ADDITIONAL INFORMATION FOR "A FORMAL MODEL OF DELEGATION IN THE EUROPEAN UNION"

Delegation preferences of the actors in case of a new EU law

Commission: The Commission prefers to change the status quo and delegating powers to itself if

$$\frac{(d_c\text{-R})[3x_c^2 + (d_c - \text{R})^2 + 3p(p\text{-}2x_c)]}{3\text{R}} > -\frac{x_u^2+2x_c^2-2x_ux_c}{2}.$$

That is, if $x_u \geq x_c + \sqrt{\dfrac{12x_cp(d_c\text{-R}) + 3x_c^2(\text{R} - 2d_c) -2(d_c\text{-} \text{R})(d_c^2 + 3p^2 -2d_c\text{R} + \text{R}^2)}{3\text{R}}}$ or

if $x_u \leq x_c - \sqrt{\dfrac{12x_cp(d_c\text{-R}) + 3x_c^2(\text{R} - 2d_c) -2(d_c\text{-} \text{R})(d_c^2 + 3p^2 -2d_c\text{R} + \text{R}^2)}{3\text{R}}}$.

It prefers restricting national administrations' discretion if

$$\frac{2(d_n - \text{R})^3\text{-}3\text{R}(2x_c^2+p^2\text{-}2x_cp) +3d_nx_u(2x_c\text{-}x_u) +3p(p\text{-}2x_c)(2d_n\text{-R})}{6\text{R}} > -\frac{x_u^2+2x_c^2-2x_ux_c}{2}$$

That is, if $x_u \geq x_c + \dfrac{\sqrt{3[3x_c^2 -12x_cp + 2(d_n^2 + 3p^2 -2d_n\text{R} + \text{R}^2)]}}{3}$ or

if $x_u \leq x_c - \dfrac{\sqrt{3[3x_c^2 -12x_cp + 2(d_n^2 + 3p^2 -2d_n\text{R} + \text{R}^2)]}}{3}$.

Government M: Government M is willing to confer powers to the Commission if

$\dfrac{(d_c\text{-R})^3\text{-} 3\text{R}p^2 + 3d_c(p^2 - x_c^2)}{3\text{R}} > -\dfrac{x_u^2}{2}$. That is, if $x_u \geq \sqrt{\dfrac{6\text{R}p^2 - 2(d_c\text{-R})^3\text{-} 6d_c(p^2 - x_c^2)}{3\text{R}}}$

It is willing to restrict the executive discretion of national administrations if

$$\frac{2(d_n - \text{R})^3\text{-}3\text{R}p^2\text{-}3d_nx_u^2+3p^2(2d_n\text{-R})}{6\text{R}} > -\frac{x_u^2}{2}.$$

Hence, if $x_u \geq \sqrt{\dfrac{2(d_n^2 + 3p^2 - 2d_n\text{R} + \text{R}^2)}{3}}$.

Government U: Government U is willing to confer powers to the Commission if

$$\frac{(d_c\text{-R})^3\text{-}3\text{R}(\text{x}_u - p)^2 + 3d_c\,(p^2 - \text{x}_c^{\,2} - 2\text{x}_u p + 2\text{x}_u\text{x}_c)}{3\text{R}} > -\frac{\text{x}_u^{\,2}}{2}.$$

That is, if $\frac{6\text{x}_c d_c - 6p(d_c\text{-R}) - \sqrt{36(\text{x}_c d_c - d_c p + p\text{R})^2 - 6\text{R}(3\text{x}_c^{\,2} d_c - (d_c\text{-R})\,(d_c^{\,2} + 3p^2 - 2d_c\text{R} + \text{R}^2))}}{3\text{R}} < \text{x}_u$

$< \frac{6\text{x}_c d_c - 6p(d_c\text{-R}) + \sqrt{36(\text{x}_c d_c - d_c p + p\text{R})^2 - 6\text{R}(3\text{x}_c^{\,2} d_c - (d_c\text{-R})\,(d_c^{\,2} + 3p^2 - 2d_c\text{R} + \text{R}^2))}}{3\text{R}}$

The government accepts restraining national administrations if

$$\frac{2(d_n - \text{R})^3 + 3d_n\,(\text{x}_u^{\,2} + 2p^2 - 4p\text{x}_u) - 6\text{R}(\text{x}_u - p)^2}{6\text{R}} > -\frac{\text{x}_u^{\,2}}{2}.$$

Hence, if $2p - \sqrt{\frac{2(3p^2 - d_n^{\,2} + 2d_n\text{R} - \text{R}^2)}{3}} < \text{x}_u < 2p + \sqrt{\frac{2(3p^2 - d_n^{\,2} + 2d_n\text{R} - \text{R}^2)}{3}}$.

