

Optimal Redistribution via Income Taxation and Market Design

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- **Food** (food stamps in the US; in-kind food transfer programs (rice, wheat,...) in developing countries)
- **Energy** (electricity in virtually all European countries at the moment; kerosene in India; energy subsidies in Latin America;...)
- **Covid-19 vaccines**
- **Road access**
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Desideratum: Understand optimal design of such policies.

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 - designer has strong redistributive preferences, but
 - does not have access to other tools to effect redistribution.

Inequality-aware Market Design (IMD)

- **IMD precursors:** Spence (1977), Weitzman (1977), Nichols and Zeckhauser (1982), Condorelli (2013), ...
- Redistribution in **simple (one- and two-sided) markets:** DKA (2021), Reuter and Groh (2020), ADK (2024), Tokarski KAD (2023) (energy pricing), ...
- Problems with **allocative externalities:** Kang (2023), A Budish DK (2024) (Covid-19 vaccines), Pai and Strack (2025), ...
- Optimality of **costly screening** and allocating bads: Kang and Zheng (2020), Yang DA (2024), D (2025), ...
- Interaction of redistributive mechanisms and **private markets:** Kang (2023), Kang and Watt (2024a, 2024b), ...
- **Information-design** interventions: Doval and Smolin (2024), Augias [Ⓘ] Ghersengorin [Ⓘ] Barreto (2025), ...

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 - Use modern tools from mechanism design to study the **interaction between IMD and income taxation.**

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1. We provide **closed-form solutions** in a linear model with two goods, binary ability type, and continuous taste type.
2. MD approach yields new intuitions about the optimal combination of market-level interventions and income taxation and uncovers a strong role of heterogeneity in tastes.

Literature Review

- **Suboptimality of goods market distortions:**

Diamond and Mirrlees (1971), Atkinson and Stiglitz (1976), Gauthier and Laroque (2009), Doligalski et al. (2025), ...

- **Taste heterogeneity and failure of Atkinson-Stiglitz theorem:**

Cremer and Gavhari (1995, 1998, 2002), Saez (2002), Kaplow (2008), Golosov et al. (2013), Gauthier and Henriët (2018), Allcott et al. (2019), Scheuer and Slemrod (2020), Schulz (2021), Hellwig and Werquin (2023), Ferey et al. (2024), Gerritsen et al. (2025), Gaubert et al. (2025), Ahlvik et al. (2025),...

- **Multi-dimensional heterogeneity in public finance:**

Cremer et al. (2003), Blomquist and Christiansen (2008), Diamond and Spinnewijn (2011), Piketty and Saez (2013), Scheuer and Wolitzky (2016), Saez and Stantcheva (2018), Golosov and Krasikov (2025), Bierbrauer et al. (2023), Boerma et al. (2025), ...

- **Related mechanism-design papers:** Jullien (2000), Che et al. (2013),

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 - **earnings** (pre-tax) $z \in \mathbb{R}$ (determined by labor supply).
- Each agent's utility function is

$$U((c, x, z), (t, a)) = u(c) + v(x; t) - w(z; a),$$

where the functions u , v , w are increasing.

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subject to **incentive compatibility** and the **resource constraint**:

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- We assume existence of solutions and strong duality.

Atkinson-Stiglitz result

When Interventions in Markets are Redundant

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$$V(m, t) = \max_{x \in \mathbb{R}_+^L} \{u(m - k \cdot x) + v(x; t)\}.$$

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$$V(m, t) = \max_{x \in \mathbb{R}_+^L} \{u(m - k \cdot x) + v(x; t)\}.$$

- Define the **marginal utility of disposable income** (whenever exists) as $\partial V(m, t)/\partial m$.

Atkinson-Stiglitz result

Theorem

Suppose that:

1. *Taste does not affect the marginal utility of income:*
 $u(c) = c, c \in \mathbb{R};$
2. *Welfare weights depend only on the ability type:*
 $\lambda(t, a) = \bar{\lambda}(a), \forall(t, a);$
3. *Ability and taste types are statistically independent:*
 $F(t, a) = F_t(t)F_a(a), \forall(t, a).$

*Any **optimal mechanism** induces an **efficient choice of goods** (by pricing them at marginal costs), and can be implemented with an **income tax alone**.*

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Idea of the proof:

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 $\Leftarrow$ Assumption 1 & 2 (directly) Assumption 3 (indirectly)

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4. Hence, the solution to the relaxed problem is **implementable in the original problem** (by pricing goods at marginal cost).

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- **Linear utility function** is:

$$u(c) + t \cdot x - \frac{1}{a} \cdot z \quad \text{where} \quad u(c) = \begin{cases} c & c \geq \underline{c}, \\ -\infty & c < \underline{c}, \end{cases}$$

where $\underline{c}$ is a “**subsistence**” level.

