

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

Rate Equations and Constants

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

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

$$c_OF = bc_OF$$

$$C_PDEW =$$

$$(.25*(Current_Opp+Eco_Protest)+.5*(Rel_Infl+Prop_Infl)+(Trad_Pop_Des_Eco_We-Pop_Des_Eco_Wel))/TTPD$$

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

$$C_Prop = Exec_Power * (Need_for_Prop-Propaganda)/Prop_RT$$

{Change in Propaganda level (propaganda/month)}

$$Dec_Rel_Eff = Rel_Effort/RE_DT$$

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

$$DPN = (White_Noise-Pink_Noise)/Noise_Correl_Time$$

{Delta Pink Noise (ND/month)}

$$DPN2 = (WTNS2-Pink_Noise2)/NCT2$$

{Delta Pink Noise2 (ND/month)}

$$D_AELI = IF (Exe_Leg_Infl \leq 0) AND (Aris_Leg_Infl \leq 0) THEN 0 ELSE IF$$

$$Exe_Leg_Infl \leq 0 THEN MAX(Exec_Seiz_LI-Aris_Seiz_LI,0) ELSE IF$$

$$Aris_Leg_Infl \leq 0 THEN MIN(Exec_Seiz_LI-Aris_Seiz_LI,0) ELSE$$

$$Exec_Seiz_LI-Aris_Seiz_LI$$

$$D_AEU = (TPE_Unrest-Ave_Eco_Unrest)/Pop_Unrest_TC$$

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

$$D_APU = (TPP_Unrest-Ave_Pol_Unrest)/Pop_Unrest_TC$$

{Delta Average Political Unrest (freedom/month)}

$$d_EW = (Output_Pop-Eco_Welfare)/EW_RT$$

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

$$D_PALI = IF (Pop_Leg_Infl \leq 0) AND (Aris_Leg_Infl \leq 0) THEN 0 ELSE IF$$

$$Pop_Leg_Infl \leq 0 THEN MIN(Aris_Seiz_LI-Pop_Seiz_LI,0) ELSE IF$$

$$Aris_Leg_Infl \leq 0 THEN MAX(Aris_Seiz_LI-Pop_Seiz_LI,0) ELSE$$

$$Aris_Seiz_LI-Pop_Seiz_LI$$

$$D_PELI = IF (Pop_Leg_Infl \leq 0) AND (Exe_Leg_Infl \leq 0) THEN 0 ELSE IF$$

$$Pop_Leg_Infl \leq 0 THEN MIN(Exec_Seiz_LI-Pop_Seiz_LI,0) ELSE IF$$

$$Exe_Leg_Infl \leq 0 THEN MAX(Exec_Seiz_LI-Pop_Seiz_LI,0) ELSE$$

$$Exec_Seiz_LI-Pop_Seiz_LI$$

$$d_POA = (Output_Aris-Perc_Out_Aris)/3$$

$$D_POP = (Output_Pop-Perc_Out_Pop)/3$$

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

$$D_TOE = (Opp_Exec-Trad_Opp_Exec)/TATO$$

{Delta Traditional Opposition to Executive (composite)}

$$D_TOG = (Opp_Leg-Trad_Opp_Gov)/TATO$$

{Delta Traditional Opposition to Government (composite)}

$$D_TPDEW =$$

$$(2*(EETPDEW-Trad_Pop_Des_Eco_We)+(Pop_Des_Eco_Wel-Trad_Pop_Des$$

```

_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_Disconten
t*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 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)}

```