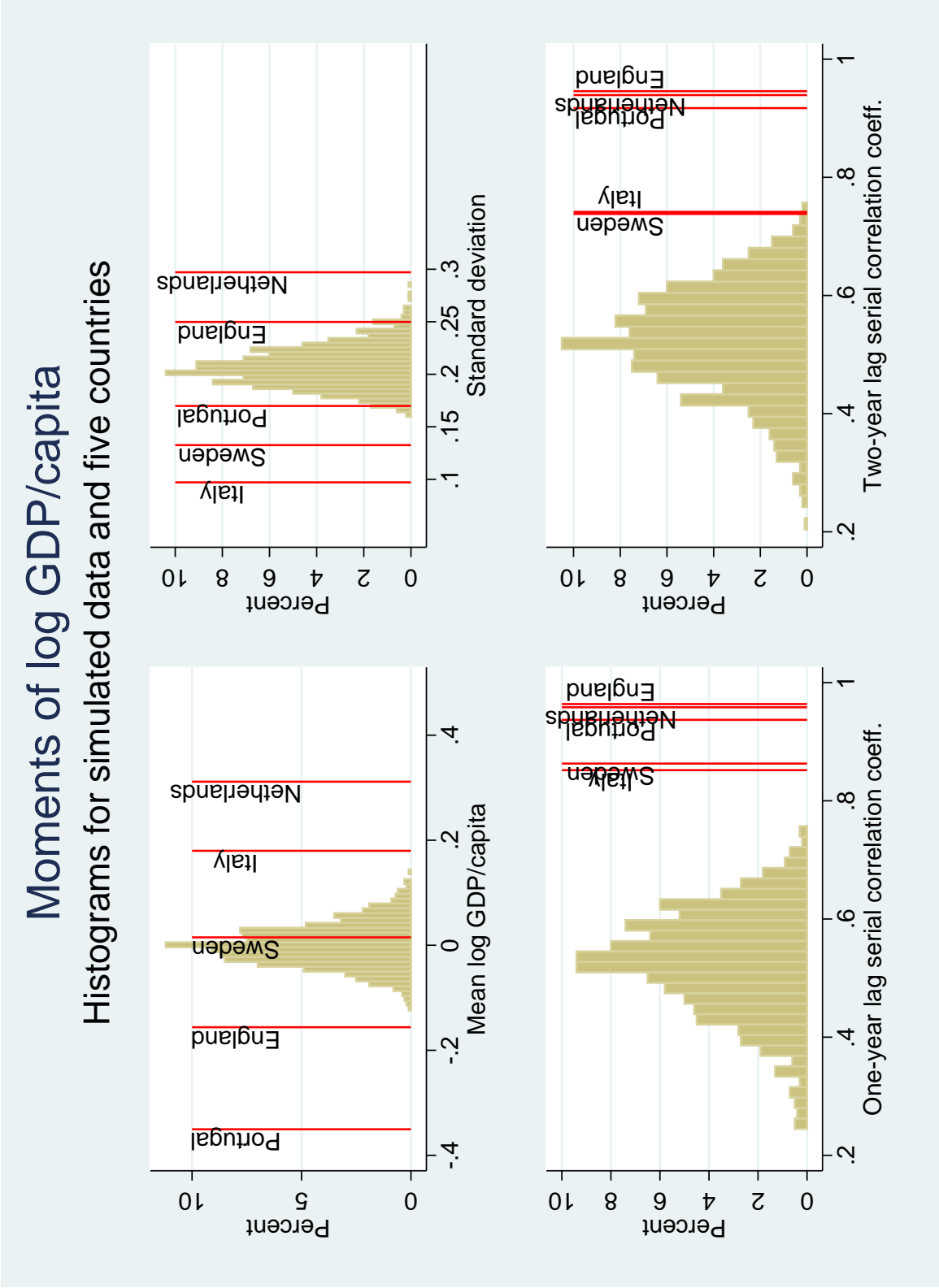
**Figure A.7:** Time paths for log of the Crude Death Rate in data for England and Sweden, and the corresponding 5th and 95th percentiles from the simulation when allowing for marriage.



