BARGAINING

- <u>Bargaining problem:</u> $\langle U, d \rangle$
- <u>Assumptions:</u> ① $d \in U$

② $\exists (v_1, v_2) \in U$ s.t. $(v_1, v_2) \gg d$

③ U is convex

④ U is compact

- <u>Bargaining Solution:</u> $F : \{\langle U, d \rangle\} \to U$
- <u>Axioms:</u>

(WP) $\nexists (v_1, v_2) \in U$ s.t. $(v_1, v_2) \gg F\langle U, d \rangle$

(SYM) <u>IF:</u> $(v_1, v_2) \in U$ iff $(v_2, v_1) \in U$

<u>and</u> $d_1 = d_2$

<u>THEN:</u> $F_1\langle U, d \rangle = F_2 \langle U, d \rangle$

(INV) <u>IF:</u> $\cancel{U' :}$ $\alpha_1, \alpha_2 \in \mathbb{R}_{>0}$, $\beta_1, \beta_2 \in \mathbb{R}$

and $U' := \{(\alpha_1 u_1 + \beta_1, \alpha_2 u_2 + \beta_2) : (u_1, u_2) \in U\}$

and $d' := (\alpha_1 d_1 + \beta_1, \alpha_2 d_2 + \beta_2)$

<u>THEN:</u> $F\langle U', d' \rangle$

$= (\alpha_1 F_1 \langle U, d \rangle + \beta_1, \alpha_2 F_2 \langle U, d \rangle + \beta_2)$

(IIA) <u>IF:</u> $U' \subseteq U$

<u>and</u> $F\langle U, d \rangle \in U'$

<u>THEN:</u> $F\langle U', d \rangle = F\langle U, d \rangle$

- <u>Nash's bargaining theorem:</u>

F satisfies WP, SYM, INV and IIA, iff:

$$F := \arg\max_{(v_1, v_2)} \underbrace{(v_1 - d_1)(v_2 - d_2)}_{\text{rectangular hyperbola}}$$

$$\text{s.t. } (v_1, v_2) \in \mathcal{U}$$

$$\text{and } (v_1, v_2) \geq d$$

- <u>Results:</u>

↪ the Nash bargaining solution is the same as the limit of the SPE outcome of an extensive-form game of probabilistic offers with a fixed probability α of breakdown after each refusal, as $\alpha \to 0$ (where d is the pair of <u>breakdown</u> payoffs).

↪ under the Nash bargaining solution, the player with lesser risk-aversion gets more of the pie.

- An extensive-form game is stationary if subgames alternate between a certain finite set of types.

- A <u>strategy</u> is <u>stationary</u> iff each player always makes the same proposals and always accepts the same set of proposals.