Risk apportionment and Stochastic dominance

by.

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Joint work with

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Plan of the talk.

I Risk aversion, prudence, temperance.

I 1. The traditional approach and some of its inconsistencies.

I 2 A neglected paper: Gollier-Pratt-Zeckhauser in AER 1990.

I 3 The notion of "risk apportionment" (pain).

I 4 The translation in utility terms.

II The extension to higher order derivatives

III Risk apportionment and S.D.

IV Extensions.

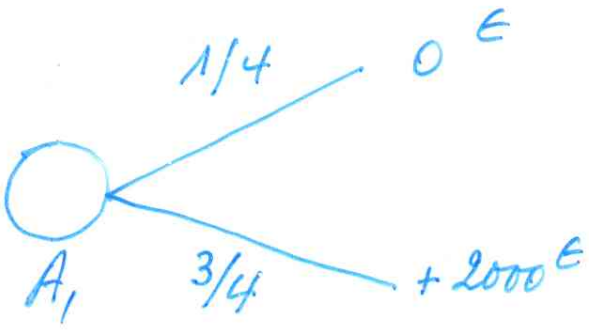
IV 1. The multivariate utility functi

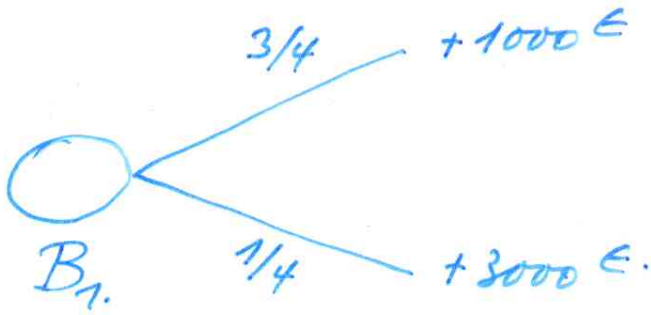
IV 2. Correlation aversion.

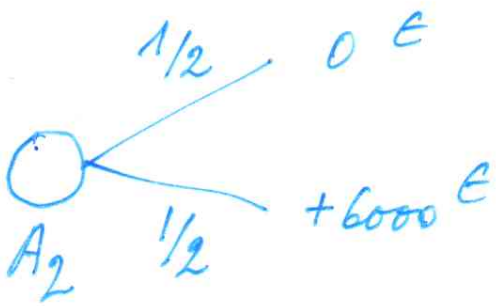
IV 3 Non E-U models.

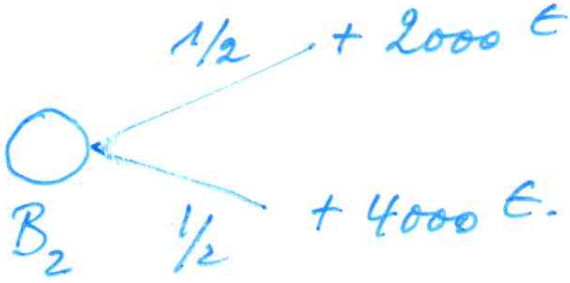
IV 4. The intensity of the effects.

IV 5 Experimental Economics.









$N = 45$

B_1 : 33

B_2 : 35

$B_1 B_2$: 30

$A_1 B_2$: 3

$B_1 A_2$: 2.

Ind 1 B_2 : 2.

I Risk aversion, prudence, temperance

I 1. The traditional approach

I.1.1. Risk aversion.

