Online Appendix

1 Proofs

Proof of Lemma It is evident that if $\succeq$ respects FOSD then $\succeq$ obeys State Monotonicity, so we only need to prove the converse.

Assume, therefore, that $\succeq$ satisfies State Monotonicity. By assumption, Ω is finite. Hence the indifference relation partitions Ω into a finite number of equivalence classes $\Omega_1, \ldots, \Omega_J$. For each j, choose and fix a representative $\theta_j \in \Omega_j$; renumbering, if necessary, we may assume that $\theta_1 \succ \theta_2 \succ \ldots \succ \theta_J$. Set $\Theta = \{\theta_j\}$.

Every $\omega \in \Omega$ belongs to some equivalence class Ω_j and hence is indifferent to some unique θ_j. Hence every lottery $W \in L(\Omega)$ is indifferent to some unique lottery $\widehat{W} \in L(\Theta)$. It follows from Transitivity that for $W, W' \in L(\Omega)$,

$$W \geq_{\text{FOSD}} W \Longleftrightarrow \widehat{W} \geq_{\text{FOSD}} \widehat{W'} \text{ and } W \succeq W' \Longleftrightarrow \widehat{W} \succeq \widehat{W'}.$$

Hence to show that $\succeq$ respects FOSD for lotteries in $L(\Omega)$ it will suffice to show that $\succeq$ respects FOSD for lotteries in $L(\Theta)$.

For each $j = 1, \ldots, J$ and $X \in L(\Theta)$, write $q_j(X)$ for the probability weight that X puts on θ_j. Thus,

$$X = \sum_{j=1}^{J} q_j(X)\theta_j.$$

Now consider two lotteries $X, X' \in L(\Theta)$ for which $X \geq_{\text{FOSD}} X'$. In the notation we have just introduced, FOSD means that for every $k \leq J$:

$$\sum_{j=1}^{k} q_j(X) \geq \sum_{j=1}^{k} q_j(X'). \tag{1}$$

To show that $X \succeq X'$ we first construct a chain of intermediate lotteries $X_0, X_1, \ldots, X_{J-1}$ in $L(\Theta)$ with the following properties:

(a) $X_0 = X$
(b) For $1 \leq j \leq k \leq J-1$: $q_j(X_k) = q_j(X'_k)$
(c) For $1 \leq k+1 < j \leq J$: $q_j(X_k) = q_j(X)$
(d) $q_k(X_k) + q_{k+1}(X_k) = q_k(X_{k+1}) + q_{k+1}(X_{k+1})$
(e) $X_{J-1} = X'$

As illustrated in the table below, such a chain gradually shifts probability mass from more-preferred states X to less-preferred states X', one step at a time. Note that, as is the case in the example, the intermediate lotteries might not all be different.

Table 1:

	X	X_0	X_1	X_2	X_3	X_4	X_5	X'	
q_1	.30	.30	.25	.25	.25	.25	.25	.25	
q_2	.20	.20	.25	.25	.25	.25	.25	.25	
q_3	.30	.30	.30	.30	.00	.00	.00	.00	
q_4	.10	.10	.10	.10	.40	.40	.40	.40	
q_5	.10	.10	.10	.10	.10	.10	.00	.00	
q_6	.00	.00	.00	.00	.00	.00	.10	.10	

The construction proceeds by induction. Set $X_0 = X$. Assume $X_0, \dots, X_{k-1}$ have been constructed. It is evident that $X_{j-1} \geq_{\text{FOSD}} X_j$ for $j \leq k-1$, and equation (1) guarantees that $q_k(X_k) - q_k(X') \geq 0$. Hence we may define X_k as follows

(i) For $j < k$: $q_j(X_k) = q_j(X_{k-1})$

(ii) $q_k(X_k) = q_k(X')$

(iii) $q_{k+1}(X_k) = q_{k+1}(X_{k-1}) + [q_k(X_k) - q_k(X')]$

(iv) For $j > X_{k+1}$: $q_j(X_k) = q_j(X_{k-1})$

We assert that $X_{k-1} \succeq X_k$ for each k. To see this, note first that $q_j(X_{k-1}) = q_j(X_k)$ for all $j \neq k, k+1$. Hence if we write $\beta_j = q_j(X_{k-1}) = q_j(X_k)$ for $j \neq k, k+1$ our construction implies that we can write:

$$\begin{aligned}
X_{k-1} &= \sum_{j \neq k,k+1} \beta_j \theta_j + q_k(X_{k-1})\theta_k + q_{k+1}(X_{k-1})\theta_{k+1} \\
&= \sum_{j \neq k,k+1} \beta_j \theta_j + q_k(X')\theta_k + \left[q_k(X_{k-1}) - q_k(X')\right]\theta_k + q_{k+1}(X_{k-1})\theta_{k+1}. \\
X_k &= \sum_{j \neq k,k+1} \beta_j \theta_j + q_k(X_k)\theta_k + q_{k+1}(X_k)\theta_{k+1} \\
&= \sum_{j \neq k,k+1} \beta_j \theta_j + q_k(X')\theta_k + \left[q_k(X_{k-1}) - q_k(X')\right]\theta_{k+1} + q_{k+1}(X_{k-1})\theta_{k+1}.
\end{aligned}$$

We have numbered so that $\theta_k \succ \theta_{k+1}$ so State Monotonicity guarantees that $X_{k-1} \succeq X_k$, as asserted. Transitivity now implies that $X \succeq X'$, so the proof is complete. ∎

Proof of Theorem 1 **Sufficiency** To see that this condition is sufficient, assume that every social state ω admits a personal state equivalent. We must show that $\succeq$ is the unique preference relation that satisfies the axioms and agrees with $\succeq_0$ on $L(P)$ and on Ω. To this end, suppose $\succeq^*$ is some preference relation that satisfies the axioms and agrees with $\succeq_0$ on $L(P)$ and on Ω. We must show that $\succeq^* = \succeq$; that is, for every pair of lotteries $\sum p_i \omega_i$

and $\sum q_i\omega_i$ we have the equivalence

$$\sum p_i\omega_i \succeq \sum q_i\omega_i \iff \sum p_i\omega_i \succeq^* \sum q_i\omega_i$$

By assumption, each social state ω_i admits a personal state equivalent $\tilde{\omega}_i$; that is, $\omega_i \sim_0 \tilde{\omega}_i$. Because $\succeq$ and $\succeq^*$ agree with $\succeq_0$ on Ω, it follows that $\omega_i \sim \tilde{\omega}_i$ and $\omega_i \sim^* \tilde{\omega}_i$. State Monotonicity of $\succeq$ implies that $\sum p_i\omega_i \sim \sum p_i\tilde{\omega}_i$ and $\sum q_i\omega_i \sim \sum q_i\tilde{\omega}_i$; State Monotonicity of $\succeq^*$ implies that $\sum p_i\omega_i \sim^* \sum p_i\tilde{\omega}_i$ and $\sum q_i\omega_i \sim^* \sum q_i\tilde{\omega}_i$. Transitivity provides a chain of equivalences:

$$\begin{array}{ccc}
\sum p_i\omega_i & \succeq & \sum q_i\omega_i \\
 & \Updownarrow & \\
\sum p_i\tilde{\omega}_i & \succeq & \sum q_i\tilde{\omega}_i \\
 & \Updownarrow & \\
\sum p_i\tilde{\omega}_i & \succeq_0 & \sum q_i\tilde{\omega}_i \\
 & \Updownarrow & \\
\sum p_i\tilde{\omega}_i & \succeq^* & \sum q_i\tilde{\omega}_i \\
 & \Updownarrow & \\
\sum p_i\omega_i & \succeq^* & \sum q_i\omega_i
\end{array}$$

It follows that $\sum p_i\omega_i \succeq \sum q_i\omega_i$ if and only if $\sum p_i\omega_i \succeq^* \sum q_i\omega_i$. Because the lotteries $\sum p_i\omega_i, \sum q_i\omega_i$ were arbitrary, we conclude that $\succeq = \succeq^*$, as asserted.

Necessity To see that this condition is necessary, assume that there is some social state X that the $\mathcal{DM}$ does *not* find indifferent to any personal state; we construct a preference relation that agrees with $\succeq$ on $L(P)$ and on Ω but not on all of $L(\Omega)$. It will require some care to ensure that the preference relation we construct obeys State Monotonicity.

