Table S2: Simulations used in optimization.

	Simulation	Terms computed	Description	Input times
1	$P53^{-/-}$ free cycling	$\tau_{G1}^{(1)}, \tau_{G2}^{(1)}$	Match observed fractions of G1, S and G2 cells	Simulated for 3 cell cycles
2	$p53^{-/-}$ arrested	$r_{CycET}^{(2,1)}, r_{CycBT}^{(2,1)}, \left\|\dot{\mathbf{x}}_{ss}^{(2)}\right\|^2$	Match steady state values of cyclins E and B	Arrest applied at 15 h; simulated for 200 h
3	Wild-type, free cycling	$\tau_{G1}^{(3)}, \tau_{G2}^{(3)}$	Match observed fractions of G1, S and G2 cells	Simulated for 3 cell cycles
4	Wild-type, arrested	$r_{CycET}^{(4,3)}, r_{CycBT}^{(4,3)}, \left\|\dot{\mathbf{x}}_{ss}^{(4)}\right\|^2$	Match steady state values of cyclins E and B	Arrest applied at 15 h; simulated for 200 h
5	Cyclin $D^{-/-}$	$T^{(5)}, T^{(1)}$	Ensure that knockout cell line still cycles	Simulated for three cell cycles
6	Cyclin $E^{-/-}$	$T^{(6)}, T^{(1)}$	Ensure that knockout cell line still cycles	Simulated for three cell cycles
7	Cycloheximide pre-restriction point	$r_{CycET}^{(7,3)}, \left\|\dot{\mathbf{x}}_{ss}^{(7)}\right\|^2$	When applied before restriction point, cells arrest with high *CycET*	Cycloheximide applied at 3 h after first division. Simulated for 200 h
8	Cycloheximide post-restriction point	$r_{CycET}^{(8,3)}, r_{CycE}^{(8,3)}, r_{Cdc20A}^{(8,3)}, \left\|\dot{\mathbf{x}}_{ss}^{(8)}\right\|^2$	When applied after restriction point, cells arrest with high *CycET*, low *CycE*, and undergo one cell division with a *Cdc20A* pulse	Cycloheximide applied at 20 h after first division. Simulated for 200 h