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Assumption 1 fails (subsistence constraint has bite):

$$\mu_H \left(1 - \frac{1}{a_H} \right) < G + \underline{c} + k.$$

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There exists an optimal mechanism in which:

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where p_H is between k and the optimal monopoly price;*
- Everyone receives a lump-sum transfer equal to $\underline{c} + p_L\bar{x}_L$.*

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- **Non-linear pricing scheme** leads to **self-selection** in the market:
 - low-ability agents with sufficiently high taste choose the **subsidized low-quality option**;
 - high-ability agents with sufficiently high taste choose the **taxed high-quality option**.
- High-quality option with tax $\implies$ more surplus can be extracted from (some) high-ability agents.

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- There is a **second-order loss** in efficiency (marginal effect)
- ... but there is a **first-order gain** since all types $t > k$ can buy a good with ϵ higher quality (inframarginal effect).

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Intuition under concave u : ► Extension

- Purchasing the good implies **higher marginal utility of income** $u'(c)$ relative to agents who do not buy $\implies$ planner values redistribution towards low-ability agents with high t .

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Intuition under concave u : ► Extension

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 - AS: More able agents consume more healthcare **only** because they have more income; better to redistribute income without distorting the allocation of healthcare.
 - Our setting: Demand for healthcare stems from **both** income (ability) and need (taste); subsidies for low-quality healthcare improve redistribution because they **endogenously target low-ability agents who have a particularly high marginal utility of income**.

Relaxing Assumption 2 & 3

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Suppose that:

1. *Taste does not affect the marginal utility of income:*
 $u(c) = c, c \in \mathbb{R};$
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 $\lambda(t, a) = \bar{\lambda}(a), \forall(t, a);$
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 $F(t, a) = F_t(t)F_a(a), \forall(t, a).$

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2. *Income is taxed at a rate $\tau < 1 - 1/a_H$ (high-ability agents work); the good is sold at a **lower price to low-ability agents** than to high-ability agents.*

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 - Incentive compatibility requires decreasing tax on labor: high-ability agents get surplus from working.
 - The optimal mechanism can be implemented as a **means-tested subsidy for the good**.

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- Mechanism 1 is optimal iff the motive to redistribute across ability types is sufficiently strong.

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- More research at the intersection of market design and public finance is needed!

Appendix

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Relaxing Assumption 2

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 - $\Lambda_L(t) \geq \Lambda_H(t)$, for all t (weaker than $\lambda_L(t) \geq \lambda_H(t)$ for all t).

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If the planner is primarily concerned with **redistribution across ability** types, it is optimal to redistribute as much as possible through the income tax.

Otherwise, it may be optimal to limit the role of income taxes to make income useful for **price discrimination** in market design:

⇒ income tax and market design are to some extent **substitutes**.

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 - $(\bar{\lambda}_L - 1)h_L(r) \geq (\bar{\lambda}_H - 1)h_H(r)$, for all t .

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Robustness of results to concavity in the utility function u :

- Suppose that u is a strictly increasing, strictly concave, continuously differentiable function.

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- We prove that:

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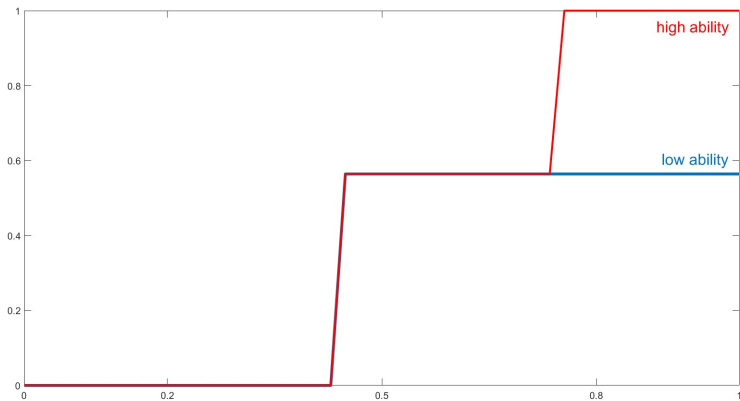
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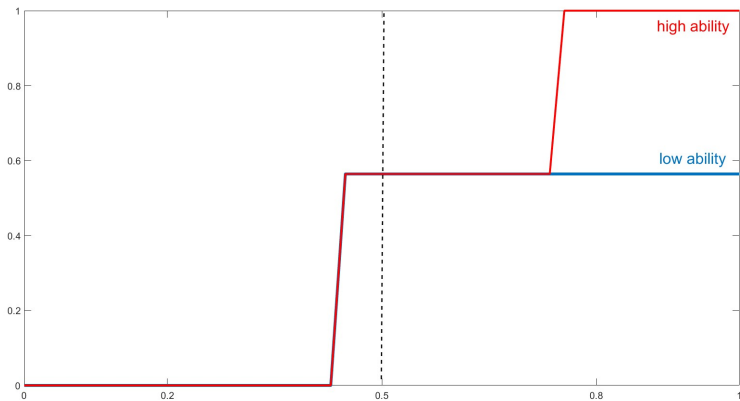
- Suppose that u is a strictly increasing, strictly concave, continuously differentiable function.
- We prove that:
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 - The consumption of high-ability agents with high enough taste type is distorted downwards.