For later use, we begin by choosing a utility representation for $\succeq$. To do so, note that, because $\succeq$ is continuous (by assumption) and $L(\Omega)$ can be identified with a finite-dimensional simplex, which is a separable metric space, we can use Debra's (1954) representation theorem to find a continuous utility function $u : L(\Omega) \to \mathbb{R}$ that represents $\succeq$, that is

$$\text{for all } \Gamma, \Gamma' \in L(\Omega) : \Gamma \succeq \Gamma' \Leftrightarrow u(\Gamma) \geq u(\Gamma').$$

To make the remainder of the proof easier to follow, suppose for the moment that $\Omega = \{A, X, B\}$, $P = \{A, B\}$ and that X is a social state that is not indifferent to either A or B. As our earlier discussion of State Monotonicity suggests, it is easy to construct a utility function U on $L(\Omega)$ with the desired properties in this setting—but it is less easy to do so in a way that generalizes to the general setting with more than three states. Assume without loss that $A \succ B$. We distinguish three cases: (i) $A \succ X \succ B$, (ii) $X \succ A \succ B$, and (iii) $A \succ B \succ X$.

- **Case (i) $\mathbf{A} \succ \mathbf{X} \succ \mathbf{B}$:** Because this is the leading (and most interesting) case, we will actually prove a bit more than is needed. Note that this is the setting illustrated in Panel A of Figure 2. Choose and fix lotteries $D_1 = a_1A + x_1X + b_1B$ and $D_2 = a_2A + x_2X + b_2B$ with the property that $a_1 + x_1 > a_2 + x_2$ and $x_1 + b_1 < x_2 + b_2$. (Note that neither of D_1, D_2 first-order stochastically dominates the other.) We define two preference relations that satisfy our axioms but provide opposite rankings of D_1, D_2, so that at least one of them differs from the given preference relation $\succeq$.

  To this end, we first define two auxiliary functions f, g:

$$\begin{aligned} f(aA + xX + bB) &= u(aA + xA + bB) \\ g(aA + xX + bB) &= u(aA + xB + bB) \end{aligned}$$

  for every lottery $aA + xX + bB \in L(\Omega)$. Note that f, g both agree with u on $\Omega = \{A, X, B\}$ and on $L(P)$ (which is the hypotenuse AB). Because u is continuous, both f and g are continuous. Evidently, f is constant on vertical lines and strictly increasing from right to left along horizontal lines, while g is strictly increasing upward on vertical lines and constant on horizontal lines. Hence for every $\lambda \in (0, 1)$ the convex combination $\lambda f + (1 - \lambda)g$ is strictly increasing upward on vertical lines *and* strictly increasing from right to left on horizontal lines.

  Taking all these things together, we conclude that, for every $\lambda \in (0, 1)$ the continuous utility function

$$u_\lambda(aA + xX + bB) = \lambda f(aA + xX + bB) + (1 - \lambda)g(aA + xX + bB)$$

  agrees with u on Ω and on $L(P)$ and is strictly increasing upward on vertical lines and strictly increasing from right to left on horizontal lines. Hence the preference relation $\succeq_\lambda$ induced by u_λ agrees with $\succeq$ on Ω and on $L(P)$ and obeys Completeness, Continuity, Transitivity, and State Monotonicity.

  Note that the definitions of u_1, u_0 imply that

$$\begin{aligned} u_1(D_1) = u(a_1A + x_1A + b_1B) > u(a_2A + x_2A + b_2B) = u_1(D_2) \\ u_0(D_1) = u(a_1A + x_1B + b_1B) < u(a_2A + x_2B + b_2B) = u_0(D_2). \end{aligned}$$

  If we choose λ_1 sufficiently close to 1 and λ_2 sufficiently close to 0 we will obtain

$$u_{\lambda_1}(D_1) > u_{\lambda_1}(D_2) \text{ and } u_{\lambda_2}(D_1) < u_{\lambda_2}(D_2).$$

  Hence the preference relations $\succeq_{\lambda_1}, \succeq_{\lambda_2}$ both satisfy our axioms but provide opposite rankings of D_1, D_2. In particular, at least one of $\succeq_{\lambda_1}, \succeq_{\lambda_2}$ must differ from $\succeq$.[1]

[1] In fact, it can be shown that if $\lambda \neq \lambda'$ then $\succeq_\lambda \neq \succeq_{\lambda'}$, so we obtain a continuum of distinct preference relations that are Complete, Continuous and Transitive, obey State Monotonicity, and agree with $\succeq$ on Ω and on $L(P)$. We leave the proof to the interested reader.

- **Case (ii) $\mathbf{X} \succ \mathbf{A} \succ \mathbf{B}$:** This is easier than Case (i), making use of the utility representation u constructed above. Continuity implies that there is some $\nu \in (0,1)$ for which $A \sim \nu X + (1-\nu)B$. Choose $\lambda > 0$ for which $u(\nu A + (1-\nu)B) + \lambda\nu \neq u(A)$ and set
$$U(xX + aA + bB) = u(xA + aA + bB) + \lambda x.$$
By construction, U agrees with u on $L(P)$ and $U(X) = u(A) + \lambda x > u(A) = U(A)$ so the preference relation $\succeq_U$ represented by U is indeed an extension of $\succeq$. It is easily checked that $\succeq_U$ satisfies all the required axioms; because $U(\nu X + (1-\nu)B) = u(\nu A + (1-\nu)B) + \lambda\nu \neq u(A)$ we conclude that $\succeq_U \neq \succeq$; this completes the construction in Case (ii).

- **Case (iii) $\mathbf{A} \succ \mathbf{B} \succ \mathbf{X}$:** The argument is almost the same as in Case (ii): we simply interchange the roles of A, B and change the sign of the linear term. Continuity guarantees that there is some $\eta \in (0,1)$ for which $B \sim \eta A + (1-\eta)X$. Choose $\lambda > 0$ for which $u(\eta A + (1-\eta)B) - \lambda\eta \neq u(B)$ and set
$$U(aA + bB + xX) = u(aA + bB + xB) - \lambda x.$$
By construction, U agrees with u on $L(P)$ and $U(X) = u(B) - \lambda x < u(B) = U(B)$ so the preference relation $\succeq_U$ represented by U is indeed an extension of $\succeq$. It is easily checked that $\succeq_U$ satisfies all the required axioms; because $U(\eta A + (1-\eta)X) = u(\eta A + (1-\eta)B) - \lambda\eta \neq u(B)$ we conclude that $\succeq_U \neq \succeq$; this completes the construction in Case (iii).

We now turn to the general setting. Here we must take account of the possible presence of additional personal and social states and of the possible differences in the ranking of the distinguished social state with respect to the additional personal states, but the main idea remains the same. Assume that there is some social state X that the $\mathcal{DM}$ does *not* find indifferent to any personal state. Write $\mathcal{A}$ for the set of states that are strictly preferred to X according to $\succeq$, $\mathcal{B}$ for the set of states that are strictly dis-preferred to X, and $\mathcal{X}$ for the set of states that are indifferent to X. Because X is not indifferent to any personal state, no member of $\mathcal{X}$ is indifferent to any personal state; moreover, at least one of $\mathcal{A}, \mathcal{B}$ is not empty.

If $\mathcal{A} \neq \emptyset$, let A be any $\succeq$-minimal element of $\mathcal{A}$; if $\mathcal{B} \neq \emptyset$ let B be any $\succeq$-maximal element of $\mathcal{B}$. (Such minimal and maximal elements exist because Ω is finite.) For each lottery $\Gamma = \sum p_i \omega_i \in L(\Omega)$ write

$$\Gamma_{\mathcal{A}} = \sum_{\omega_i \in \mathcal{A}} p_i \omega_i \ ; \ \ \Gamma_{\mathcal{B}} = \sum_{\omega_i \in \mathcal{B}} p_i \omega_i \ ; \ \ \Gamma_{\mathcal{X}} = \sum_{\omega_i \in \mathcal{X}} p_i \omega_i \ ; \ x(\Gamma) = \sum_{\omega_i \in \mathcal{X}} p_i$$

Evidently, $\Gamma = \Gamma_{\mathcal{A}} + \Gamma_{\mathcal{B}} + \Gamma_{\mathcal{X}}$. (If $\mathcal{A}$ or $\mathcal{B}$ is empty, then the corresponding sum is 0.)

