Drivers of Sustainable Finance

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Some (financial) history

(2-period incomplete markets economies) Equilibrium existence and restricted participation: (Cea-Echenique and Torres-Martínez 2018; Cea-Echenique and Torres-Martinez 2016) Kakutani application *via*

- Prices of commodities and unrestricted assets on a simplex.

Bounds of restricted assets' prices (segmentation) through no-arbitrage pricing and

- Impatience in preferences (Seghir and Torres-Martínez 2011) and/or
- Super-replication of segmented asset returns through unsegmented assets

An "inspiration" to include public goods

Bounds on assets prices argument requires a role of assets' returns in utility function through impatience

- Positions in unsegmented assets are required to no-arbitrage argument of asset prices

¿Why not to consider preferences over asset returns? Sort of *trade glow (literature recommendations welcome)*

- Externalities produced by investing: ¿public goods?

Actually, there is a growing literature on measuring externalities of investments trhough Environmental, Social and Governances (ESG) factors

Restricted participation and public goods provision

Motivation: NGOs difficulties to access for funding

Tool: Apply restricted participation framework in a model with public goods and uncertainty

First Step: Configure a simple public good model where donations reflect investments and returns are stochastic dependent on variables costs

Gradstein, Nitzan, and Slutsky (1993) propose a departing point: classic public good game where agents have to allocate income between private consumption and the contribution to the public good

Private Provision of Public Goods Under Price Uncertainty

Typically, we observe relations in the literature regarding the impact of uncertainty on strategic decisions

- It is hard to establish results from strategic decisions to welfare

Intuition proposes that uncertainty impact negatively on contributions and, consequently, on welfare

- we depart from a numeric example stating the (overall) opposite:

Uncertainty increases welfare

- Gradstein, Nitzan, and Slutsky (1993) already stated something similar but conditional on contributions

A comment

Proposition 3

(Gradstein, Nitzan, and Slutsky 1993)
[...] if uncertainty decreases the amount of contributions, then welfare decreases

In contrast:

> *"We show that price uncertainty can improve welfare [...] regardless of whether such uncertainty increases or decreases the amount of contributions to the public good relative to price certainty."*

Proposition

(Billette de Villemeur, Cea-Echenique, and Cuevas 2024)
[...] if uncertainty (in) / decreases the amount of contributions, then welfare ~~de~~increases

Example

n identical agents with income I, a public and a private good

Individual problem: $$\max_{\underbrace{s_i}_{\text{nominal contribution}}} \quad E_p\left[U\left(\frac{\left(s_i+\sum_{j\neq i} s_j\right)}{\underbrace{p}_{\text{Public good price}}}, I-s_i\right)\right]$$

where risk-averse utility is given by

$$U\left(\underbrace{X}_{\text{Public good}}, \overbrace{\tilde{y}}^{\text{Private good}}\right) = \begin{cases} \frac{(X^{1-\sigma}-1)+(y^{1-\sigma}-1)}{1-\sigma}, & \text{if } \sigma \neq 1 \\ \log(X)+\log(y), & \text{if } \sigma = 1, \end{cases}$$

Equilibrium welfare decomposition

Nash-equilibrium individual contributions:

- s^* with price p uncertainty
- s^o without price uncertainty, i.e., $p^o = E[p]$