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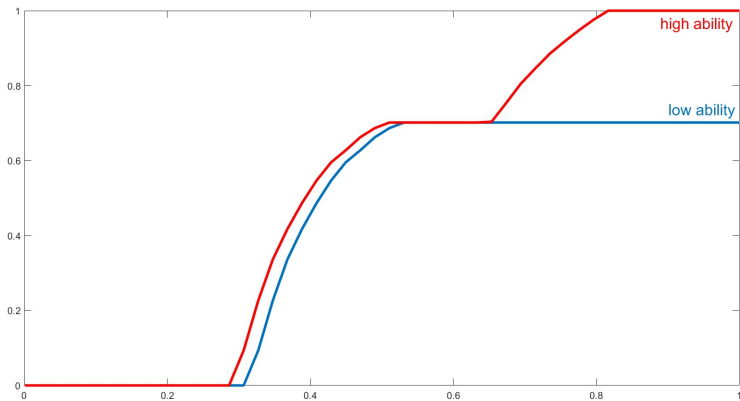
Goods allocation in optimal mechanism

Relaxing Assumption 1



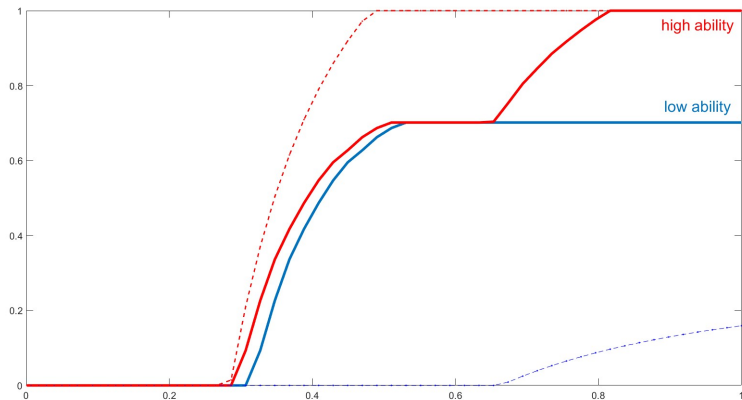
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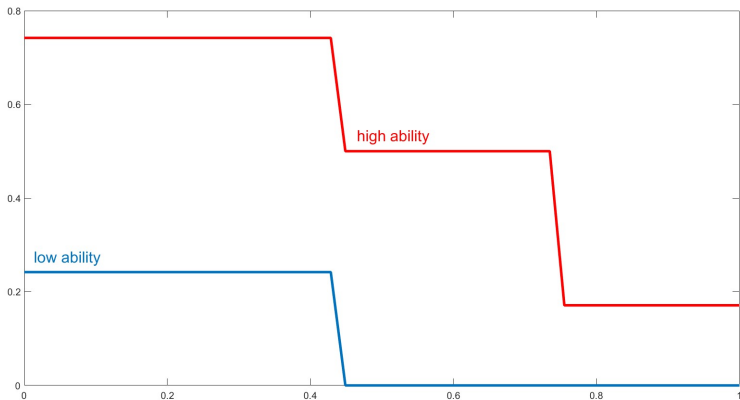
Goods allocation in optimal mechanism ($u(c) = \sqrt{c}$)

Relaxing Assumption 1



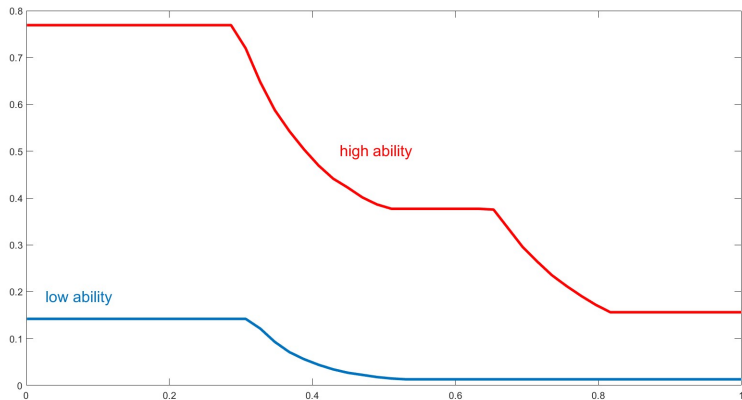
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Numeraire consumption in optimal mechanism

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Numerator consumption in optimal mechanism ($u(c) = \sqrt{c}$)