
Equations of System Dynamics Model

Corruption(t) = Corruption(t - dt) + (change_in_C) * dt

INIT Corruption = 2

UNITS: Dmnl

DOCUMENT: A score of 6 points equates to Very Low Corruption Level and a score of 0 points to Very High Corruption Level

The initial value in 1984 was 2 in Pakistan for corruption index.

INFLOWS:

change_in_C = min((max_C - Corruption), (Democratic_Accountability * effect_of_DA_on_C) + (effect_of_OC_on_C * Organised_Crime) + (Inflation * effect_of_inflation_on_C) + (Income_Inequality * effect_of_Income_Inequality_on_C))

UNITS: dmn/yr

Democratic_Accountability(t) = Democratic_Accountability(t - dt) + (change_in_DA) * dt

INIT Democratic_Accountability = 2.6

DOCUMENT: A score of 6 points equates to Very Low Risk and a score of 0 points to Very High Risk.

The initial value in 1984 was 2.6 in Pakistan for democratic accountability index.

INFLOWS:

change_in_DA = min((max_DA - Democratic_Accountability), (Government_Stability * effect_of_GS_on_DA) + (Military_in_Politics * effect_of_MiP_on_DA))

Economic_Openness(t) = Economic_Openness(t - dt) + (change_in_Economic_Openness) * dt

INIT Economic_Openness = 33.70

UNITS: Percent

DOCUMENT: This is the initial value of economic openness (as percent of GDP) in 1984.

INFLOWS:

change_in_Economic_Openness = (Corruption-neutral_Corruption) * effect_of_C_on_Economic_Openness

UNITS: percent/yr

Government_Expenditure(t) = Government_Expenditure(t - dt) + (change_in_GE) * dt

INIT Government_Expenditure = 12

UNITS: Percent

DOCUMENT: It shows the government expenditure as percent of GDP in 1984. The higher the percentage, government expenditure will be higher.

INFLOWS:

change_in_GE = min((max_GE - Government_Expenditure), (neutral_Corruption - Corruption) * effect_of_C_on_GE)

UNITS: percent/yr

Government_Stability(t) = Government_Stability(t - dt) + (change_in_GS) * dt

INIT Government_Stability = 5.25

UNITS: Dmnl

DOCUMENT: A score of 12 points equates to Very Low Risk and a score of 0 points to Very High Risk.

The initial value in 1984 was 5.25 in Pakistan for government stability index.

INFLOWS:

$\text{change_in_GS} = \min((\text{max_GS} - \text{Government_Stability}), (\text{Law_ \& _Order} * \text{effect_of_L\&O_on_GS}))$

UNITS: dmnl/yr

$\text{Income_Inequality}(t) = \text{Income_Inequality}(t - dt) + (\text{change_in_Income_Inequality}) * dt$

INIT Income_Inequality = 34.50

UNITS: Dmnl

DOCUMENT: This stock is related to inequality measures such as the GINI index. For this model, 0 is equity or no income inequality. If the value is higher then it is worse (more inequality). In 1984, income inequality in Pakistan was 34.50.

INFLOWS:

$\text{change_in_Income_Inequality} = \min((\text{max_Income_Inequality} - \text{Income_Inequality}), (\text{effect_of_SEC_on_Income_Inequality} * \text{Socioeconomic_Condition}) + (\text{Corruption} - \text{neutral_Corruption}) * \text{effect_of_C_on_Income_Inequality})$

UNITS: dmnl/yr

$\text{Inflation}(t) = \text{Inflation}(t - dt) + (\text{change_in_inflation}) * dt$

INIT Inflation = 6.09

UNITS: Percent

DOCUMENT: This stock is related to inflation measures such as the CPI index. For this model, 0 is no inflation in the country. As the value increases the inflation rate in the country also increases. The initial value in 1984 is 6.09 per cent.

INFLOWS:

$\text{change_in_inflation} = (\text{Level_of_GDP} * \text{effect_of_Level_of_GDP_on_Inflation})$

UNITS: percent/yr

$\text{Law_ \& _Order}(t) = \text{Law_ \& _Order}(t - dt) + (\text{change_in_L\&O}) * dt$

INIT Law_&_Order = 2

UNITS: Dmnl

DOCUMENT: A score of 6 points equates to Very Low Risk and a score of 0 points to Very High Risk.

The initial value in 1984 was 2 in Pakistan for law and order index.