We now distinguish three cases that are parallel to the three cases considered above, and carry out constructions parallel to those above.

- **Case (i) $\mathcal{A} \neq \emptyset$ and $\mathcal{B} \neq \emptyset$:** As before, define auxiliary functions $f, g : L(\Omega) \to \mathbb{R}$

$$\begin{aligned} f(\Gamma) &= u(\Gamma_{\mathcal{A}} + x(\Gamma)A + \Gamma_{\mathcal{B}}) \\ g(\Gamma) &= u(\Gamma_{\mathcal{A}} + x(\Gamma)B + \Gamma_{\mathcal{B}}) \end{aligned}$$

  For each $\lambda \in (0,1)$, define $u; L(\Omega) \to [0,1]$ by

$$u_\lambda(\Gamma) = \lambda f(\Gamma) + (1-\lambda)g(\Gamma)$$

  and let $\succeq_\lambda$ be the preference relation on $L(\Omega)$ induced by u_λ. Just as before, we see that, for every λ, the preference relation $\succeq_\lambda$ is Complete, Continuous and Transitive, that it obeys State Monotonicity, and that it agrees with $\succeq$ on Ω and on $L(P)$. And, just as before, we see that there is some λ^* for which $\succeq_{\lambda^*} \neq \succeq$. This completes the construction in Case (i).

- **Case (ii) $\mathcal{A} = \emptyset$ and $\mathcal{B} \neq \emptyset$:** Because there are at least two inequivalent personal states, we can choose $B' \in \mathcal{B}$ with $B \succ B'$. Continuity guarantees there is some $\nu \in (0,1)$ for which $B \sim \nu X + (1-\nu)B'$. Choose $\lambda > 0$ so that $u(\nu B + (1-\nu)B') - \lambda\nu \neq u(B)$ and set

$$U(\Gamma) = u(x(\Gamma)B + \Gamma_{\mathcal{B}}) - \lambda x(\Gamma)$$

  It is easily checked that the preference relation $\succeq_U$ induced by U satisfies all the desired axioms, and that, because $U(\nu X + (1-\nu)B') = u(\nu B + (1-\nu)B') \neq u(B)$, we conclude that $\succeq_U \neq \succeq$. This completes the construction in Case (ii).

- **Case (iii) $\mathcal{A} \neq \emptyset$ and $\mathcal{B} = \emptyset$:** Because there are at least two inequivalent personal states, we can choose $A' \in \mathcal{A}$ for which $A' \succ A$. Continuity guarantees there is some $\eta \in (0,1)$ for which $A \sim \eta A' + (1-\eta)X$. Choose $\lambda > 0$ for which $u(\eta A' + (1-\eta)A) + \lambda\eta \neq u(A)$ and set

$$U(\Gamma) = u(\Gamma_{\mathcal{A}} + x(\Gamma)A) + \lambda x(\Gamma)$$

  It is easily checked that the preference relation $\succeq_U$ induced by U satisfies all the desired axioms, and that because $U(\eta A' + (1-\eta)X) = u(\eta A' + (1-\eta)A) + \lambda\eta \neq u(A)$, we conclude that $\succeq_U \neq \succeq$. This completes the construction in Case (iii).

In each case we have constructed a preference relation that extends $\succeq_0$, satisfies all of our axioms and differs from $\succeq$; therefore the proof is complete. ■

Proof of Proposition 1 Let $\succeq^*$ be any preference relation on $L_\Pi(\Omega)$ that satisfies Completeness, Transitivity, Continuity, and State Monotonicity, and for which the restriction of $\succeq^*$ to Ω agrees with $\succeq_\Omega$ and the restriction of $\succeq^*$ to $L_\Pi(P)$ agrees with $\succeq_{L_\Pi(P)}$. We must show that $\succeq^*$ agrees with $\succeq$.

By assumption, for every social state there is some (not necessarily unique) personal state $\tilde{\omega} \in P$ for which $\omega \sim_\Omega \tilde{\omega}$. By assumption, the restriction of $\succeq^*$ to Ω agrees with the restriction of $\succeq$ to Ω so $\omega \sim^* \tilde{\omega}$. State Monotonicity implies that if $(p_1, \ldots, p_k) \in \Pi$ and $\omega_1, \ldots, \omega_k \in \Omega$ then

$$\sum p_i \omega_i \sim \sum p_i \tilde{\omega}_i \text{ and} \sum p_i \omega_i \sim^* \sum p_i \tilde{\omega}_i.$$

Now fix any pair of lotteries $\sum p_i \omega_i, \sum q_j \omega_j \in L_\Pi(\Omega)$. We obtain the following chain of equivalences:

$$\begin{array}{lll} \sum p_i \omega_i & \succeq^* & \sum q_j \omega_j \\ & \Updownarrow & \\ \sum p_i \tilde{\omega}_i & \succeq^* & \sum q_j \tilde{\omega}_j \\ & \Updownarrow & \\ \sum p_i \tilde{\omega}_i & \succeq_{L_\Pi(P)} & \sum q_j \tilde{\omega}_j \\ & \Updownarrow & \\ \sum p_i \omega_i & \succeq & \sum q_j \omega_j \end{array}$$

(The first equivalence follows from State Monotonicity and Transitivity for $\succeq^*$; the second equivalence follows from the assumption that $\succeq^*$ and $\succeq$ agree on $L_\Pi(P)$; the third equivalence follows from State Monotonicity and Transitivity for $\succeq$.) Taken together, this string of equivalences asserts that

$$\sum p_i \omega_i \succeq^* \sum q_j \omega_j \Longleftrightarrow \sum p_i \omega_i \succeq \sum q_j \omega_j.$$

Because this is true for all pairs of lotteries $\sum p_i \omega_i, \sum q_j \omega_j \in L_\Pi(\Omega)$, we conclude that $\succeq^* = \succeq$, as asserted. ■

Proof of Proposition 2 Fix a budget line $\mathcal{B} \in \mathbb{B}$. By definition, $\langle x, y \rangle \in \arg\max_{\mathcal{B}}(\succeq_{\mathcal{PR}})$ in the Personal Risk domain if and only if $\langle x, y \rangle \succeq_{\mathcal{PR}} \langle \hat{x}, \hat{y} \rangle$ for every $\langle \hat{x}, \hat{y} \rangle \in \mathcal{B}$. Unwinding the notation, this means that

$$\langle x, y \rangle = \tfrac{1}{2}(0, x) + \tfrac{1}{2}(0, y) \succeq_{\mathcal{PR}} \tfrac{1}{2}(0, \hat{x}) + \tfrac{1}{2}(0, \hat{y}) = \langle \hat{x}, \hat{y} \rangle$$

for every $\langle \hat{x}, \hat{y} \rangle \in \mathcal{B}$. If preferences $\succeq_{\mathcal{SC}}$ are selfish $(x, y) \sim_{\mathcal{SC}} (0, y)$ for all (x, y); this is true if and only if

$$[x, y] = \tfrac{1}{2}(y, x) + \tfrac{1}{2}(x, y) \succeq_{\mathcal{SR}} \tfrac{1}{2}(\hat{y}, \hat{x}) + \tfrac{1}{2}(\hat{x}, \hat{y}) = [\hat{x}, \hat{y}]$$

for every $[\hat{x}, \hat{y}] \in \mathcal{B}$. We conclude that preferences $\succeq_{\mathcal{PR}}$ in the Personal Risk domain coincide with preferences $\succeq_{\mathcal{SR}}$ in the Social Risk domain. Given that preferences in the two domains coincide, choice behavior coincides as well. ■

Proof of Proposition 3 Assume preferences $\succeq_{\mathcal{SC}}$ in the SOCIAL CHOICE domain are symmetric. Consider two choices $[x, y]$ and $[\hat{x}, \hat{y}]$ in the SOCIAL RISK domain and assume that $[\hat{x}, \hat{y}] \succ_{\mathcal{SR}} [x, y]$. Expressed explicitly in terms of lotteries, this means

$$\tfrac{1}{2}(\hat{x}, \hat{y}) + \tfrac{1}{2}(\hat{y}, \hat{x}) \succ_{\mathcal{SR}} \tfrac{1}{2}(x, y) + \tfrac{1}{2}(y, x).$$

