X (Partisanship) X=1(Demo) X=0(Rep)
Y(Economic Condition) Y=1(Expan) Y=0(Rece)
S(X,Y) S1=(1,1) S2=(1,0)
S3=(0,1) S4=(0,0)

	S1(1,1)(t+1)	S2(1,0)(t+1)	S3(0,1)(t+1)	S4(0,0)(t+1)
S1(1,1)(t)	T1	T2	T3	1-T1-T2-T3
S2(1,0)(t)	T4	T5	T6	1-T4-T5-T6
S3(0,1)(t)	T7	T8	T9	1-T7-T8-T9
S4(0,0)(t)	T10	T11	T12	1-T10-T11-T12

Log likelihood function = $\sum_{t=1}^{T}(X_t)(X_{t+1})(Y_t)(Y_{t+1})\log(T1) + (X_t)(X_{t+1})(Y_t)(1-Y_{t+1})\log(T2) + (X_t)(1-X_{t+1})(Y_t)(Y_{t+1})\log(T3) + (X_t)(1-X_{t+1})(Y_t)(1-Y_{t+1})\log(1-T1-T2-T3) + \cdots + (1-X_t)(X_{t+1})(1-Y_t)(Y_{t+1})\log(T10) + (1-X_t)(X_{t+1})(1-Y_t)(1-Y_{t+1})\log(T11) + (1-X_t)(1-X_{t+1})(1-Y_t)(Y_{t+1})\log(T12) + (1-X_{t-1})(1-X_{t+1})(1-Y_t)(1-Y_{t+1})\log(1-T10-T11-T12)$