

Trad_Opp_Exec = Trad_Opp_Exec + dt * (D_TOE)
INIT(Trad_Opp_Exec) = 21.2
{Traditional Opposition to Executive (freedom/welfare discrepancy)}
Trad_Opp_Gov = Trad_Opp_Gov + dt * (D_TOG)
INIT(Trad_Opp_Gov) = 42.4
{Traditional Opposition to Government (freedom/welfare discrepancy)}
Trad_Pop_Des_Eco_We = Trad_Pop_Des_Eco_We + dt * (D_TPDEW)
INIT(Trad_Pop_Des_Eco_We) = 65
Trad_Pop_Des_Free = Trad_Pop_Des_Free + dt * (D_TPDF)
INIT(Trad_Pop_Des_Free) = 65

Rate Equations and Constants

ADF_RT = 120
Aris_Seiz_LI = IF TIME < 0 THEN 0 ELSE EATDLI*.9
A_E_Discontent = -(Aris_Des_Eco_Wel-Perc_Out_Aris)
{Aristocratic Economic Discontent (kilo-output/aristocrat/month)}
a_OF = IF OF_Pop<=0 THEN MIN(EEPCF,0) ELSE IF OF_Aris<=0 THEN MAX(EEPOF,0) ELSE EEPOF
{Redistribution between Aristocrats and Populace (fraction)}
A_P_Discontent = Aris_Des_Free-Gov_Pol_Free
{Aristocratic Political Discontent (freedom)}
A_Tot_Discontent = A_E_Discontent+A_P_Discontent
{Total Aristocratic Discontent (freedom/welfare discrepancy)}
bc_OF = (Exec_Power/10-OF_Exec)/2
{Redistribution to Executive of Output (fraction)}
b_OF = bc_OF
Climate_Opp = Current_Opp/Trad_Opp
{Climate of Opposition (ratio)}
Cli_Opp_Exec = Opp_Exec/Trad_Opp_Exec
{Climate of Opposition to Executive (ratio)}
Cli_Opp_Gov = Opp_Leg/Trad_Opp_Gov
{Climate of Opposition to Government (ratio)}
Current_Opp = Opp_Exec+Opp_Leg
{Current Opposition (composite)}
C_A_Des_Free = (Trad_Aris_Des_Free-Aris_Des_Free)/ADF_RT+ECOADF
{Change in Aristocratic Desired Freedom (freedom/month)}
C_Exec_Power = IF EOEP<=0 THEN 1.5*EOEP/(Exec_Competence*EEPO)
ELSE EOEP*Exec_Competence*EEPO*.85
{Change in Executive Power (fraction/month)}
C_GPF = (Pol_Initiative-Gov_Pol_Free)/Policy_RT

Appendix C: Listing of Model Equations

{Change in Government Policy for Freedom (freedom/month)}

$c_{OF} = bc_{OF}$

$C_{PDEW} = (.25 * (\text{Current_Opp} + \text{Eco_Protest}) + .5 * (\text{Rel_Infl} + \text{Prop_Infl}) + (\text{Trad_Pop_Des_Eco_We} - \text{Pop_Des_Eco_Wel})) / TTPD$

{Change in Popular Desired Economic Welfare (freedom/month)}

$C_{Prop} = \text{Exec_Power} * (\text{Need_for_Prop} - \text{Propaganda}) / \text{Prop_RT}$

{Change in Propaganda level (propaganda/month)}

$\Delta_{Rel_Eff} = \text{Rel_Effort} / RE_{DT}$

{Decline in Religious Effort (weighting fraction/month)}

$DPN = (\text{White_Noise} - \text{Pink_Noise}) / \text{Noise_Correl_Time}$

{Delta Pink Noise (ND/month)}

$DPN2 = (\text{WTNS2} - \text{Pink_Noise2}) / NCT2$

{Delta Pink Noise2 (ND/month)}

$D_{AELI} = \text{IF } (\text{Exe_Leg_Infl} \leq 0) \text{ AND } (\text{Aris_Leg_Infl} \leq 0) \text{ THEN } 0 \text{ ELSE IF } \text{Exe_Leg_Infl} \leq 0 \text{ THEN MAX}(\text{Exec_Seiz_LI} - \text{Aris_Seiz_LI}, 0) \text{ ELSE IF } \text{Aris_Leg_Infl} \leq 0 \text{ THEN MIN}(\text{Exec_Seiz_LI} - \text{Aris_Seiz_LI}, 0) \text{ ELSE } \text{Exec_Seiz_LI} - \text{Aris_Seiz_LI}$