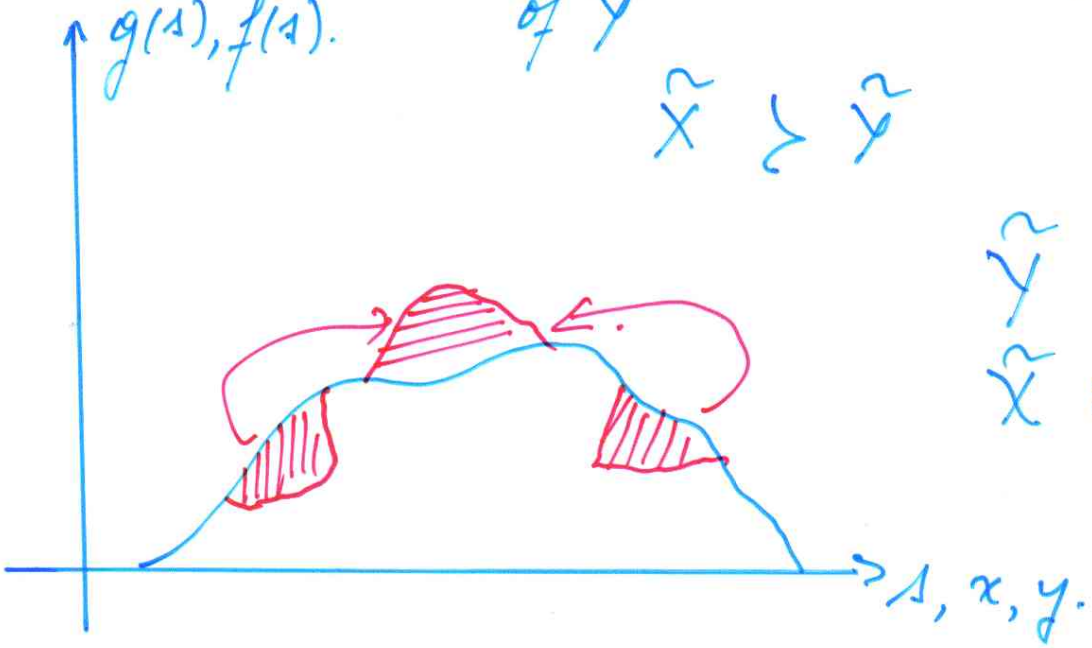
a) The most used definition is in the E-u model: $u'' < 0$.

b) Yet there exists a "model-free" approach (Rothschild-Stiglitz).

- weak form: $E(\tilde{x}) \succ \tilde{x}$
- strong form

if $\tilde{x}$ is a Mean Preserving Contract of $\tilde{y}$

$\tilde{x} \succ \tilde{y}$



$\tilde{y}$: $g(s)$

$\tilde{x}$: $f(s)$.

In the E-u model $\tilde{x} \succ \tilde{y} \Leftrightarrow u'' < 0$.

The definition is preference based.
Then: implication for choices.

I.1.2 Prudence

Basic reference: Kimball, Econometrica, 1990.

Predecessors: Leland (1968) Sandmo (1970)
Dréze-Modigliani (1972)

Summary of the idea: compare 2 DECISION problems in the E-U framework

-) $\max_{c_1} \; u(c_1) + u((y_1 - c_1) + y_2)$

$$c_1^* = \frac{y_1 + y_2}{2} = c_2^*$$

-) $\max_{c_1} \; u(c_1) + E\left[u((y_1 - c_1) + \tilde{y}_2)\right]$

$$E(\tilde{y}_2) = y_2$$

Result: $\hat{c}_1 < c_1^* \Leftrightarrow u''' > 0$

Hence the property $u''' > 0$ is defined from a decision problem.

I 1.3 Temperance

Basic reference : Kimball, New Palgrave Dict. of Money and Finance (1992)

"The precautionary motive for holding assets"

"An unavoidable risk lead(s) an agent to reduce exposure to another risk even if the 2 risks are statistically independent"

Compare 2 DECISION problems.

$$\max_{\alpha} E[u(w+\alpha\tilde{\varepsilon})] \qquad E(\tilde{\varepsilon})>0$$

$$\alpha^*$$

$$\max_{\alpha} E[u(w+\tilde{\theta}+\alpha\tilde{\varepsilon})] \qquad E(\tilde{\theta})=0.$$

$$\alpha^{**} \qquad \tilde{\theta} \perp \tilde{\varepsilon}$$

$$\alpha^{**} < \alpha^{*} = \text{temperance}$$

$u^{(4)} < 0$ is necessary.

