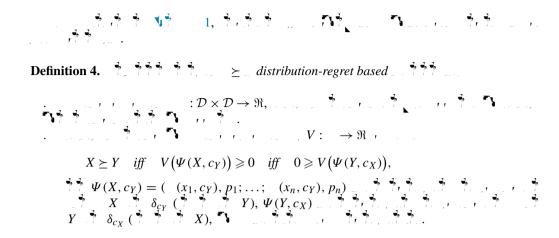


**Lemma 1.** Let  $\succeq$  be a distribution-regret preference relation. Then  $\succeq$  admits a two-dimensional regret function  $*: \mathcal{D} \times \mathcal{D} \to \Re$  and a regret functional  $V^*$  such that

$$X \succeq Y \iff V^* \begin{pmatrix} *(x_1, c_Y), p_1; \dots; & *(x_n, c_Y), p_n \end{pmatrix} \geqslant 0$$
  
$$\iff V^* \begin{pmatrix} *(y_1, c_X), q_1; \dots; & *(y_m, c_X), q_m \end{pmatrix} \leqslant 0$$

where  $c_X$  and  $c_Y$  are the certainty equivalents of X and Y respectively.



 $\boldsymbol{x}$ 

$$X \sim \delta_{c_Y} \implies V( nd V)$$



1, 7

**Proposition 3.** If the preference relation  $\succ$  is consistent then it satisfies distribution regret.

**Position 3.** If the projection  $f(c_{Z}, \lambda) = 0.10$   $f(c_{Z}, \lambda) = 0.1$ Proof.  $\lambda(Z) = -c_Z \qquad (x, y) = x - y.$   $f(x, \lambda(Y)) \in \mathcal{D} \mathcal{N}^{\frac{1}{2}}.$ 

$$f(X, \lambda(Y)) = (f(x_1, \lambda(Y)), p_1; \dots; f(x_n, \lambda(Y)), p_n)$$

$$= ((x_1, c_Y), p_1; \dots; (x_n, c_Y), p_n)$$

$$= \Psi(X, c_Y)$$

$$(4)$$

$$X \succeq Y \sim \delta_{c_Y} \quad \Longleftrightarrow \quad f(X, \lambda(Y)) \succeq f(Y, \lambda(Y)) \sim \delta_{f(c_Y, \lambda(Y))} = \delta_0$$
$$\iff \quad U(f(X, \lambda(Y))) \geqslant U(f(Y, \lambda(Y))) = U(\delta_0) = 0$$

 $V(\Psi(X, c_Y)) = U(f(X, \lambda(Y))) = U(\Psi(X, c_Y))$ 

$$\begin{split} X \succeq Y &\iff U \big( \Psi(X, c_Y) \big) \geqslant 0 \\ &\iff V \big( \Psi(X, c_Y) \big) \geqslant 0 \\ &\stackrel{?}{\uparrow} \succeq 0 \quad \text{and} \quad \stackrel{?}{\uparrow} \quad \text{for all } \quad \Box \end{split}$$

 $Z = (z_1, r_1; \dots; z_n, r_n) \qquad z_1 \leqslant \dots \leqslant z_n, \qquad z_n \leqslant z_n, \qquad z_n \leqslant z_n \leqslant z_n, \qquad z_n \leqslant z_n \leqslant z_n, \qquad z_n \leqslant z_$ 

$$c_Z = u^{-1} \left( u(z_1)g(r_1) + \sum_{i=2}^n u(z_i) \left[ g\left(\sum_{j=1}^i p_j\right) - g\left(\sum_{j=1}^{i-1} p_j\right) \right] \right)$$

$$f(x,\lambda) = u^{-1}(u(x) + \lambda)$$

$$f(c_Z, \lambda(Z)) = 0 \implies \lambda(Z) = -u(z_1)g(r_1) - \sum_{i=2}^n u(z_i) \left[ g\left(\sum_{j=1}^i p_j\right) - g\left(\sum_{j=1}^{i-1} p_j\right) \right]$$

 $<sup>\</sup>overrightarrow{\hspace{1cm}} , \qquad 0 \in [\mathcal{D}].$ (x, x) = d.  $(x, x) = (x, c_{\delta_X}) = f(x, \lambda(\delta_X)) = 0.$ 

$$\Psi(X', c_{Z'}) =$$

$$[X] + \alpha \mu_X^+ = (1 + \alpha)\alpha \implies \alpha = \frac{-(1 - \mu_X^+) + \sqrt{(1 - \mu_X^+)^2 + 4 [X]}}{2}$$

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$$[X] > 0 \quad (X < 0) > 0 \quad \Longrightarrow \quad X > \delta_{[X]} \tag{}$$

$$(X < 0) > 0 \implies X > \delta[X]$$

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$$(X < 0) > 0 \implies X > \delta$$

$$\left[\left(z, \frac{1+t}{1+z}; -1, \frac{z-t}{1+z}\right)\right] = t, \quad \stackrel{*}{\uparrow} \quad \left(z, \frac{1+t}{1+z}; -1, \frac{z-t}{1+z}\right) \sim (t, 1)$$

$$\left(f(z,\lambda_0), \frac{1+t}{1+z}; s, \frac{z-t}{1+z}\right) \sim (0,1)$$
 (10)

) / 17.5320.4 0 1 1 (10)()17 1 371 1 (1264 0 1 7 7 ((). 626 0 0 . 626 72.246 465.70 () / 0.0 / 0 **Proposition 4.** *If the preference relation*  $\succeq$  *satisfies distribution regret with a commutative regret function* , *then it is consistent.* 

Proof. If 
$$d \in \Re$$
 if  $(x, x) = d$   $x \in \mathcal{D}$ . (if  $d \in \Re$  if  $(x, \lambda) = y$  if  $(x, y) = d - \lambda$ . (13)

$$(x, f(x, \lambda)) = d - \lambda$$

$$(x, f(x, \lambda)) = d - \lambda$$

$$(x, f(c_X, \lambda)) = (c_Y, f(c_Y, \lambda)) = d - \lambda$$

$$(x, f(c_X, \lambda)) = (c_Y, f(c_Y, \lambda)) = d - \lambda$$

$$(x, f(c_X, \lambda)) = (c_X, c_Y) = (f(c_X, \lambda), f(c_Y, \lambda)),$$

$$(x, f(c_X, \lambda)) = (f(c_X, \lambda), f(c_Y, \lambda)),$$

$$(x, f(c_X, \lambda)) = (f(c_X, \lambda), f(c_Y, \lambda)),$$

$$(x, f(c_X, \lambda)) = (f(x_i, \lambda), f(c_X, \lambda)),$$

$$(x_i, c_X) = (f(x_i, \lambda), f(c_X, \lambda)),$$

$$(x_i, c_X) = (f(x_i, \lambda), f(c_X, \lambda)),$$

$$(x_i, c_X) = (f(x_i, \lambda), f(c_X, \lambda)),$$

## 5. Discussion