$D_{AEU} = (\text{TPE_Unrest} - \text{Ave_Eco_Unrest}) / \text{Pop_Unrest_TC}$

{Delta Average Economic Unrest (output/person/month/month)}

$D_{APU} = (\text{TPP_Unrest} - \text{Ave_Pol_Unrest}) / \text{Pop_Unrest_TC}$

{Delta Average Political Unrest (freedom/month)}

$d_{EW} = (\text{Output_Pop} - \text{Eco_Welfare}) / EW_{RT}$

{Delta Economic Welfare of populace (output/person/month/month)}

$D_{PALI} = \text{IF } (\text{Pop_Leg_Infl} \leq 0) \text{ AND } (\text{Aris_Leg_Infl} \leq 0) \text{ THEN } 0 \text{ ELSE IF } \text{Pop_Leg_Infl} \leq 0 \text{ THEN MIN}(\text{Aris_Seiz_LI} - \text{Pop_Seiz_LI}, 0) \text{ ELSE IF } \text{Aris_Leg_Infl} \leq 0 \text{ THEN MAX}(\text{Aris_Seiz_LI} - \text{Pop_Seiz_LI}, 0) \text{ ELSE } \text{Aris_Seiz_LI} - \text{Pop_Seiz_LI}$

$D_{PELI} = \text{IF } (\text{Pop_Leg_Infl} \leq 0) \text{ AND } (\text{Exe_Leg_Infl} \leq 0) \text{ THEN } 0 \text{ ELSE IF } \text{Pop_Leg_Infl} \leq 0 \text{ THEN MIN}(\text{Exec_Seiz_LI} - \text{Pop_Seiz_LI}, 0) \text{ ELSE IF } \text{Exe_Leg_Infl} \leq 0 \text{ THEN MAX}(\text{Exec_Seiz_LI} - \text{Pop_Seiz_LI}, 0) \text{ ELSE } \text{Exec_Seiz_LI} - \text{Pop_Seiz_LI}$

$d_{POA} = (\text{Output_Aris} - \text{Perc_Out_Aris}) / 3$

$D_{POP} = (\text{Output_Pop} - \text{Perc_Out_Pop}) / 3$

{Delta Perceived Output to Populace (welfare/month)}

$D_{TOE} = (\text{Opp_Exec} - \text{Trad_Opp_Exec}) / TATO$

{Delta Traditional Opposition to Executive (composite)}

$D_{TOG} = (\text{Opp_Leg} - \text{Trad_Opp_Gov}) / TATO$

{Delta Traditional Opposition to Government (composite)}

$D_{TPDEW} = (2 * (\text{EETPDEW} - \text{Trad_Pop_Des_Eco_We}) + (\text{Pop_Des_Eco_Wel} - \text{Trad_Pop_Des_Eco_We})) / TTPD$

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_Eco_We))/360
D_TPDF =
(2*(EFOPDF-Trad_Pop_Des_Free)+(Pop_Des_Free-Trad_Pop_Des_Free))/3
60
Eco_Initiative =
Exe_Des_Eco_Wel*Exec_Power+Economic_Law*(1-Exec_Power)
{Economic Initiative of administration (welfare)}
Eco_Legislation =(
E_E_Discontent*Exe_Leg_Infl+Eco_Protest*Pop_Leg_Infl+A_E_Discontent*Aris_Leg_Infl)/Leg_Resp_Time
{Economic Legislation (welfare)}
Eco_Policy = Eco_Initiative/Eco_Welfare
{Economic Policy indicated (ratio)}
Eco_Protest = P_E_Discontent*EEW_Protest*EPF_Protest
{Economic Protest of populace (welfare)}
Eco_Turmoil = TPE_Unrest-Ave_Eco_Unrest
{Economic Turmoil (welfare)}
EEOPDF = 65
EETPDEW = 65
EW_RT = 12
{Economic Welfare Response Time (months)}
Exec_Competence = .9
{Executive Competence (non-dimensional)}
Exec_Seiz_LI = IF TIME<0 THEN 0 ELSE
N_Siez_Infl*Exec_Power*Exec_Competence*EEPRLI
{Executive Seizure of Legislative Influence (fraction)}
Exe_Des_Eco_Wel = 50+Exe_Eco_Vac+Pink_Noise
{Executive Desired Economic Welfare for populace (welfare)}
Exe_Des_Freedom = 50+Exe_Pol_Vac+Pink_Noise
{Executive Desired Freedom for populace (freedom)}
Exe_Eco_Vac = IF TIME<140 THEN RAMP(-.333/2,50) ELSE -15
{Executive Economic Vacillation (welfare)}
Exe_Pol_Vac = IF TIME<290 THEN RAMP(-.333/2,200) ELSE -15
{Executive Political Vacillation (freedom)}
Exe_Power_Ratio = Exe_Leg_Infl/Exec_Power
Ext_Factors = 1
{External Factors affecting production (non-dimensional)}
E_E_Discontent = Exe_Des_Eco_Wel-Eco_Welfare
{Executive Economic Discontent (welfare)}
E_P_Discontent = Exe_Des_Freedom-Pol_Freedom
{Executive Political Discontent (freedom)}

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