Parliament: The Parliament is willing to delegate powers to the Commission if

$$\frac{(d_c\text{-R})^3\text{-}3\text{R}(\text{x}_{pr} - p)^2 + 3d_c\,(p^2 - \text{x}_c^{\,2} - 2\text{x}_{pr} p + 2\text{x}_{pr}\text{x}_c)}{3\text{R}} > -\frac{\text{x}_u^{\,2} + 2\text{x}_{pr}^{\,2} - 2\text{x}_u\text{x}_{pr}}{2}$$

That is, if, $\text{x}_u > \text{x}_{pr} + \sqrt{\frac{3\text{R}\text{x}_{pr}^{\,2} - 12\text{x}_{pr}(\text{x}_c d_c + p(\text{R}-d_c)) + 2(3\text{x}_c^{\,2} d_c - (d_c\text{-R})(d_c^{\,2} + 3p^2 - 2d_c\text{R} + \text{R}^2))}{3\text{R}}}$ or

$\text{x}_u < \text{x}_{pr} - \sqrt{\frac{3\text{R}\text{x}_{pr}^{\,2} - 12\text{x}_{pr}(\text{x}_c d_c + p(\text{R}-d_c)) + 2(3\text{x}_c^{\,2} d_c - (d_c\text{-R})(d_c^{\,2} + 3p^2 - 2d_c\text{R} + \text{R}^2))}{3\text{R}}}$.

It accepts restraining national administrations under the same conditions as the Commission does, of course, with the caveat of substituting x_{pr} for x_c.

Strategies of actors to determine the subgame perfect equilibria

Executive Stage (common to all three legislative procedures):

The implemented policy p^i (for i=c,a1,a2) maximizes the executive agent's utility given the baseline equilibrium policy p^*, the degree of equilibrium discretion d_l^* (for l=c,n) and the state of Nature ω.

Formally, let the set of available policies to implement Y determine the function $\delta(p^*, d_l^*, \omega) = \{Y \in R^1\}$ such that $|Y + p^* - \omega| \leq d_l^*$, the condition becomes:

$$p^i(p^*, d_l^*, \omega) \in \mathrm{argmax}_{p^i \in \delta(p^*, d_l^*, \omega)} U_i(p^* + p^i + \omega),$$

where U_i the utility of executive agent i.

Legislative Stage: Definitions and Assumptions

Legislative proposals consist of a baseline policy *p*, and administrator *D*, and a level of discretion *d*. Governments want to maximize their expected utility (EU_i for i=m,u) after the state of Nature *ω* is revealed and the executive agents set the policy p^i. The Commission makes a proposal that maximizes its expected utility and is approved under the relevant procedure. I assume that decisions are taken sequentially. The setting of the policy precedes the conferral of discretionary authority to an administrator.

Let:

1) $v(p,D,d)$ be the proposal of the Commission,

2) Z be the set of proposals that are preferred to the Commission's proposal by governments M and U. A proposal *s* belongs to Z iff $EU_m(s) > EU_m(v)$ and $EU_u(s) > EU_u(v)$. I assume that $Z = \varnothing$ for $x_c < 0$,

3) W be the set of proposals that are preferred to the Commission's proposal by both government M and the Parliament. A proposal *j* belongs to W iff $EU_m(j) > EU_m(v)$ and $EU_{pr}(j) > EU_{pr}(v)$,

