Parameters

Emma Holmes

January 25, 2021

1 Initial conditions of the model

Symbol	Initial condition	Variable description
$\lambda(0)$	0.675	Employment rate
$\omega(0)$	0.578	Wage share
$d(0)$	1.53	Debt share
$K(0)$	161.3	Capital stock
$w(0)$	10.591	Wages
$D(0)$	91.4	Debt in trillions of USD
$a(0)$	18.323	Labour productivity
$N(0)$	4.83	Workforce in billions
$\sigma(0)$	0.62	Emission intensity of the economy
$g_\sigma(0)$	-0.0105	Growth rate of the emissions intensity of the economy
$p(0)$	1	Composite good price level
$p_{BS}(0)$	547.22	Price level of backstop technology
$p_c(0)$	2	Carbon price
$E_{land}(0)$	2.6	Exogenous land use CO_2-e emissions, in Gt C
$CO_2^{AT}(0)$	851	CO_2-e concentration in the atmosphere layer, in Gt C
$CO_2^{UP}(0)$	460	CO_2-e concentration in the biosphere and upper ocean layer, in Gt C
$CO_2^{LO}(0)$	1740	CO_2-e concentration in the lower ocean layer, in Gt C
$T(0)$	0.85	Temperature anomaly, in degrees Celsius
$T_{LO}(0)$	0.0068	Temperature anomaly in lower ocean layer, in degrees Celsius

Initial conditions explored: $0 \leq \lambda(0) \leq 1$, $0 \leq \omega(0) \leq 1$, and $0 \leq d(0) \leq 3$ while $\bar{\gamma} = 0.9$, $\bar{\eta} = 0.192$, and $\bar{\xi} = \{1.18, 1.3, 1.875\}$.

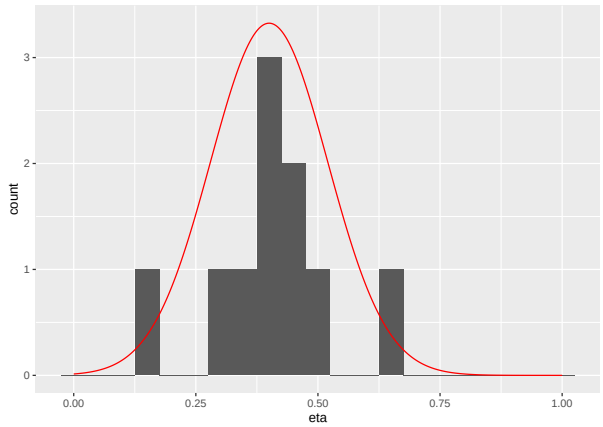
2 Model parameters

Symbol	Value	Parameter description
$\bar{\alpha}$	0.02	Productivity growth rate
$\bar{\delta}$	0.04	Depreciation rate of capital
$\bar{\nu}$	2.7	Capital to output ratio
$\bar{\delta}_N$	0.031	Growth rate of workforce
$\bar{N}_{max}$	7.056	Maximum workforce
Φ_0	-0.292	Phillips curve constant – linear specification
Φ_1	0.469	Phillips curve slope – linear specification
κ_0	0.032	Investment function constant
κ_1	0.575	Investment function slope
κ_{min}	0	Investment function minimum
κ_{max}	0.3	Investment function maximum
Δ_0	-0.078	Dividend function constant
Δ_1	0.553	Dividend function slope
Δ_{min}	0	Dividend function minimum
Δ_{max}	0.3	Dividend function maximum
r	0.02	Long term interest rate
$\bar{\eta}$	0.192	Inflation relaxation parameter
$\bar{\xi}$	1.875	Price markup
$\bar{\gamma}$	0.9	Effect of inflation on wages
C^{AT}_{preind}	588	Preind. concentration of CO_2 in the atmosphere layer, in Gt C
C^{UP}_{preind}	360	Preind. concentration of CO_2 in the biosphere/upper ocean layer, in Gt C
C^{LO}_{preind}	1720	Preind. concentration of CO_2 in the lower ocean layer, in Gt C
ϕ_{12}	0.024	Transfer coefficient for carbon from AT to UP
ϕ_{23}	0.001	Transfer coefficient for carbon from UP to LO
δ_{g_σ}	-0.001	Variation rate of the growth of emission intensity
$\delta_{E_{land}}$	-0.022	Growth rate of land use change CO2-e emissions
F_{dbl}	3.682	Change in radiative forcing from a doubling of preindustrial CO_2, in W/m^2
F^{start}_{exo}	0.5	Initial value of exogenous radiative forcing
F^{end}_{exo}	1	End value of exogenous radiative forcing
T_{preind}	13.74	Preindustrial temperature, in degrees Celsius
C_{init}	10.20	Heat capacity of AT and UP, in SI
C_{LO}	3.52	Heat capacity of the lower ocean layer
γ^*	0.0176	Heat exchange coefficient between temperature layers, in SI
S	3.1	Equilibrium climate sensitivity, in degrees Celsius
ξ_1	0	Damage function parameter
ξ_2	0.00236	Damage function parameter
ξ_3	4.48e-06	Damage function parameter
ζ	7	Damage function parameter
θ	2.6	Abatement cost function parameter
$g_{p_{BS}}$	-0.0051	Growth rate of the price of backstop technology
δ_C	1	Linear growth rate of the carbon price

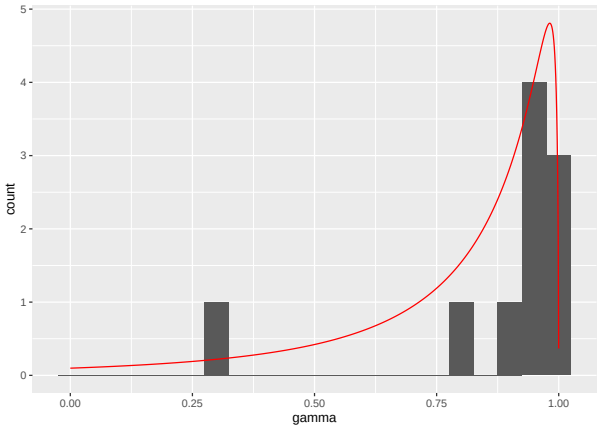
Parameter space explored: $0 \leq \bar{\eta} \leq 1$, $1 \leq \bar{\xi} \leq 2.5$, and $0 \leq \bar{\gamma} \leq 1$.

2.1 Parameter distributions

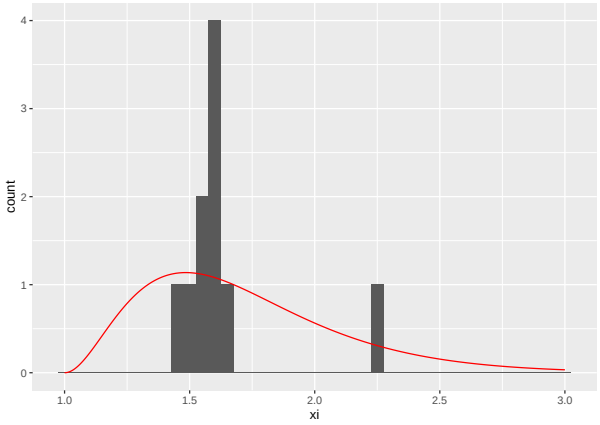
Here I compare the distributions (red lines) to the data you sent me (histograms).



(a) Distribution of the relaxation parameter, η



(b) Distribution of the money illusion parameter, γ



(c) Distribution of the markup rate, ξ

Figure 1: Probability density functions of the pricing parameters η, ξ, and γ.