Online Supplementary Material

Legislative Bargaining and Partisan Delegation

Here, we provide the *Mathematica* Notebook that was used to help prove Proposition 3.

? D

D[f, x] gives the partial derivative $\partial f / \partial x$.
D[f, {x, n}] gives the multiple derivative $\partial^n f / \partial x^n$.
D[f, x, y, …] differentiates f successively with respect to x, y, ….
D[f, {{x_1, x_2, …}}] for a scalar f gives the vector derivative $(\partial f / \partial x_1, \partial f / \partial x_2, \ldots)$.
D[f, {$array$}] gives a tensor derivative. >>

? Reduce

Reduce[$expr$, $vars$] reduces the statement $expr$ by solving equations or inequalities for $vars$ and eliminating quantifiers.
Reduce[$expr$, $vars$, dom] does the reduction over
the domain dom. Common choices of dom are Reals, Integers, and Complexes. >>

To differentiate the δ bound in α:

$$\texttt{Simplify}\left[\texttt{D}\left[\frac{2\left(\left(3\,\Pi-1\right)\alpha-1\right)}{\left(1+\alpha\right)\left(\Pi\left(2+\alpha\right)-2\right)},\ \alpha\right]\right]$$

$$\frac{2\,\Pi\left(-5+2\,\alpha+\alpha^2\left(1-3\,\Pi\right)+6\,\Pi\right)}{\left(1+\alpha\right)^2\left(-2+\left(2+\alpha\right)\Pi\right)^2}$$

$$\texttt{Reduce}\left[\left\{\texttt{D}\left[\frac{2\left(\left(3\,\Pi-1\right)\alpha-1\right)}{\left(1+\alpha\right)\left(\Pi\left(2+\alpha\right)-2\right)},\ \alpha\right]>0,\ \frac{1}{3\,\Pi-1}<\alpha<1,\ \frac{2}{3}<\Pi\leq 1\right\},\ \alpha\right]$$

$$\frac{2}{3}<\Pi\leq 1\ \&\&\ \frac{1}{-1+3\,\Pi}<\alpha<1$$

To differentiate the δ bound in Π:

$$\texttt{Factor}\left[\texttt{D}\left[\frac{2\left(\left(3\,\Pi-1\right)\alpha-1\right)}{\left(1+\alpha\right)\left(\Pi\left(2+\alpha\right)-2\right)},\ \Pi\right]\right]$$

$$\frac{2\left(-2+\alpha\right)\left(-1+\alpha\right)}{\left(1+\alpha\right)\left(-2+2\,\Pi+\alpha\,\Pi\right)^2}$$

$$\texttt{Reduce}\left[\left\{\texttt{D}\left[\frac{2\left(\left(3\,\Pi-1\right)\alpha-1\right)}{\left(1+\alpha\right)\left(\Pi\left(2+\alpha\right)-2\right)},\ \Pi\right]>0,\ \frac{1}{3\,\Pi-1}<\alpha<1,\ \frac{2}{3}<\Pi\leq 1\right\},\ \alpha\right]$$

$$\frac{2}{3}<\Pi\leq 1\ \&\&\ \frac{1}{-1+3\,\Pi}<\alpha<1$$