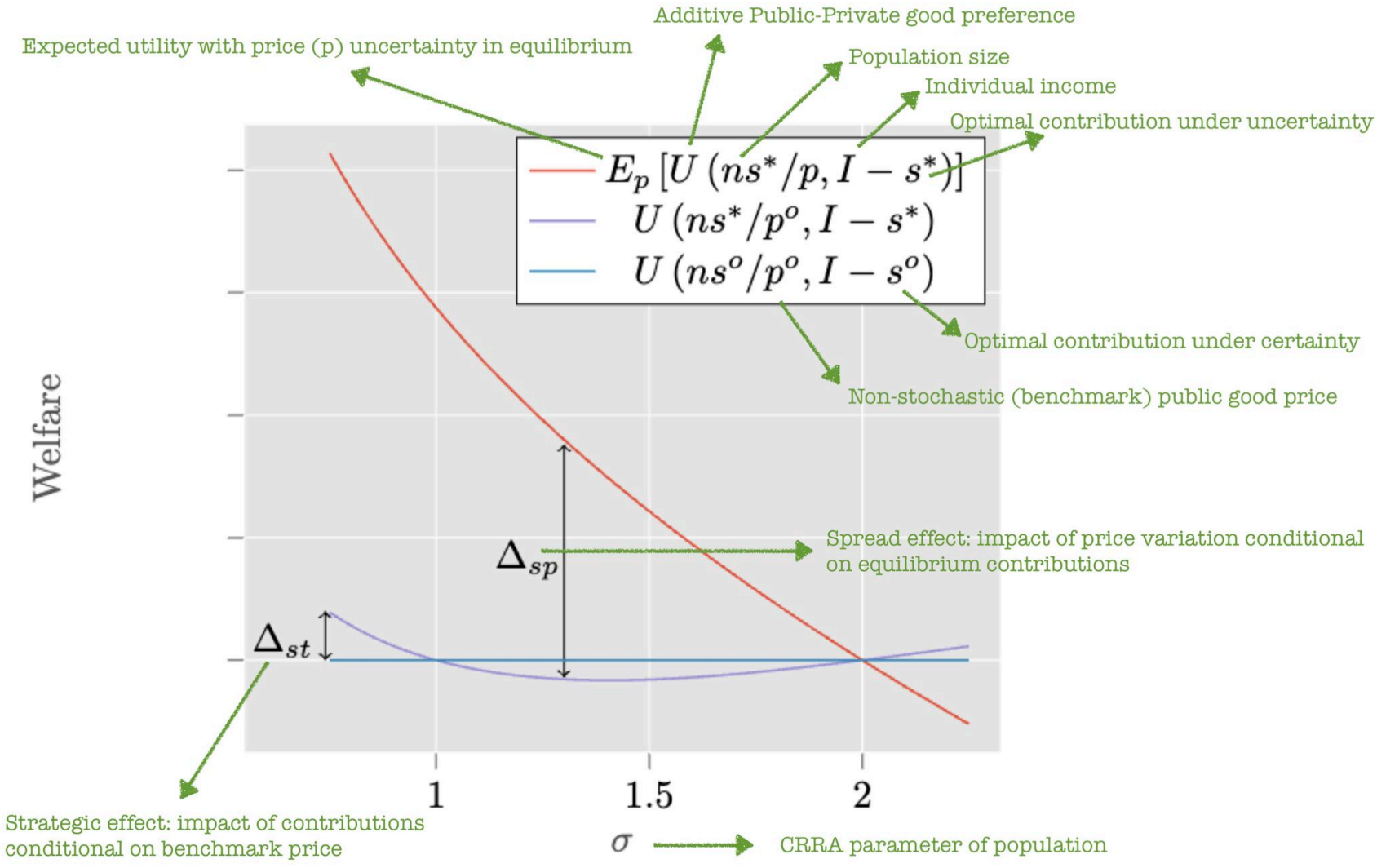
$$\Delta = E_p\left[U\left(\frac{n \cdot s^*}{p}, I - s^*\right)\right] - U\left(\frac{n \cdot s^o}{p^o}, I - s^o\right)$$

$$\Leftrightarrow \left\{E_p\left[U\left(\frac{n \cdot s^*}{p}, I - s^*\right)\right] - U\left(\frac{n \cdot s^*}{p^o}, I - s^*\right)\right\}$$

$$+ \left\{U\left(\frac{n \cdot s^o}{p^o}, I - s^o\right) - U\left(\frac{n \cdot s^*}{p^o}, I - s^*\right)\right\}$$

$$= \Delta_{sp} + \Delta_{st}$$

Welfare with respect to risk-aversion



Further characterizations (unpublished)

Given that uncertainty may or may not improve welfare, it is important to characterize conditions ensuring improvements.

Additionally, ¿Is it possible to generalize the argument more heterogeneous preferences?

Setup

- $U(X, y) = y_i + \beta_i \cdot u(X)$

Lemma (Contributions' response to uncertainty)

If $u'(X/p) \cdot (1/p)$ is strictly convex (resp. concave) in p, total donations (resp. do no) increase with uncertainty

Further characterizations (unpublished) [cont'd]

$$u(X/p) = \frac{(X/p)^{1-\sigma} - 1}{1-\sigma} \quad \text{for simplicity}$$

Note that for two equilibria S, S' with associated individual contributions s_i, s_i', the following condition is not necessarily true:

$$[\text{Same Direction}] \quad S > S' \Rightarrow d_i > d_i', \quad \forall i \quad \text{contributor}$$

Proposition

Under Same Direction, every agent with $\beta_i > 0$ is strictly better off under uncertainty while others are indifferent if and only if the coefficient of relative risk aversion is less than two.

ESG investment and attention

Bottom line: Investment in public good under uncertainty is benefical depending on risk aversion

ESG investment:

- no consensus on the value of the information conveyed by those metrics (e.g. public good price produced)
- complexity of the metrics (e.g. difficult to estimate public good price)

Attention:

- If information is complex, agents pay attention rationally to the metrics they choose (i.e. information is costly)

Current divergent undergraduate efforts

Undergraduate

- Planner inattention and energy prices
- Test experimental attention to ESG metrics on asset allocation

Graduate

- Estimate ESG preferences changes: Trump's opt-out from COP21

Thanks!

Some remarks

Asymmetric information: (Cea-Echenique, Hervés-Beloso, and Torres-Martínez 2017) coherence between private information and asset returns

References I

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