Prior distributions of the testbed models

Please see more information of the unit parameters and the equations for each model in the Vensim models uploaded on the GitHub repository (https://github.com/ali-akhavan89/SD_Neural_Estimation_Benchmarking).

Random Walk

Table 1. Parameter priors of the Random Walk model that are estimated

Name	Prior
Drift	Uniform(-1, 1)
InitS	Uniform(0, 10)
NoiseStd	Uniform(0, 0.5)
MeasStd	Uniform(0, 0.5)

SEIRb

Table 2. Parameter priors of the SEIRb model that are estimated

Name	Prior
Death_Measurement_Noise_Scale	Uniform(0, 0.3)
IFR	Uniform(0.003, 0.01)
Noise_Correlation_Time_1	Uniform(1, 20)
Noise_Standard_Deviation_1	Uniform(0, 0.3)
Onset_Measurement_Noise_Scale	Uniform(0, 0.3)
Patient_Zero_Arrival_Time	Uniform(0, 100)
PWRisk_Gamma	Uniform(0, 5)
Recovery_Measurement_Noise_Scale	Uniform(0, 0.3)
Sensitivity_to_death_Alpha	Uniform(0.01, 100)
Time_to_perceive_Tp	Uniform(5, 100)
Time_to_reduce_risk	Uniform(10, 400)
Transmission_intensity_Beta	Uniform(0.1, 4)

Market Growth

Table 3. Parameter priors of the Market Growth model that are estimated

Name	Prior
Capacity Acquisition Delay	Uniform(15, 21)
Capacity Utilization Power	Uniform(0.2, 0.8)
Fraction of Revenue to Sales	Uniform(0.15, 0.35)
Initial Backlog	Uniform(200, 2000)
Initial Capacity	Uniform(200, 1000)
Multiplier Company Goal for Delivery Delay	Uniform(0.25, 2)
Normal Delivery Delay	Uniform(0.5, 5)
Normal Sales Effectiveness	Uniform(5,30)
Price	Uniform(1000, 30000)
Revenue Reporting Delay	Uniform(1,5)
Sales Force Adjustment Time	Uniform(3,30)
Slope of Pressure on Desired Capacity	Uniform(0.1, 0.8)
Measurement Noise Standard Deviation for Capacity	Uniform(0, 0.2)
Measurement Noise Standard Deviation for Order Rate	Uniform(0, 0.1)
Measurement Noise Standard Deviation for Revenue	Uniform(0, 0.1)
Process Noise Standard Deviation for Order Rate	Uniform(0, 0.2)
Process Noise Standard Deviation for Sales Force Net Hiring Rate	Uniform(0, 0.2)
Process Noise Standard Deviation for Desired Capacity	Uniform(0, 0.2)
Target Delivery Delay Multiplier	Uniform(0.5, 2)
Time for Company to Perceive Delivery Delay	Uniform(1, 5)
Time for Market to Perceive Delivery Delay	Uniform(2, 20)
Process Noise Correlation Time for Order Rate	Uniform(1, 10)
Process Noise Correlation Time for Sales Force Net Hiring Rate	Uniform(1, 10)
Process Noise Correlation Time for Desired Capacity	Uniform(1, 10)

Lotka-Volterra

Table 4. Parameter priors of the Lotka-Volterra model that are estimated

Name	Prior
a12	Uniform(0, 0.1)
a21	Uniform(-0.1, 0)
Init N1	Uniform(0, 1)
Init N2	Uniform(0, 1)
K1	Uniform(0.01, 0.05)
K2	Uniform(0, 0.05)
r1	Uniform(0, 0.1)
r2	Uniform(-0.1, 0)
SM1	Uniform(0, 0.2)
SM2	Uniform(0, 0.2)
sp1	Uniform(0, 0.2)
sp2	Uniform(0, 0.2)
tsp1	Uniform(1, 10)
tsp2	Uniform(1, 10)

Generalized Bass

Table 5. Parameter priors of the Generalized Bass model that are estimated

Name	Prior
b1	Uniform(0, 1)
b2	Uniform(0, 0.01)
Imitation q	Uniform(0, 0.25)
Initial Adopters	Uniform(0, 50)
Innovation p	Uniform(0, 0.025)
SM1	Uniform(0, 0.05)
SM2	Uniform(0, 0.05)
sp1	Uniform(0, 0.2)
tsp1	Uniform(1, 10)

Real Business Cycle

Table 6. Parameter priors of the Real Business Cycle model that are estimated

Name	Prior
AGrowth	Uniform(1, 1.01)
alpha	Uniform(0.15, 0.45)
b	Uniform(0.05, 0.2)
delta	Uniform(0.01, 0.1)
Init K	Uniform(1, 20)
Init Tech	Uniform(1, 3)
sp1	Uniform(0, 0.2)
sp2	Uniform(0, 0.05)
tsp1	Uniform(1, 10)
tsp2	Uniform(1, 10)

World Dynamics

Table 7. Parameter priors of the World Dynamics model that are estimated

Name	Prior
a17	Uniform(1.5, 3)
a18	Uniform(1, 8)
a19	Uniform(2, 7)
a20	Uniform(0.1, 1)
a21	Uniform(0.3, 1)
a22	Uniform(0.02, 0.1)
b20	Uniform(0, 0.1)
b21	Uniform(0.1, 0.4)
BRN BIRTH RATE NORMAL	Uniform(0.02, 0.06)
c10	Uniform(0.05, 0.25)
c12	Uniform(0.2, 0.9)
c2	Uniform(0, 0.9)
c5	Uniform(0, 0.9)
c6	Uniform(0, 0.9)
c7share	Uniform(0.1, 0.98)
CIAFT adjustment time constant	Uniform(5, 30)
CIDN CAPITAL INVESTMENT DISCARD NORMAL	Uniform(0.02, 0.04)
CIGN CAPITAL INVESTMENT NORMAL	Uniform(0.03, 0.07)
M13	Uniform(2, 10)
M14	Uniform(0.26, 0.99)
M15	Uniform(5, 40)
M16	Uniform(1.5, 4)
m3	Uniform(12, 40)
max16	Uniform(1, 10)
min13	Uniform(0.3, 0.7)
min16	Uniform(0, 0.3)
NRUN NATURAL RESOURCE USAGE NORMAL	Uniform(0.03, 3)
POLI	Uniform(5e+07, 5e+08)
POLN POLLUTION NORMAL	Uniform(0.5, 2)
s10	Uniform(0.5, 2)
s12	Uniform(2, 8)
s2	Uniform(1, 3)
s5	Uniform(1, 2)
s6	Uniform(2, 4)
s7	Uniform(0.3, 1)
SM1	Uniform(0, 0.1)
SM2	Uniform(0, 0.1)
SM3	Uniform(0, 0.2)
SM4	Uniform(0, 0.2)
SM5	Uniform(0, 0.2)

sp1	Uniform(0, 0.2)
sp2	Uniform(0, 0.2)
tsp1	Uniform(1, 10)
tsp2	Uniform(1, 10)