**Figure A.8:** Time paths for log of the Crude Marriage Rate in data for England and Sweden (adjusted as explained in the text), and the corresponding 5th and 95th percentiles from the simulation when allowing for marriage.



**Figure A.9:** The same histograms as in Figure 6 in the paper, when setting  $\sigma_A = 0$  and  $\sigma_X = .35$ .



**Figure A.10:** The same histograms as in Figure 6 in the paper, considering the period 1560–1800, for which data are available for all five countries.

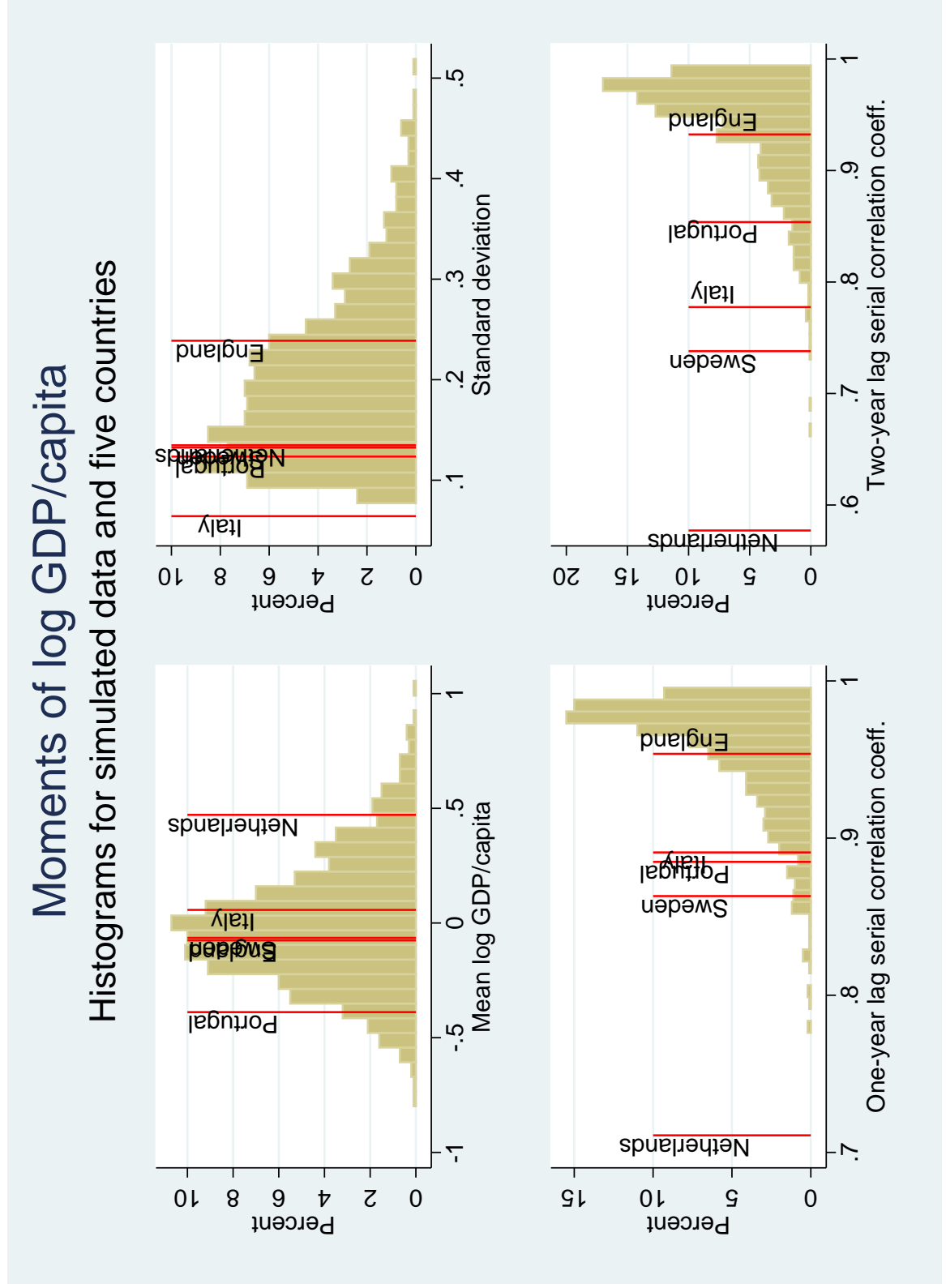
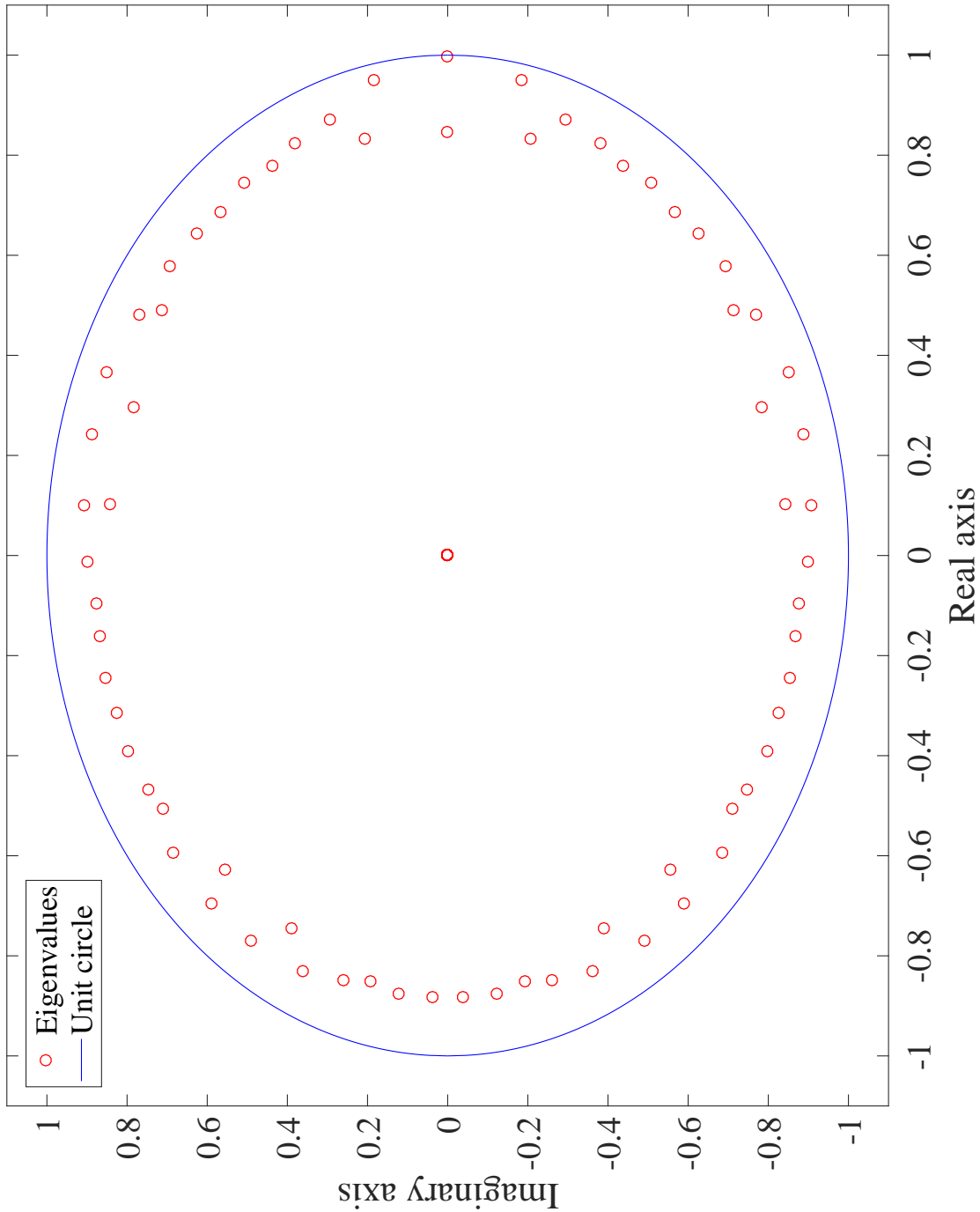
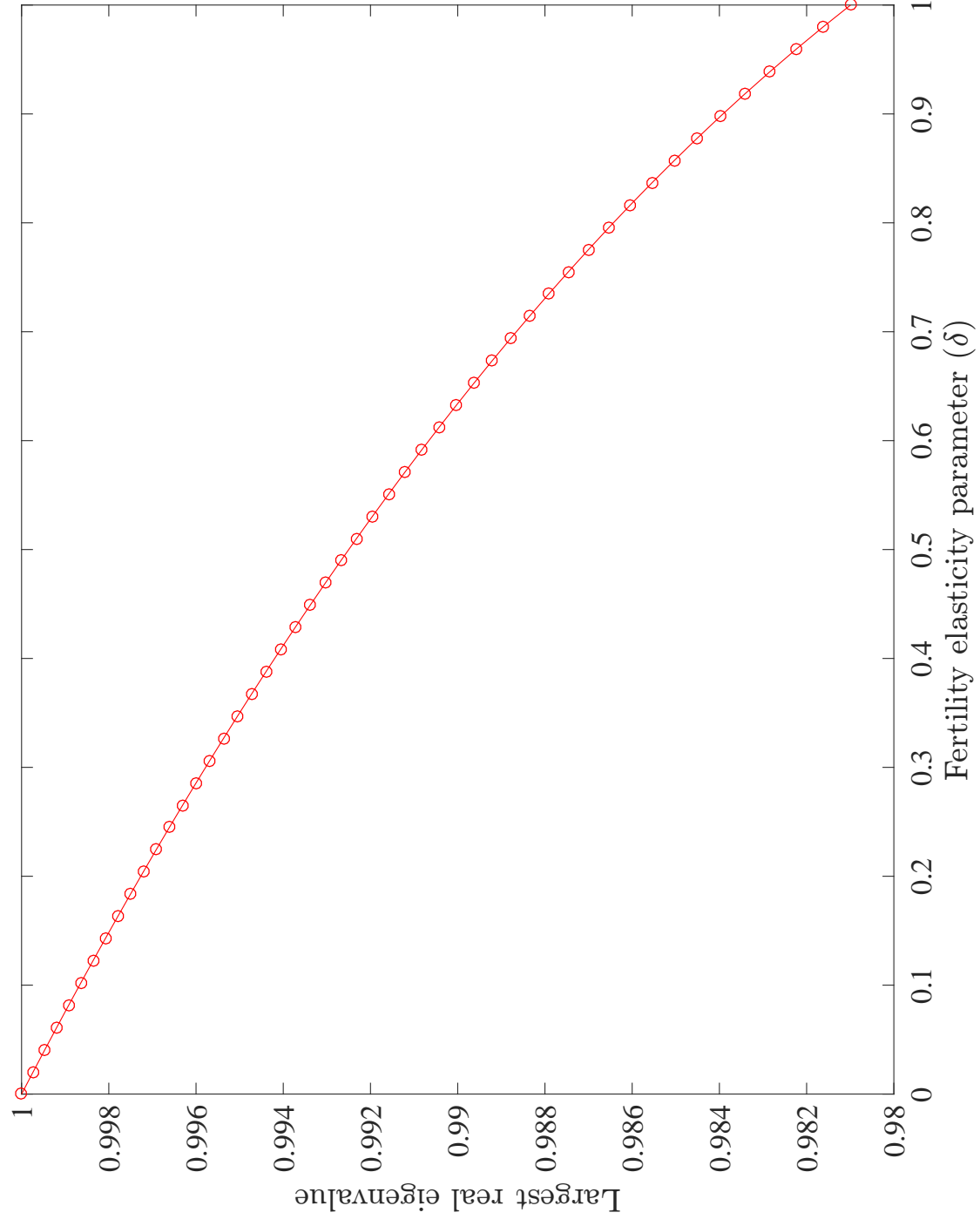


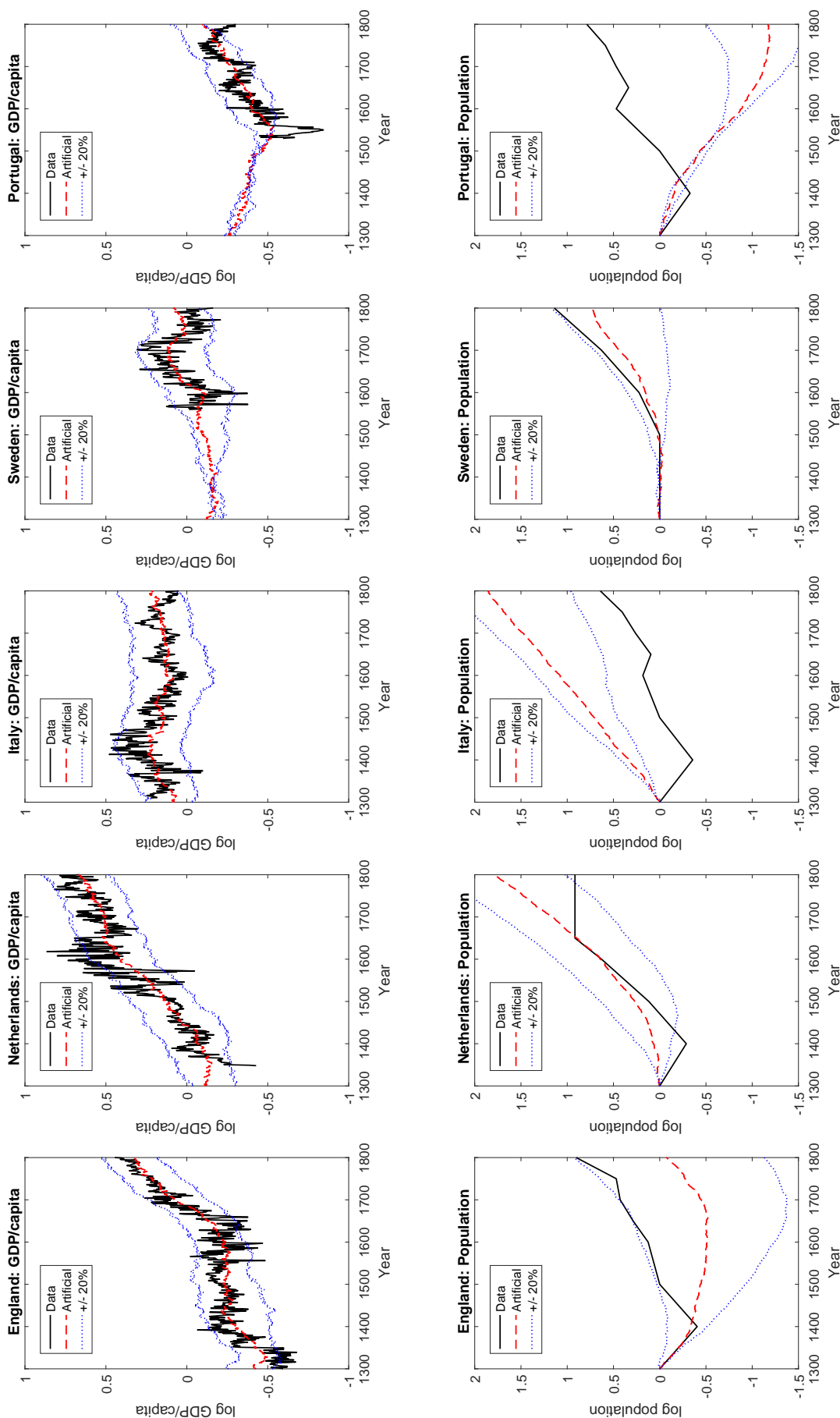
Figure A.11: Eigenvalues of the matrix  $\Pi$ .



**Figure A.12:** How the largest eigenvalue of  $\Pi$  varies with  $\delta$ .



**Figure A.13:** Paths for log GDP/capita and log population for five actual countries, and five artificial ones. The artificial paths are constructed as the averages among the 25 simulated economies which are closest to the GDP/capita data for each country. The figure also shows paths artificially constructed to mimic levels 20% higher or lower than the GDP/capita levels observed in the data.



**Figure A.14:** The same paths as in Figure A.13, after demeaning the log GDP/capita data for each country to equal zero when averaging across years.