State Monotonicity implies that either $(\hat{x}, \hat{y}) \succ_{\mathcal{SC}} (x, y)$ or $(\hat{y}, \hat{x}) \succ_{\mathcal{SC}} (y, x)$; Impartiality implies that if either of these is true then both are true. Hence, if $[\hat{x}, \hat{y}] \succ_{\mathcal{SR}} [x, y]$ in the SOCIAL RISK domain then $(\hat{x}, \hat{y}) \succ_{\mathcal{SC}} (x, y)$ in the SOCIAL CHOICE domain. Conversely if $(\hat{x}, \hat{y}) \succ_{\mathcal{SC}} (x, y)$ in the SOCIAL CHOICE domain then

$$\tfrac{1}{2}(\hat{x}, \hat{y}) + \tfrac{1}{2}(\hat{y}, \hat{x}) \succ_{\mathcal{SR}} \tfrac{1}{2}(x, y) + \tfrac{1}{2}(y, x).$$

That is: $[\hat{x}, \hat{y}] \succ_{\mathcal{SR}} [x, y]$ in the SOCIAL RISK domain. Putting these together we conclude that preferences $\succeq_{\mathcal{SC}}$ in the SOCIAL CHOICE domain coincide with preferences $\succeq_{\mathcal{SR}}$ in the SOCIAL RISK domain. Given that preferences in the two domains coincide, choice behavior coincides as well. ∎

Proof of Theorem 2 **Sufficiency** If every social state is indifferent to some personal state, then Theorem 1 tells us that $\succeq$ is the unique extension of $\succeq_0$ that satisfies our axioms, so it is certainly the unique extension of $\succeq_1$ that satisfies our axioms. Hence this condition is sufficient.

Necessity If there is some social state X that the $\mathcal{DM}$ does *not* find indifferent to any personal state, we need to construct a preference relation that agrees with $\succeq$ on $L(P) \cup \Omega$ but not on all of $L(\Omega)$; the argument is almost the same as in the proof of Theorem 1, but with a small twist. As in the proof of Theorem 1, we will need to ensure that the preference relation we construct obeys Continuity and State Monotonicity. As before, we use Debreu's (1954) representation theorem to find a continuous utility function $u : L(\Omega) \to [0, 1]$ that represents $\succeq$. We construct a new utility function $U : L(\Omega) \to [0, 1]$ that agrees with u on $L(P) \cup \Omega$—and hence induces the same preference ordering as $\succeq_1$ on $L(P) \cup \Omega$—but does not induce the same ordering as $\succeq$ on $L(\Omega)$.

As before, define $\mathcal{A}, \mathcal{B}, \mathcal{X}$ to be the sets of social states that are strictly preferred to X, strictly dis-preferred to X and indifferent to X, respectively. If $\mathcal{A} \neq \emptyset$, let $A \in \mathcal{A}$ be a minimal element; if $\mathcal{B} \neq \emptyset$, let $B \in \mathcal{B}$ be a maximal element. For each lottery $\Gamma = \sum p_i \omega_i \in L(\Omega)$ define $\Gamma_{\mathcal{A}}$, $\Gamma_{\mathcal{B}}$, $\Gamma_{\mathcal{X}}$ and $x(\Gamma)$ exactly as before and note, as before, that $\Gamma = \Gamma_{\mathcal{A}} + \Gamma_{\mathcal{B}} + \Gamma_{\mathcal{X}}$.

We distinguish the same three cases as in Theorem 1; the arguments for Case (ii) and Case (iii) are identical to those in the proof of Theorem 1, but the argument for Case (i) requires a twist because we must be careful to construct the utility function U to preserve the relationship between the social state X (and all those social states in $\mathcal{X}$ that are indifferent to X) and personal *lotteries*, as well as personal *states*. (No additional care is required in Case (ii) because X is preferred to all personal lotteries, or in Case (iii) because X is dis-preferred to all personal lotteries.)

Assume therefore that neither $\mathcal{A}$ nor $\mathcal{B}$ is empty (so that we are in Case (i)). Use Continuity to choose $\gamma, \zeta \in (0,1)$ such that

$$X \sim \gamma A + (1-\gamma)B$$
$$\tfrac{1}{2}A + \tfrac{1}{2}X \sim \zeta A + (1-\zeta)B.$$

As before, define auxiliary functions $f, g : L(\Omega) \to \mathbb{R}$ by

$$f(\Gamma) = u(\Gamma_{\mathcal{A}} + x(\Gamma)A + \Gamma_{\mathcal{B}})$$
$$g(\Gamma) = u(\Gamma_{\mathcal{A}} + x(\Gamma)B + \Gamma_{\mathcal{B}}).$$

We are no longer free to choose U to be an arbitrary convex combination $U = \lambda f + (1-\lambda)g$ because we require

$$U(X) = U(\gamma A + (1-\gamma)B) = u(\gamma A + (1-\gamma)B).$$

This would completely determine λ and it might happen that, for this particular λ, the preference relation $\succeq_U$ coincides with $\succeq$. To get around this, we need to combine f, g in a different way.

Let $H : [0,1] \times [0,1] \to [0,1]$ be any continuous function which is strictly increasing in each variable separately and for which $H(s,s) = s$ for every $s \in [0,1]$. (Note that for any $\lambda \in (0,1)$ the the function $H(s,t) = \lambda s + (1-\lambda)t$ has these properties.) Given such an H, define a utility function U_H on $L(\Omega)$ by

$$U_H(\Gamma) = H\left(f(\Gamma), g(\Gamma)\right)$$

and let $\succeq_H$ be the preference relation on $L(\Omega)$ induced by U_H. Because U_H is a function, the preference relation $\succeq_H$ is Complete and Transitive. Because f, g, H are all continuous, so is U_H, and hence the preference relation $\succeq_H$ is continuous. Because H is strictly increasing in each variable separately, the preference relation $\succeq_H$ respects FOSD. Because $H(s,s) = s$ for every $s \in [0,1]$, $U_H(\Gamma) = u(\Gamma)$ for every $\Gamma \in L(\Omega)$ and $U_H(\omega) = u(\omega)$ for every $\omega \in \Omega$, so $\succeq_H$ is an extension of $\succeq_1$.

It remains only to choose an appropriate function H for which $\succeq_H \neq \succeq$; this is easy to do. (Indeed there are infinitely many such functions.) For each $\alpha, \beta \in (0,1)$ define the function $H_{\alpha,\beta} : [0,1] \times [0,1] \to [0,1]$ by

$$H_{\alpha,\beta}(s,t) = \tfrac{1}{2}\left[\alpha s^2 + (1-\alpha)t^2\right]^{1/2} + \tfrac{1}{2}\left[\beta s + (1-\beta)t\right].$$

Note that

$$f(X) = u(A) > u(X) = u(\gamma A + (1-\gamma)B > u(B) = g(X)$$

and

$$f(X) = u(A) > u(\tfrac{1}{2}A + \tfrac{1}{2}X) > u(\tfrac{1}{2}A + \tfrac{1}{2}B) > u(B) = g(X).$$

Choose the parameters α, β so that

$$\begin{aligned} U_{H_{\alpha,\beta}}(X) &= H_{\alpha,\beta}(f(X), g(X)) \\ &= u(X). \\ U_{H_{\alpha,\beta}}(\tfrac{1}{2}A + \tfrac{1}{2}X) &= H_{\alpha,\beta}(u(A), u(\tfrac{1}{2}A + \tfrac{1}{2}B)) \\ &\neq u(\zeta A + (1-\zeta)B) \\ &= u(\tfrac{1}{2}A + \tfrac{1}{2}X). \end{aligned}$$

For such a choice of α, β the preference relation $\succeq_{H_{\alpha,\beta}}$ is an extension of $\succeq_1$ that differs from $\succeq$, as desired. ■

Proof of Theorem 3 Sufficiency The argument for sufficiency is parallel to the argument for sufficiency in Theorem 1, except that we substitute personal lottery equivalents for personal state equivalents.