4) EU_i^{sq} be the expected utility from the status quo for player i

Legislative Stage: Strategies of Unanimity Procedure Game

1. Adoption of a Commission's proposal occurs iff

$$EU_i(v) \geq EU_i^{sq} \text{ for i=u,m and } Z = \varnothing,$$

otherwise the Council adopts any proposal *k* whereby

$$EU_i(k) \geq EU_i^{sq} \text{ and } EU_i(k) \geq EU_i(v) \text{ for i=u,m.}$$

2. The Commission introduces a proposal such that:

$$v(p,D,d) \in \text{argmax } EU_c(p,D,d),$$

$$\text{and } EU_i(v) \geq EU_i^{sq} \text{ for i=u,m}$$

$$\text{and } Z = \varnothing.$$

Legislative Stage: Strategies of Qualified Majority Voting Procedure Game

1. Adoption of a Commission's proposal occurs iff

$$EU_m(v) \geq EU_m^{sq} \text{ and } Z = \varnothing,$$

otherwise the Council adopts any proposal *k* whereby

$$EU_i(k) \geq EU_i^{sq} \text{ and } EU_i(k) \geq EU_i(v) \text{ for i=u,m.}$$

2. The Commission introduces a proposal such that:

$$v(p,D,d) \in \text{argmax } EU_c(p,D,d),$$

$$\text{and } EU_m(v) \geq EU_m^{sq}$$

$$\text{and } Z = \varnothing.$$

Legislative Stage: Strategies of Codecision Procedure Game

1. Adoption of a Commission's proposal occurs iff

$$EU_i(v) \geq EU_i^{sq} \text{ for i=m,pr and } W = \varnothing,$$

otherwise the Council and the Parliament adopt any proposal *k* whereby

$$EU_i(k) \geq EU_i^{sq} \text{ and } EU_i(k) \geq EU_i(v) \text{ for i=m,pr.}$$

2. The Commission introduce a proposal such that:

$v(p,D,d) \in \text{argmax } EU_c(p,D,d)$,

and $EU_i(v) \geq EU_i^{sq}$ for i=m,pr

and $W = \varnothing$

Equilibrium in the three procedures and in case of a new law[1]

Unanimity: $D^* = N$ and

$d^* = d_n^0 = R$ if $p^* < 0$

if $x_c < p^*$, $x_u > (2+\sqrt{2})\, x_c$ and $[x_u < \sqrt{2}\, p^*$ or $x_u > (2+\sqrt{2})\, p^*]$

if $x_c < p^*$ and $x_u < \sqrt{2}\, x_c$

if $x_c > p^*$, $x_u < \sqrt{2}\, p^*$ or $x_u > (2+\sqrt{2})\, x_c$ or $[x_u > \sqrt{\frac{2R^2}{3} + 2p^{*2}}$ and $x_c > g(\bullet)]$

$$d^* = d_n = \left[R - \frac{\sqrt{x_u^2 - 2p^{*2}}}{\sqrt{2}},\ R - \frac{\sqrt{4x_u p^* - x_u^2 - 2p^{*2}}}{\sqrt{2}}\right]$$

if $x_c < p^*$, $\sqrt{2}\, p^* < x_u < (2+\sqrt{2})\, p^*$ and $x_u > (2+\sqrt{2})\, x_c$

if $x_c > p^*$, $\sqrt{2}\, p^* < x_u < \sqrt{2x_c^2 - \frac{4(x_c^2 - p^{*2})^{3/2}}{3R}}$ and $x_c < \sqrt{R^2 + p^{*2}}$

if $x_c > p^*$, $\sqrt{2}\, p^* < x_u < \sqrt{\frac{2R^2}{3} + 2p^{*2}}$ and $x_c > \sqrt{R^2 + p^{*2}}$

[1] Although the equilibria in this appendix are sufficiently characterized, this is a concise exposition because it provides ranges for d^* rather than specific values. More detailed equilibria can be developed but they do not add any substantive value to the results. In unanimity, the case of $x_u < p$ is disregarded because p is not an equilibrium; $g(\bullet)$ is a very long expression, available on request. In majority voting, the cases for either a) $p<[>]0$ and $p<[>]x_c$ or b) $x_u<p$ are disregarded because p is not an equilibrium. In codecision, the cases disregarded for the same reason are for either a) $x_{pr}>[<]0$ and $p<[>]0$ or b) $|p|>|x_{pr}|$.

D^* = C and $d^* = d_c = [R - \sqrt{x_c^2 - p^{*2}}\,,\ R - \sqrt{x_c^2 - p^{*2} - 2x_u (x_c - p^*)}\ ]$ otherwise.

Qualified majority: D^* = N and

$d^* = d_n^0 = R$ if $x_u < \sqrt{2}\,|p^*|$,

if $p^* > 0$, $x_u > \sqrt{\frac{2R^2}{3} + 2p^{*2}}$ and $x_c > g(\bullet)$

$d^* = d_n = [R - \frac{\sqrt{x_u^2 - 2p^{*2}}}{\sqrt{2}}\,,\ R - \frac{\sqrt{4x_u p^* - x_u^2 - 2p^{*2}}}{\sqrt{2}}\ ]$

if $\sqrt{2}\,|p^*| < x_u < \sqrt{2x_c^2 - \frac{4(x_c^2 - p^{*2})^{3/2}}{3R}}$ and $-\sqrt{R^2 + p^{*2}} < x_c < \sqrt{R^2 + p^{*2}}$

if $\sqrt{2}\,|p^*| < x_u < \sqrt{\frac{2R^2}{3} + 2p^{*2}}$ and $[x_c < -\sqrt{R^2 + p^{*2}}$ or $x_c > \sqrt{R^2 + p^{*2}}]$

D^* = C and $d^* = R - \frac{36(p^{*2} - x_c^2) + f(\bullet)^2}{6\, f(\bullet)}$ otherwise,

where $f(\bullet) = [162R(2x_c^2 - x_u^2) + \frac{\sqrt{4(36p^{*2} - 36x_c^2)^3 + (648Rx_c^2 - 324Rx_u^2)^2}}{2}\ ]^{1/3}$