INFLOWS:

$\text{change_in_L\&O} = \min((\text{max_L\&O} - \text{Law_ \& _Order}), (\text{Corruption} - \text{neutral_Corruption}) * \text{effect_of_C_on_L\&O} + \text{People's_Attitude_Against_Corruption} * \text{effect_of_PAAC_on_L\&O})$

UNITS: dmnl/yr

$\text{Level_of_GDP}(t) = \text{Level_of_GDP}(t - dt) + (\text{change_in_Level_of_GDP}) * dt$

INIT Level_of_GDP = 35.24

UNITS: US dollars per year (USD/yr)

DOCUMENT: This stock is related to economic development measures such as the Level of GDP. The initial value in 1984 is 35.24 billion US dollars per year.

INFLOWS:

$\text{change_in_Level_of_GDP} = (\text{Economic_Openness} * \text{effect_of_Economic_Openness_on_Level_of_GDP})$

UNITS: usd/yr²

$\text{Military_in_Politics}(t) = \text{Military_in_Politics}(t - dt) + (\text{change_in_MiP}) * dt$

INIT Military_in_Politics = 1

UNITS: Dmnl

DOCUMENT: A score of 6 points equates to Very Low Risk and a score of 0 points to Very High Risk.

The initial value in 1984 was 1 in Pakistan for military in politics index.

INFLOWS:

$\text{change_in_MiP} = \min((\text{max_MiP} - \text{Military_in_Politics}), (\text{Law_ \& _Order} * \text{effect_of_L\&O_on_MiP}))$

UNITS: dmdl/yr

$\text{Organised_Crime}(t) = \text{Organised_Crime}(t - dt) + (\text{change_in_OC}) * dt$

INIT Organised_Crime = 84.70

UNITS: Dmnl

DOCUMENT: 0 represent no crime rate in the country. 100 is the highest value which indicates high crime rate.

The initial value in 1984 was 84.70 in Pakistan for organized crime index.

INFLOWS:

$\text{change_in_OC} = \min((\text{max_OC} - \text{Organised_Crime}), (\text{effect_of_L\&O_on_OC} * \text{Law_ \& _Order}))$

UNITS: dmdl/yr

$\text{People's_Attitude_Against_Corruption}(t) = \text{People's_Attitude_Against_Corruption}(t - dt) + (\text{change_in_PAAC}) * dt$

INIT People's_Attitude_Against_Corruption = 5

UNITS: Dmnl

DOCUMENT: This stock is related to PAAC index. It is assumed that in 1984, PAAC index in Pakistan was 5.

INFLOWS:

$\text{change_in_PAAC} = \min((\text{max_PAAC} - \text{People's_Attitude_Against_Corruption}), (\text{Corruption-neutral_Corruption}) * \text{effect_of_C_on_PAAC})$

UNITS: dmdl/yr

$\text{Socioeconomic_Condition}(t) = \text{Socioeconomic_Condition}(t - dt) + (\text{change_in_SEC}) * dt$

INIT Socioeconomic_Condition = 6.92

UNITS: Dmnl

DOCUMENT: This is the level social economic conditions, such as the GDP or other measures (note that a good GDP doesn't guarantee good social economic conditions such as income equality). 0 is worse socio economic conditions. 12 means socio economic conditions in the country are at best.

The initial value of this index in Pakistan in 1984 was 6.92.

INFLOWS:

$\text{change_in_SEC} = \min((\text{max_SEC} - \text{Socioeconomic_Condition}), (\text{effect_of_GE_on_SEC} * \text{Government_Expenditure}))$

UNITS: dmdl/yr

$\text{effect_of_C_on_Economic_Openness} = 0.15$

DOCUMENT: This represents the impact of corruption on economic openness, i.e. the higher the corruption value is, the more chances of deterioration in economic openness. The value of 0.15 represents the strength of this effect.

$\text{effect_of_C_on_GE} = -0.0905$

DOCUMENT: This represents the 'negative' impact of corruption on GE. The value of -0.0905 represents the strength of this effect.

$\text{effect_of_C_on_Income_Inequality} = -0.0058$

DOCUMENT: This represents the impact of corruption on Income Inequality, i.e. the higher the corruption value is (low value of corruption index), the more chances of deterioration in income equality in the country. The value of -0.0058 represents the strength of this effect.