Necessity Assume that every social state ω admits a personal lottery equivalent. We must show that $\succeq$ is the unique preference relation that is Complete, Continuous, Transitive, obeys the Independence Axiom and agrees with $\succeq_1$ on $L(P) \cup \Omega$. To this end, suppose $\succeq^*$ is any such preference relation; we must show that $\succeq^* = \succeq$; that is, for every pair of lotteries $\sum p_i\omega_i$ and $\sum q_i\omega_i$ we have the equivalence

$$\sum p_i\omega_i \succeq \sum q_i\omega_i \iff \sum p_i\omega_i \succeq^* \sum q_i\omega_i.$$

By assumption, each social state ω_i admits a personal state equivalent Γ_ω; that is, $\omega_i \sim_1 \Gamma_\omega$. Because $\succeq$ and $\succeq^*$ agree with $\succeq_1$ on $L(P) \cup \Omega$, it follows that $\omega_i \sim \Gamma_{\omega_i}$ and $\omega_i^* \!\sim \Gamma_{\omega_i}$. Independence implies that $\sum p_i\omega_i \sim \sum p_i\Gamma_{\omega_i}$ and $\sum q_i\omega_i \sim \sum q_i\Gamma_{\omega_i}$; Independence of $\succeq^*$ implies that

$$\sum p_i\omega_i \sim^* \sum p_i\Gamma_{\omega_i} \text{ and} \sum q_i\omega_i \sim^* \sum q_i\Gamma_{\omega_i}.$$

Transitivity provides a chain of equivalences:

$$\begin{array}{ccc} \sum p_i\omega_i & \succeq & \sum q_i\omega_i \\ & \Updownarrow & \\ \sum p_i\Gamma_{\omega_i} & \succeq & \sum q_i\Gamma_{\omega_i} \\ & \Updownarrow & \\ \sum p_i\Gamma_{\omega_i} & \succeq_1 & \sum q_i\Gamma_{\omega_i} \\ & \Updownarrow & \\ \sum p_i\Gamma_{\omega_i} & \succeq^* & \sum q_i\Gamma_{\omega_i} \\ & \Updownarrow & \\ \sum p_i\omega_i & \succeq^* & \sum q_i\omega_i \end{array}$$

It follows that $\sum p_i\omega_i \succeq \sum q_i\omega_i$ if and only if $\sum p_i\omega_i \succeq^* \sum q_i\omega_i$. Because the lotteries $\sum p_i\omega_i, \sum q_i\omega_i$ were arbitrary, we conclude that $\succeq = \succeq^*$, as asserted. ■

2 Additional analysis and results

We here provide additional analysis and results referred to in the main text.

2.1 Supplementary descriptives on participants

Table 2 provides summary statistics on the background of participants.

[Table 2 about here]

2.2 Order effects

In the experiment, subjects first faced the Social Risk domain. The order of the other experimental domains—Personal Risk and Social Choice—was counterbalanced across sessions to balance out domain order effects. As mentioned, we also included an Observer treatment in which each subject faced the same menu of 50 budget lines representing monetary payoffs for two *others*. However, since this treatment does not offer testable implications for our theory, we do not use it in our analysis.

To verify that our counterbalancing of treatment sequences—including the Observer treatment—was effective, we conducted the following test: For each subject, we calculate the average—across all 50 choices—fraction of tokens kept by *self* in the Social Choice domain, and the average fraction of tokens allocated to the *cheaper* account (that is, to x when $p_x < p_y$ and to y otherwise) in the Personal Risk and Social Risk domains. If there are no order effects, these individual-level averages should be independent of the sequence in which the treatments were presented.

Since the Social Risk domain was presented first to all subjects, there cannot be any order effects influencing the choices in this domain. Similarly, there cannot be any order effects influencing the choices in the treatment presented second, following the Social Risk domain, across the two sequences in which it is presented second. Therefore, there are five relevant sequences for each treatment—Personal Risk, Social Choice and Observer. Using the Kruskal–Wallis nonparametric rank-sum test, we can rule out any order effects: $\chi^2_4 = 1.154$ (p-value $= 0.886$) in Personal Risk, $\chi^2_4 = 5.789$ (p-value $= 0.216$) in Social Choice, and $\chi^2_4 = 2.416$ (p-value $= 0.660$) in Observer.

2.3 Extending the test

The main text presents the non-parametric test for equality of preferences for the case of two domains ($K = 2$). We here show how a version of this test can be applied to study symmetry of preferences, and how it can be generalized to K domains.

2.3.1 Symmetry of preferences

We test for symmetry of preferences without requiring that the original choices satisfy GARP. Our approach is related to Chambers (2018), which proposes a joint test of GARP and symmetry of preferences using a concatenated dataset (the original data set concatenated to the mirrored one).

Formally, consider an individual's actual decision (x, y) from a budget set defined by prices (p_x, p_y) and the total restriction on expenditure (M): (p_x, p_y, M). Symmetry of preferences imply that for each budget set, the mirrored choice (y, x) is chosen on the mirror budget line (p_y, p_x, M).

Consider now an original dataset with N budget sets. We can construct 2^N permutations of this dataset, with each budget set either being represented by the actual or the mirrored data. For each of these datasets, we can calculate the CCEI. The original dataset can be considered a random realization from this distribution, and we can thus calculate a p-value based on how far to the right the actual CCEI (e^{actual}) is in the distribution F of the CCEI. The p-value is $P(E \geq e^{\text{actual}})$, with E representing the CCEI under the null hypothesis of symmetry.

Let $\widehat{F}$ represent the empirical distribution function of the CCEI, calculated on a random subset of the permuted datasets. We can now test the null hypothesis of symmetry using $p = 1 - \widehat{F}(e^{\text{actual}} - \varepsilon)$.[2]

2.3.2 Equality of preferences: K groups

In the paper, we focus on a non-parametric test of whether the preferences are the same in two domains, $K = 2$. This test can be extended to cover any number of domains $K > 2$, which implies that it also can be used to test for whether there is equality of preferences across all the three domains in the experiment (Social Choice, Social Risk, and Personal Risk).

The test relies on there being K realizations of a choice on the same budget set (for which the interpretation of the axes differ). For each budget set, under the null hypothesis of equality of preferences, these K decisions are exchangeable, and with N decisions from each of K domains, we can create K^N permuted datasets of decisions, $\{(\mathbf{p}^i, \mathbf{x}^i)\}_{i=1}^N$. We can calculate the CCEI score for each permuted dataset and construct a distribution F of CCEI scores under the null hypothesis that the preferences are the same in all K domains.

The CCEI for each of the K actual domain-specific datasets, $e_1, e_2, \ldots, e_K$, can be considered random realizations from the distribution F. Let $e^+ = \max_k e_k$ and $e^- = \min_k e_k$ be the minimum and the maximum realized CCEI. The p-values can now be calculated based on how far to the right the maximum and minimum realized CCEI are in the distri-

[2] ε is a small positive number that allows for there being discrete jumps in the distribution function $\widehat{F}$ when we replace $P(E \geq e^{\text{actual}})$ with $1 - P(E < e^{\text{actual}})$, where the second term requires a strong inequality and the first term only a weak inequality.

bution F:

$$\begin{aligned}
p_{e^+} &= P(\max_k e_k \geq e^+), \\
&= 1 - P(\max_k e_k < e^+), \\
&= 1 - P(e_1 < e^+, e_2 < e^+, \ldots, e_K < e^+), \\
&= 1 - \left(P(e_1 < e^+) \cdot P(e_2 < e^+) \cdot \ldots \cdot P(e_K < e^+)\right), \\
&= 1 - \left(\lim_{\epsilon \downarrow 0} F(e^+ - \epsilon)\right)^K, \\
&\approx 1 - \left(F(e^+ - \varepsilon)\right)^K,
\end{aligned}$$

and

$$\begin{aligned}
p_{e^-} &= P(\min_k e_k \geq e^-), \\
&= P(e_1 \geq e^-, e_2 \geq e^-, \ldots, e_K \geq e^-), \\
&= \left(1 - P(e_1 < e^-)\right) \cdot \left(1 - P(e_2 < e^-)\right) \cdot \ldots \cdot \left(1 - P(e_K < e^-)\right), \\
&= \left(1 - \lim_{\epsilon \downarrow 0} F(e^- - \epsilon)\right)^K, \\
&\approx \left(1 - F(e^- - \varepsilon)\right)^K.
\end{aligned}$$

Let $\widehat{F}$ represent the empirical distribution function of the CCEI, calculated on a random subset of the permuted datasets. We can now test the null hypothesis of equality of preferences across the K domains using $p^- = (1 - \widehat{F}(e^+ - \varepsilon))^K$ and $p^+ = (1 - \widehat{F}(e^+ - \varepsilon))^K$.[3]

Applying the Bonferroni-correction to the two p-values, the joint p-value, is given by:

$$\min\{2 \min\{p_{e^-}, p_{e^+}\}, 1\}.$$

2.4 Additional results

Table 3 replicates Table 1B from the main paper, but imposing the additional restriction that preferences are symmetric. We impose symmetry by pre-processing the data for the tests. Instead of having 50 decisions per domain per subject, we create the 50 mirrored observations (if (x, y) are chosen at prices (p_1, p_2), the mirrored data is that (y, x) at prices $p_2, p_1,$) and add these to the individual data such that there are 100 observations per domain involved in the tests.

