About sensitivity analysis

I have based my thoughts on http://www.math.uwaterloo.ca/ bingalls/MMSB/Notes.pdf. See p.101 and definition of relative sensitivity.

Relative sensitivity of concentration in steady state, s^{ss}, with respect to variable p, is defined as

$$\frac{p}{s^{ss}}\frac{ds^{ss}}{dp}.$$

It relates the size of a relative perturbation in p to a relative change in s^{ss}. If system shows a small sensitivity coefficient with respect to a parameter, then behaviour is robust with respect to perturbations of that parameter. Large value suggest 'control points' at which interventions will have significant effects. I assume that this is exactly what 2011 Northwestern team did (http://2011.igem.org/Team:Northwestern/Project/Modelling).

I have calculated the steady state concentrations for all species in reactions with the case of simple model (starting from Acetoacetyl-CoA) but they are for now only in my notes because they are quite large and it would be time consuming to add them here. Every one of them is of form denominator and nominator which are just multiplications (no subtractions or additions). The constants k are to the power of one or two.

With these formulas of steady state concentrations it is easy to calculate the sensitivity coefficients, however the results are relatively boring. All constants are either 1, 2, -1 or -2. There is one -3 if the derivative is taken from Butyric acid with respect to NADPH. These number are a result of our simple, straight pathway, with no branches or anything else more interesting happening with current assumptions.