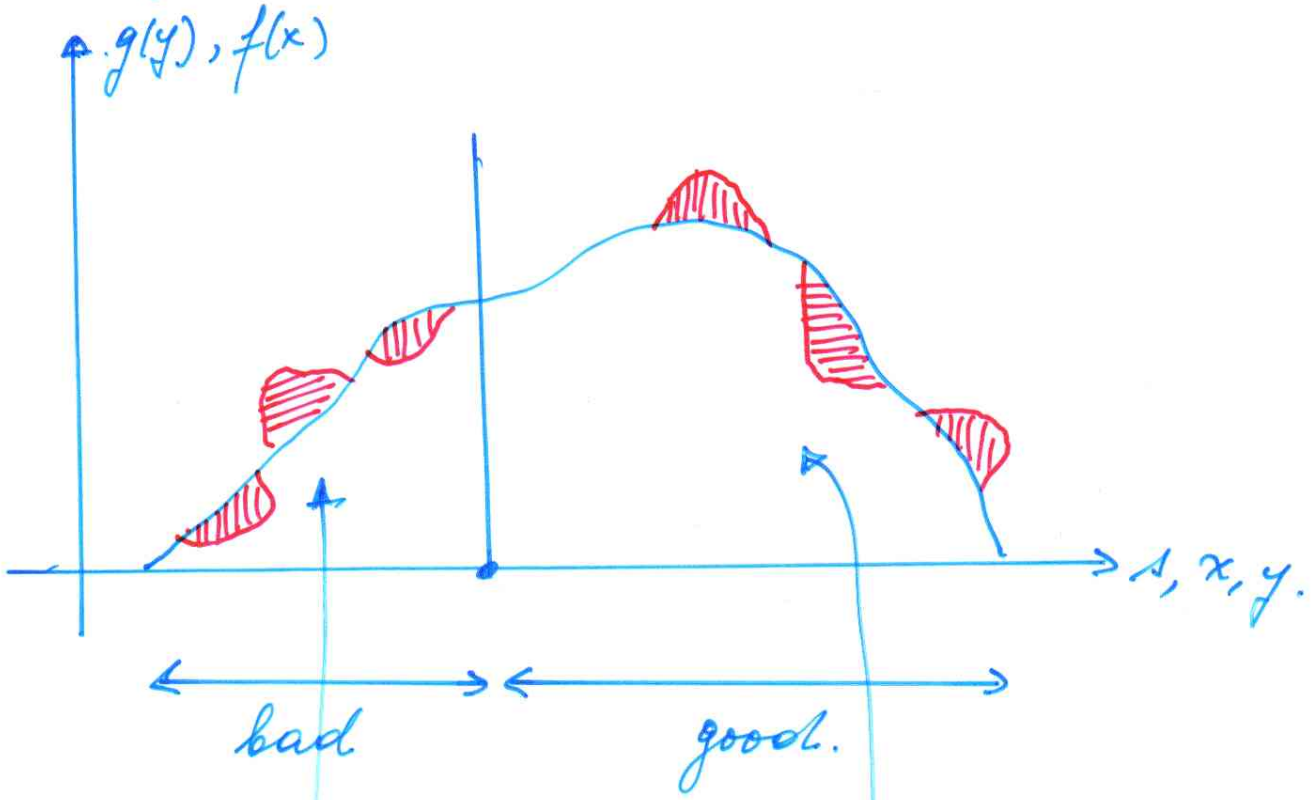
Summary: the "inconsistency"

- risk aversion: from preference ($\succeq^{NM}$, $\succeq^{CE}$) to decisions, using besides the DARA assumption
- prudence and temperance: from decisions to preferences (signs of u''' and $u^{(4)}$)

Hence: search for a preference based definition of prudence and temperance

I 2 A neglected paper

Gerts, Menezes, Tressler, AER (1980)



MPC.

$U'' < 0 \Rightarrow$ welfare improving

MPS.

$U'' < 0 \Rightarrow$ welfare deteriorating.

(Since the changes have the same "size" we face a Mean Variance Preserv. Transf.

$U''' > 0 \iff$ The change is globally beneficial

Downside risk aversion.

This is a preference approach in E.U.