[3] ε is also in this case a small positive number that allows for there being discrete jumps in the distribution function $\widehat{F}$.

Table 2: Descriptive statistics on participants

	Statistics	
	mean	sd
Age (in years)	22.8	3.2
Gender (male)	0.587	0.493
Business school	0.634	0.483
Political view (left-right)	4.42	1.22
Yearly expenditures (in 1000 NOK)	136	192
Parental income (categories in 1000 NOK):		
0–250	0.058	0.234
250–500	0.098	0.298
500–750	0.141	0.349
750–1000	0.268	0.444
1000–1250	0.163	0.370
1250–1500	0.069	0.254
1500+	0.203	0.403
Number of observations	276	

Note: The table reports background characteristics of the participants based on a post-experiment survey. "Age" is in years. There were a few older participants that might have been identifiable from their reported age. To control disclosure risk, age was censored at 30 years: those with age 30 years and above ($n = 8$) are represented with their reported group average of 36 years. "Gender (male)," and "Business school" are both indicator variables, "Business school" indicates the session was run at NHH Norwegian School of Economics (and not at the University of Bergen). Political view is measured on a 1–7 scale: "1: very left wing" and "7: very right wing" (with 5 non-responding participants). Yearly expenditure is the participant's self-reported own expenditures in the previous calendar year (with 13 non-responding participants), Parental income is the participant's estimate of the total (gross) income of their parents.

Table 3: Population-level summaries of the individual-level test results for symmetric preferences

		1% significance level				5% significance level				10% significance level			
Classification	n	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
V	19	0.316	0.158	0.105	0.316	0.421	0.211	0.105	0.368	0.474	0.368	0.158	0.368
	257	0.374	0.840	0.903	0.942	0.451	0.868	0.914	0.942	0.498	0.879	0.922	0.949
VI	30	0.267	0.267	0.300	0.433	0.400	0.267	0.300	0.467	0.433	0.367	0.333	0.467
	246	0.382	0.858	0.915	0.955	0.455	0.890	0.927	0.955	0.504	0.902	0.935	0.963
VII	33	0.303	0.303	0.303	0.455	0.455	0.333	0.303	0.485	0.485	0.424	0.333	0.485
	243	0.379	0.860	0.922	0.959	0.449	0.889	0.934	0.959	0.498	0.901	0.942	0.967
VIII	37	0.324	0.297	0.324	0.459	0.459	0.351	0.324	0.486	0.486	0.432	0.378	0.514
	239	0.377	0.870	0.929	0.967	0.448	0.895	0.941	0.967	0.498	0.908	0.946	0.971

Note: The test results reported in Table 1B for symmetric preferences—using the union of the data and the mirror-image data—for the subjects we classify as impartial/non-impartial) based on their choices in the Social Choice domain. The columns of each panel report the percent of subjects for whom we can reject the null that preferences coincide: (1) $\succeq_{\mathcal{PR}}=\succeq_{\mathcal{SR}}$, (2) $\succeq_{\mathcal{SC}}=\succeq_{\mathcal{SR}}$, (3) $\succeq_{\mathcal{PR}}=\succeq_{\mathcal{SC}}$, (4) $\succeq_{\mathcal{SC}}=\succeq_{\mathcal{PR}}=\succeq_{\mathcal{SR}}$. The test of the theoretical predictions reported in column (2) are presented in bold type. Top entry at each cell is for the impartial subjects and the bottom entry is for the non-impartial subjects. We classify a subject as impartial if in the Social Choice domain (V) $0.45 < y/(x+y) < 0.55$, and (VI)-(VIII) using the nonparametric test that preferences $\succeq_{\mathcal{SC}}$ in the Social Choice domain are symmetric using 10%, 5%, and 1% significance levels, respectively.

3 General introduction given to participants

This section repeats the general introduction that were read to participants (but also available on paper). Section 4 includes the treatment specific texts the participants could reference for each treatment. Attached at the end (as Figure C4 and Figure C5) is a general questionnaire that participants answered.

Leader reads on signal.

Welcome. My name is . . . and I will lead this session. Since the results from this experiment will be used in a research project, we ask you to follow the rules of conduct that you have on your desk:

- Please do not communicate with other participants during the experiment.
- If you have questions, raise your hand and we will assist you.
- Visiting websites during the experiment is not allowed.
- Using your mobile phone is not allowed during the experiment.
- If you fail to comply with these rules, you might be asked to leave the experiment without compensation.

I am now going to read the instructions for this experiment. These instructions are also available to you on your desk. This is an experiment in decision-making. Your payoffs will depend partly on your decisions, the decisions of other participants, and partly on chance. Funding for this experiment has been provided by public and private research foundations. Please pay careful attention to the instructions as a considerable amount of money is (potentially) at stake.

Your participation in the experiment and any information about your payoffs will be kept strictly confidential. Each participant is assigned a participant ID number. This number will be used to record all data. Neither the experimenters nor the other participants will be able to link you to any of your decisions. Neither your name nor any other identifying information about you will be used in any final reports of the study.

The entire experiment should be complete within one and a half to two hours. Your earnings in the experiment will be 100 NOK as a participation fee (simply for showing up on time) plus whatever you earn in the experiment. You will be paid privately according to your participant ID number at the end of the experiment. Details of how you will make decisions and receive payments will be provided below.

During the experiment we will speak in terms of experimental tokens instead of NOK. Your earnings will be calculated in terms of tokens and then translated at the end of the experiment into NOK at the following rate:

1 Token = 1.20 NOK

If you have any questions, please raise your hand and a research assistant will approach your desk.

Once the experiment begins, we ask everyone to remain silent. In order to keep your decisions private, please do not reveal your choices to any other participant. Also, make sure to not close the program window at any time during the experiment.

3.1 The computer program

The experiment has four parts.[4]

In each part of the experiment, you will participate in 50 independent decision problems that share a common form. This section describes in detail the process that will be repeated in all decision problems and the computer program that you will use to make your decisions. An example of the computer dialog window is shown in Attachment 1.[5]

Leader waits till everyone has found Attachment 1.

In each decision problem, you will be asked to allocate tokens between two accounts, labeled x and y. The x account corresponds to the x-axis (the horizontal axis) and the y account corresponds to the y-axis (the vertical axis) on a two-dimensional graph. Each choice will involve choosing a point on a line representing possible token allocations. The instructions for each part will describe in detail how the payoff for each part of the experiment will be determined.

Each decision problem will start by having the computer select such a line randomly from the set of lines that intersect with at least one of the axes at 50 or more tokens but with no intercept exceeding 100 tokens. Examples of lines that you might face are shown in Attachment 2.[6] In each part of the experiment, the lines selected for you in different decision problems are independent of each other and of the lines selected for any of the other participants in their decision problems, and will not depend on your choices in any of the earlier decision problems.

[4] The paper "Linking Social and Personal Preferences: Theory and Experiment" only uses data from three of these four parts.

[5] Attachment 1 is enclosed as Figure C1

[6] Attachment 2 is enclosed as Figure C2.