$\text{effect_of_C_on_L\&O} = 0.032$

DOCUMENT: This represents the impact of corruption on law and order in the country, i.e. the higher the value of corruption index is, the law and order situation will be much better in the country. The value of 0.032 represents the strength of this effect.

effect_of_C_on_PAAC = -0.106

DOCUMENT: This represents the impact of corruption on PAAC, i.e. the higher the corruption is (low value of corruption index), the more strong will be the peoples attitude against corruption results. The value of -0.106 represents the strength of this effect.

effect_of_DA_on_C = 0.065

DOCUMENT: This represents the impact of democratic accountability on corruption level in the country, i.e. the higher the value of democratic accountability is, there will be less corruption in the country. The value of 0.065 represents the strength of this effect.

effect_of_Economic_Openness_on_Level_of_GDP = 0.0723

DOCUMENT: This represents the 'poitive' impact of economic openness on Level of GDP. i.e., the higher the economic openness is, the more increase of level of GDP results. The value of 0.0723 represents the strength of this effect.

effect_of_GE_on_SEC = 0.00258

DOCUMENT: This represents the impact of GE on SEC, i.e. the higher the GE value is, the more chances of better socio economic conditions in the country. The value of 0.00258 represents the strength of this effect.

effect_of_GS_on_DA = 0.014

DOCUMENT: This represents the impact of government stability on democratic accountability in the country, i.e. the higher the value of GS index is, the democratic accountability will be much better in the country. The value of 0.014 represents the strength of this effect.

effect_of_Income__Inequalaity_on_C = -0.00118

DOCUMENT: This represents the impact of income inequality (income distribution) on corruption level in the country, i.e. the higher the level of income inequality is, the corruption level will be higher in the country. The value of -0.00118 represents the strength of this effect.

effect_of_inflation_on_C = -0.00250

DOCUMENT: This represents the impact of inflation on corruption level in the country, i.e. the higher the value of inflation is, the corruption level will be higher in the country. The value of -0.00250 represents the strength of this effect.

effect_of_L&O_on_GS = 0.028

DOCUMENT: This represents the impact of law and order on government stability, i.e. the higher the value of law and order index is, the more stable will be the government. The value of 0.028 represents the strength of this effect.

effect_of_L&O_on_MiP = 0.0022

DOCUMENT: This represents the impact of law and order on military in politics, i.e. the higher the value of law and order index is, the less chances will be there for involvement of military in politics. The value of 0.0022 represents the strength of this effect.

effect_of_L&O_on_OC = -0.030

DOCUMENT: This represents the impact of law and order on gorganised crime, i.e. the higher the value of law and order index is, the law and order situation will be good in the countryt. The value of -0.030 represents the strength of this effect.

effect_of_Level_of_GDP_on_Inflation = -0.00102

DOCUMENT: This represents the 'negative' impact of Level of GDP on inflation. i.e., the higher the Level of GDP is, the more reduction of inflation results. The value of 0.00102 represents the strength of this effect.

effect_of_MiP_on_DA = 0.0019

DOCUMENT: This represents the impact of military in politics on democratic accountability in the country, i.e. the higher the value of MiP index is, the democratic accountability will be deteriorated in the country. The value of 0.019 represents the strength of this effect.

effect_of_OC_on__C = -0.002

DOCUMENT: This represents the impact of organized crime on level of corruption in the country, i.e. the higher the value of organized crime index is, the corruption level will be much higher in the country. The value of -0.002 represents the strength of this effect.

effect_of_PAAC_on_L&O = 0.015

DOCUMENT: This represents the impact of peoples attitude against corruption on law and order in the country, i.e. the higher the value of PAAC index is, the law and order situation will be much better in the country. The value of 0.015 represents the strength of this effect.

effect_of_SEC_on_Income_Inequality = -0.002

DOCUMENT: This represents the impact of SEC on Income Inequality, i.e. the higher the SEC value is, the more chances of better income equality in the country. The value of -0.002 represents the strength of this effect.

max_C = 6

DOCUMENT: The maximum value for corruption index is 6.

max_DA = 6

DOCUMENT: The maximum value for democratic accountability index is 6.

max_GE = 100

DOCUMENT: This is the maximum value for government expenditure (as percentage of GDP).

max_GS = 12

DOCUMENT: The maximum value for GS index is 12.

max_Income_Inequality = 100

DOCUMENT: 100 is the maximum value for income inequality (GINI index).

max_L&O = 6

DOCUMENT: The maximum value for law and order index is 6.

max_MiP = 6

DOCUMENT: The maximum value for MiP index is 6.

max_OC = 100

UNITS: Dmnl

DOCUMENT: The maximum value for organized crime index is 100.

max_PAAC = 10

DOCUMENT: The maximum value for PAAC index is 10.

max_SEC = 12

DOCUMENT: The maximum value of SEC index is 12.

neutral_Corruption = 4