Co-decision and supranational Parliament (i.e. $x_{pr} < p^* < 0$): D^* = N and

$d^* = d_n^0 = R$ if $x_u < |p^*|\sqrt{2}$ and $x_u < |x_c|\sqrt{2}$

$d^* = d_n = [R - \frac{\sqrt{x_u^2 - 2p^{*2}}}{\sqrt{2}}\,,\ R - \frac{\sqrt{x_u^2 - 2p^{*2} - 2x_{pr}(x_u - 2p^*)}}{\sqrt{2}}\ ]$

if $\sqrt{2}\,|p^*| < x_u < \sqrt{2x_c^2 - \frac{4(x_c^2 - p^{*2})^{3/2}}{3R}}$ and $-\sqrt{R^2 + p^{*2}} < x_c < p^*$

if $\sqrt{2}\,|p^*| < x_u < \sqrt{\frac{2R^2}{3} + 2p^{*2}}$ and $x_c < -\sqrt{R^2 + p^{*2}}$

$\text{if } \sqrt{2}\,|p^*| < x_u < x_c\sqrt{2}$

$D^* = C$ and $d^* = d_c = [R - \sqrt{x_c^2 - p^{*2}}\ ,\ R - \sqrt{x_c^2 - p^{*2} - 2x_{pr}\,(x_c - p^*)}\ ]$ otherwise.

Co-decision and national Parliament (i.e. $x_{pr} > p^* > 0$): $D^* = N$ and

$d^* = d_n^0 = R \quad \text{if } x_u < p^*\sqrt{2} \text{ and } x_u < |x_c|\sqrt{2}$

$\text{if } x_u < p^*\sqrt{2},\ x_u > |x_c|\sqrt{2} \text{ and } x_{pr} - \sqrt{x_{pr}^2 - 4x_{pr}x_c + 2x_c^2} < x_u < x_{pr} + \sqrt{x_{pr}^2 - 4x_{pr}x_c + 2x_c^2}$

$\text{if } x_{pr} - \sqrt{x_{pr}^2 - 4x_{pr}p^* + 2p^{*2}} < x_u < x_{pr} + \sqrt{x_{pr}^2 - 4x_{pr}p^* + 2p^{*2}}$ and

$x_{pr} - \sqrt{x_{pr}^2 - 4x_{pr}x_c + 2x_c^2} < x_u < x_{pr} + \sqrt{x_{pr}^2 - 4x_{pr}x_c + 2x_c^2}$

$$d^* = d_n = [R - \frac{\sqrt{x_u^2 - 2p^{*2}}}{\sqrt{2}}\ ,\ R - \frac{\sqrt{x_u^2 - 2p^{*2} - 2x_{pr}\,(x_u - 2p^*)}}{\sqrt{2}}\ ]$$

$\text{if } \sqrt{2}\,p^* < x_u < x_c\sqrt{2} \text{ and } x_{pr} - \sqrt{x_{pr}^2 - 4x_{pr}x_c + 2x_c^2} < x_u < x_{pr} + \sqrt{x_{pr}^2 - 4x_{pr}x_c + 2x_c^2}$

$\text{if } \sqrt{2}\,p^* < x_u < \sqrt{\frac{2R^2}{3} + 2p^{*2}} \text{ and } x_c > \sqrt{R^2 + p^{*2}}$

$\text{if } \sqrt{2}\,p^* < x_u < \sqrt{2x_c^2 - \frac{4(x_c^2 - p^{*2})^{3/2}}{3R}} \text{ and } p^* < x_c < \sqrt{R^2 + p^{*2}}$

$\text{if } x_c < p^*,\ \sqrt{2}\,p^* < x_u < x_{pr} + \sqrt{\frac{3x_{pr}^2 - 12x_{pr}p^* + 2(3p^{*2} + R^2)}{3}}$ and

$x_{pr} - \sqrt{x_{pr}^2 - 4x_{pr}x_c + 2x_c^2} < x_u < x_{pr} + \sqrt{x_{pr}^2 - 4x_{pr}x_c + 2x_c^2}$

$\text{if } x_c < p^*,\ x_{pr} + \sqrt{\frac{3x_{pr}^2 - 12x_{pr}p^* + 2(3p^{*2} + R^2)}{3}} < x_u < |x_c|\sqrt{2}$

$D^* = C$ and $d^* = d_c = [R - \sqrt{x_c^2 - p^{*2}}\ ,\ R - \sqrt{x_c^2 - p^{*2} - 2x_{pr}\,(x_c - p^*)}\ ]$ otherwise.