In each choice, you may choose any x and y pair that is on the line. For example, as illustrated in Attachment 3, choice A represents a decision to allocate q tokens to the x account and r tokens to the y account. Similarly, choice B represents a decision to allocate w tokens to the x account and z tokens to the y account.[7]

To choose an allocation, use the mouse to move the pointer on the computer screen to the allocation that you desire. The computer will only allow you to choose x and y combinations that are on the line. When you are ready to make your decision, left-click to enter your chosen allocation. After that, confirm your decision by clicking on the Submit button. To move on to the next round, click the OK button. Once you have clicked the OK button, your decision cannot be revised.

Next, you will be asked to make a decision in another independent decision. This process will be repeated until all 50 decision problems in each part of the experiment are completed. At that point, you may have to wait for other participants to finish. Each part of the experiment will end after all participants have made all their decisions. At the end of each part of the experiment, you will receive further instructions. At the end the experiment, the computer will randomly select one of the 50 decision rounds from each of the four parts of the experiment to carry out for payoffs. The round selected from each part depends solely upon chance.

3.2 Round 1

You will now be given the instructions for part 1. Please raise your hand if you have any questions.[8]

> SA3 and 4 hands out Round 1 instructions. Everyone gets the same sheet.
>
> When the participants have finished reading the Round 1 instructions, and when nobody has more questions, leader starts Round 1.
>
> When all of the participants are finished with Round 1, the leader continues reading

You have now finished Part 1 of the experiment. We will now collect the instructions for Part 1.

> SA3 and 4 collects the papers for Round 1. Leader waits to read until SA3 and 4 has finished collecting the Round 1 instructions

[7] Attachment 3 is enclosed as Figure C3.

[8] The instructions that were handed out are presented in Section 4.

3.3 Part 2

You will now be given the instructions for part 2. Please raise your hand if you have any questions.

SA3 and 4 hands out Round 2 instructions. Different for every desk. Give correct sheet to correct desk.

When the participants have finished reading the Round 2 instructions, and when nobody has more questions, leader starts Round 2.

When all of the participants are finished with Round 2, the leader continues reading

You have now finished Part 2 of the experiment. We will now collect the instructions for Part 2.

SA3 and 4 collects the papers for Round 2. Leader waits to read until SA3 and 4 has finished collecting the Round 2 instructions

3.4 Part 3

You will now be given the instructions for part 3. Please raise your hand if you have any questions.

SA3 and 4 hands out Round 3 instructions. Different for every desk. Give correct sheet to correct desk.

When the participants have finished reading the Round 3 instructions, and when nobody has more questions, leader starts Round 3.

When all of the participants are finished with Round 3, the leader continues reading

You have now finished Part 3 of the experiment. We will now collect the instructions for Part 3.

SA3 and 4 collects the papers for Round 3. Leader waits to read until SA3 and 4 has finished collecting the Round 3 instructions

3.5 Part 4

You will now be given the instructions for part 4. Please raise your hand if you have any questions.

SA3 and 4 hands out Round 4 instructions. Different for every desk. Give correct sheet to correct desk.

When the participants have finished reading the Round 4 instructions, and when nobody has more questions, leader starts Round 4.

When all of the participants are finished with Round 4, the leader continues reading

You have now finished Part 4 of the experiment. We will now collect the instructions for Part 4.

SA3 and 4 collects the papers for Round 4. Leader waits to read until SA3 and 4 has finished collecting the Round 4 instructions

4 Instruction sheets handed out to participants

Treatment-specific instructions follow. In the headings, the domain name is included in small caps for reference, these were not shown to participants.

4.1 Instructions for part M (Social Risk)

For each allocation that you make to the x account and the y account in this part of the experiment, the computer will randomly (entirely dependent upon chance) select one of the accounts, x or y. It is equally likely that account x or account y will be chosen. You will receive the number of tokens you allocated to the account that was chosen. Another person, who will be chosen at random from the group of participants in the experiment, will receive the number of tokens you allocated to the other account.

You will also receive the tokens allocated to a randomly chosen account by a third person, where the third person is chosen at random from the group of participants in the experiment. The computer will make sure that the participant to whom you allocate tokens does not allocate tokens to you as a third person (and vice versa). Neither you nor any other participants will observe who allocated tokens to whom or which account was chosen in any decision round, that is, the choices of all participants are anonymous in the experiment.

Your earnings for this part of the experiment will be determined as follows. At the end of the experiment, the computer will randomly select one of the 50 decision rounds to carry out for payoffs. The round selected depends solely upon chance. You will then be paid the tokens you allocated to the account that was chosen for you in this round. In addition, you will also be paid the tokens that the randomly chosen third person allocated to the account that was not chosen for her or him in this round. You will therefore be paid two groups of tokens: one based on your own decision to allocate tokens and one based on the decision of another random participant to allocate tokens.

For example, suppose that in the round the computer randomly selects to carry out for payoffs, you chose allocation A, as illustrated in Attachment 3. Additionally, suppose that the computer chose the y account for you in your decision problem. In that case, you will be paid r tokens from your own y account and the recipient will be paid q tokens from the x account. The payment to you from the choice paid by the third person in the selected round is determined in the same way. At the end of the experiment, the tokens paid to you from the selected round will be converted into money. Recall that each token will be worth 1.20 NOK. At the end of this part of the experiment, you will receive further instructions.

4.2 Instructions for part D (Social Choice)

For each allocation of tokens to the x account and the y account that you make in this part of the experiment, you will receive the number of tokens in your y account. Another person, who will be chosen at random (entirely dependent upon chance) from the group of participants in the experiment, will receive the number of tokens in your x account.

You will also receive the tokens allocated to the x account by a third person, where the third person is chosen at random from the group of participants in the experiment. The computer will make sure that the participant to whom you allocate tokens does not allocate tokens to you as a third person (and vice versa). Neither you nor any other participant will observe who allocated tokens to whom in any decision round, that is, the choices of all participants are anonymous in the experiment.

Your earnings for this part of the experiment will be determined as follows. At the end of the experiment, the computer will randomly select one of the 50 decision rounds to carry out for payoffs. The round selected depends solely upon chance. You will then be paid the tokens you allocated to the y account in this round. In addition, you will also be paid the tokens that the randomly chosen third person allocated to her or his x account in this round. You will therefore be paid two groups of tokens: one based on your own decision to allocate tokens and one based on the decision of another random participant to allocate tokens.

For example, suppose that in the round the computer chose to carry out for payoffs, you chose allocation A, as illustrated in Attachment 3. In that case you would be paid r tokens from your own y account and the recipient will be paid q tokens from the x account. The payment to you from the choice paid by the third person in the selected round is determined in the same way. At the end of the experiment, the tokens paid to you from the selected round will be converted into money. Recall that each token will be worth 1.20 NOK. At the end of this part of the experiment, you will receive further instructions.

4.3 Instructions for part R (Personal Risk)

For each allocation that you make in this part of the experiment in the x account and the y account, the computer will randomly (entirely dependent upon chance) select one of the accounts, x or y. It is equally likely that account x or account y will be chosen. You will only receive the number of tokens you allocated to the account that was chosen. The tokens you allocated to the other account will be lost (not allocated to anyone).

Your earnings for this part of the experiment will be determined as follows. At the end of the experiment, the computer will randomly select one of the 50 decision rounds to carry out for payoffs. The round selected depends solely upon chance. You will only be paid the number of tokens you allocated to the account that was chosen in this round. These are the only tokens you will be paid from this part of the experiment. Recall that it is equally likely that account x or account y will be chosen.

For example, suppose that in the round the computer chose to carry out for payoffs, you chose allocation A, as illustrated in Attachment 3, and that the computer chose account x for you in that round. In that case you would be paid q tokens in total. Similarly, if the computer chose the account y for you in that round then you would be paid r tokens in total. At the end of the experiment, the tokens will be converted into money. Recall that each token will be worth 1.20 NOK. At the end of this part of the experiment, you will receive further instructions.

4.4 Instructions for part O (Observer)

For each allocation that you make in this part of the experiment to the x account and the y account, two other participants chosen at random (entirely dependent upon chance) from the group of participants in the experiment will receive tokens. One participant will receive the tokens you allocated to the x account; another participant will receive the tokens you allocated to the y account.

You will receive the tokens a third person allocated to the x account and a fourth person allocated to the y account. These persons will also be chosen at random from the group of participants in the experiment. The computer will make sure that the participant to whom you allocate tokens does not allocate tokens to you as a third or fourth person (and vice versa). Neither you nor any other participants will observe who allocated tokens to whom, that is, the choices of all participants are anonymous in the experiment.

In this part of the experiment, your earnings are not determined by your own choices, but by the choices made by the randomly chosen third and fourth person. Your choices, however, will determine the earnings of two other randomly chosen participants. At the end of the experiment, the computer will randomly select one of the 50 decision rounds to carry out for payoffs. You will then be paid the tokens that the randomly chosen third person allocated to the x account and the randomly chosen fourth person allocated to the y accounts in this round. In the same way, two other randomly chosen participants will be paid what you allocated to the x account and y account in this round, respectively.

For example, suppose that in the round the computer chose to carry out for payoffs, you chose allocation A, as illustrated in Attachment 3. In that case, two other participants will be paid r tokens and q tokens, respectively. The payment to you from the choices made by the third person and the fourth person in the selected round is determined in the same way. At the end of the experiment, the tokens will be converted into money. Recall that each token will be worth 1.20 NOK. At the end of this part of the experiment, you will receive further instructions.

Attachment 1

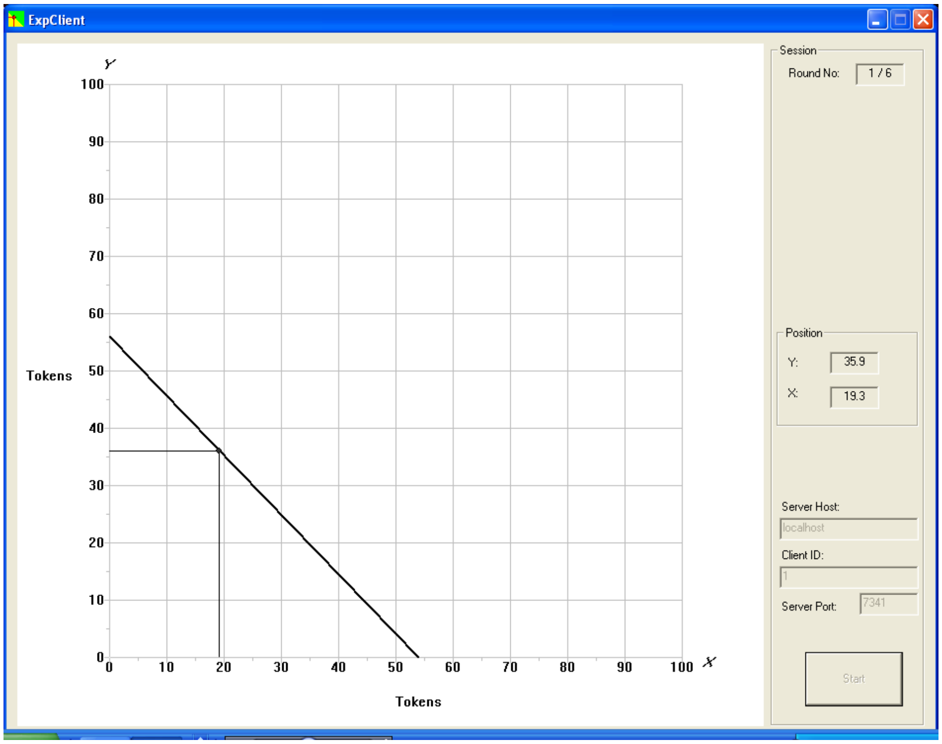

Figure C1: Attachment 1, referenced in the instructions

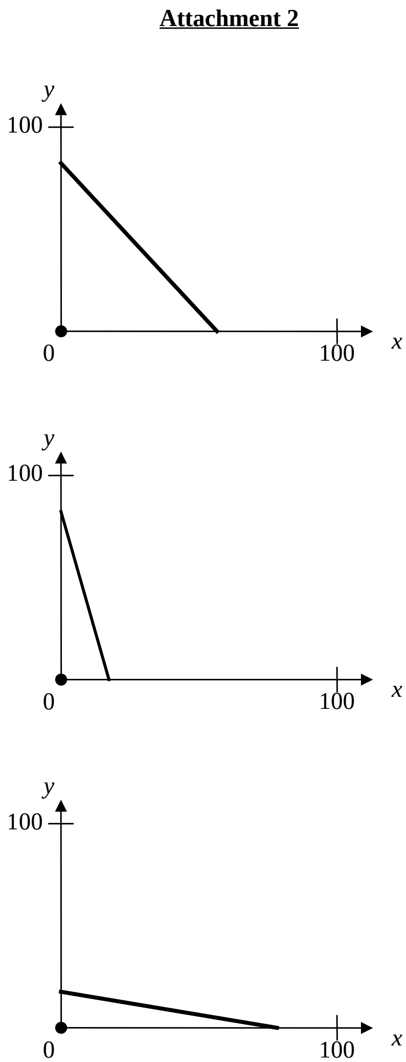

Figure C2: Attachment 2, referenced in the instructions

Attachment 3

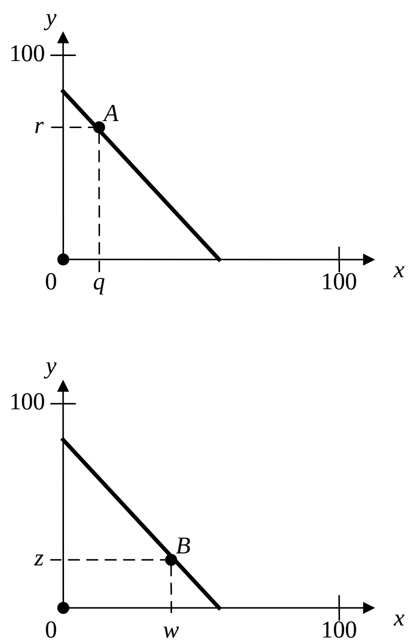

Figure C3: Attachment 3, referenced in the instructions

Session:
Desk:

Small survey

1. What is your age in years? ________

2. What is your gender? (M/F) ________

3. What is your best estimate of your total expenditures the previous calendar year (2012)?

   ____

4. What is the total (gross) income of your parents? Please make your best guess and tick off the corresponding circle.

   O 0 to less than 250 000 NOK
   O 250 000 to less than 500 000 NOK
   O 500 000 to less than 750 000 NOK
   O 750 000 to less than 1 000 000 NOK
   O 1 000 000 to less than 1 250 000 NOK
   O 1 250 000 to less than 1 500 000 NOK
   O 1 500 000 NOK or more

Please indicate how much you agree or disagree with the following statements by circling the corresponding number.

5. A society should aim at equalizing incomes.

Disagree completely	Disagree	Neither agree nor disagree	Agree	Agree completely
1	2	3	4	5

6. In the present situation in Norway, we should do more to equalize incomes.

Disagree completely	Disagree	Neither agree nor disagree	Agree	Agree completely
1	2	3	4	5

Figure C4: First page of questionnaire at the end of experiment

Session:
Desk:

7. Imagine two people, one earning twice as much as the other:

   The person earning twice as much should pay more than double of the other in tax.

Disagree completely	Disagree	Neither agree nor disagree	Agree	Agree completely
1	2	3	4	5

8. The government should spend more of the tax revenues on social services and benefits targeting the poor than the rich.

Disagree completely	Disagree	Neither agree nor disagree	Agree	Agree completely
1	2	3	4	5

9. What total amount of tax per year, if any at all, should in your opinion be paid by a person earning NOK 200,000 a year? By taxes, we mean all personal income taxes. Indicate your answers in NOK.

   And what total amount of tax should be paid by a person earning NOK 400,000?

   And what total amount of tax should be paid by a person earning NOK 800,000?

   And what total amount of tax should be paid by a person earning NOK 1,600,000?

10. Below is a seven-point scale on which the political views that people might hold are arranged from very left-wing to very right-wing. Where would you place yourself on this scale?

Very left-wing	Left-wing	Slightly left-wing	Moderate	Slightly right-wing	Right-wing	Very right-wing
O	O	O	O	O	O	O

Figure C5: Second page of questionnaire at the end of experiment