

Optimal Redistribution via Income Taxation and Market Design

Paweł Doligalski 

University of Bristol

Piotr Dworczak^{*}

Northwestern University; GRAPE

Mohammad Akbarpour 

Stanford University

Scott Kominers

Harvard University; a16z

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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**
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Desideratum: Understand optimal design of such policies.

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How to design *individual* markets in the presence of socioeconomic *inequality* and *private information*?
- Key takeaway: Market **distortions** (price control, rationing, taxes/ subsidies) may be part of the **optimal** mechanism.

Inequality-aware Market Design (IMD)

- **Antecedents:**

Weitzman (1977), Spence (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), ...

- 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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- **This paper:**
 - Attempt to build a bridge to the public finance literature.
 - Use modern tools from mechanism design to study the **interaction between IMD and income taxation.**

IMD and Income Taxation

Result #1: Under separability and multidimensional heterogeneity, if

1. taste type does not affect the marginal utility of income;
2. welfare weights depend only on the ability type;
3. taste type and ability type are statistically independent,

then **redistribution** should be effected **entirely via income taxes**.

IMD and Income Taxation

Result #1: Under separability and multidimensional heterogeneity, if Assumptions 1, 2, 3 hold, then **redistribution** should be effected **entirely via income taxes**.

Result #2: If any of the assumptions 1, 2, or 3 are relaxed, then **redistributive market design ($\approx$ non-linear commodity taxation)** also plays a role.

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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 Gahvari (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),...

- **Multidimensional 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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- Each agent's utility function takes the **separable** form:

$$v(x, t) - w(z, a),$$

where $v(x, t)$ is the utility from consumption, and $w(z, a)$ is the disutility of labor supply.

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- Planner **maximizes social welfare**

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

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- We assume existence of solutions and strong duality.

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- Define the **marginal utility of disposable income** as

$$\frac{\partial v^*(m, t)}{\partial m}.$$

When Interventions in Markets are Redundant

Theorem

Suppose that:

1. *Taste does not affect the marginal utility of disposable income:*

$$v^*(m, t) = v_0^*(m) + v_1^*(t), \quad \forall(t, m).$$

2. *Welfare weights depend only on the ability type:*

$$\lambda(t, a) = \bar{\lambda}(a), \quad \forall(t, a).$$

3. *Ability and taste types are statistically independent:*

$$F(t, a) = F_t(t)F_a(a), \quad \forall(t, a).$$

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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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 $\Leftarrow$ 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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- **Ordinal:** Engel curves of any two taste types either never cross or perfectly overlap (for $m > 0$):

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- **Cardinal:** Knife-edge cardinal representation.

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- If $\nu(q, t) = tq$, with $q \in [0, 1]$, so that t is WTP for q , then **Assumption 1 does not hold** (except for boundary cases).

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Assumption 1 fails:

$$\mu_H \left(1 - \frac{1}{a_H} \right) \bar{z} - G < k.$$

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Suppose $\frac{1-F(t)}{f(t)}$ is non-increasing and $\frac{F(t)}{f(t)}$ is non-decreasing.

There exists an optimal mechanism in which:

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- Everyone receives a lump-sum transfer equal to $p_L\bar{q}_L$.*

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- **Non-linear pricing scheme** leads to **self-selection** in the market:

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- High-quality option with tax ⇒ more surplus can be extracted from (some) high-ability agents.

Relaxing Assumption 1

High-level intuition:

Without Assumption 1, purchasing the good implies **higher marginal utility of income** $\implies$ planner values redistribution towards low-ability agents with high t .

► Extension

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Contrast to original Atkinson-Stiglitz logic (example: **healthcare**)

- 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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Theorem

Suppose that:

1. *Taste does not affect the marginal utility of income:*

$$v^*(m, t) = v_0^*(m) + v_1^*(t), \quad \forall (t, m).$$

2. *Welfare weights depend only on the ability type:*

$$\lambda(t, a) = \bar{\lambda}(a), \quad \forall (t, a).$$

3. *Ability and taste types are statistically independent:*

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(generally $\neq 1$ when either Assumption 2 or 3 is relaxed).

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1. *Income is taxed at a rate $1 - 1/a_H$ (high-ability agents work); the good is sold at a **single price** p^* satisfying*

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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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 - 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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- High-ability agents do not mimic low-ability agents
 $\iff$ an **outside option constraint**.

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- We have an outside-option constraint: $\forall t \in [0, \bar{t}]$,

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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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Under regularity conditions, and fixing all parameters other than $\bar{\lambda}_L$ (while adjusting $\bar{\lambda}_H$ to keep the mean welfare weight constant at 1), there exists a cutoff value $\bar{\lambda}_L^0 \geq 1$ such that mechanism 1 is optimal if $\bar{\lambda}_L > \bar{\lambda}_L^0$ and mechanism 2 is optimal if $\bar{\lambda}_L < \bar{\lambda}_L^0$.

If the designer 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**.

Relaxing Assumption 1

Robustness of results to concavity in the utility function u :

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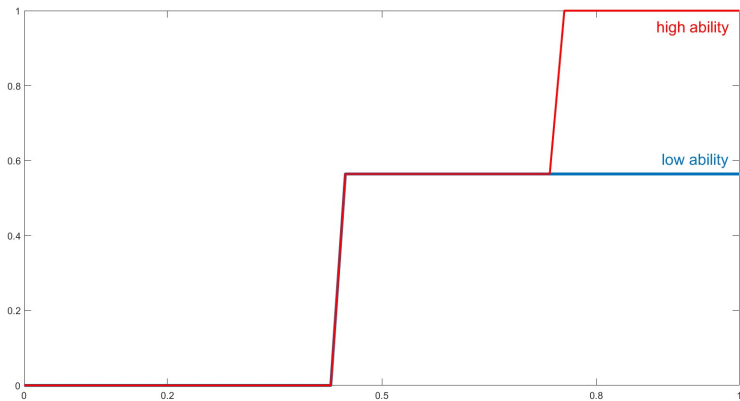
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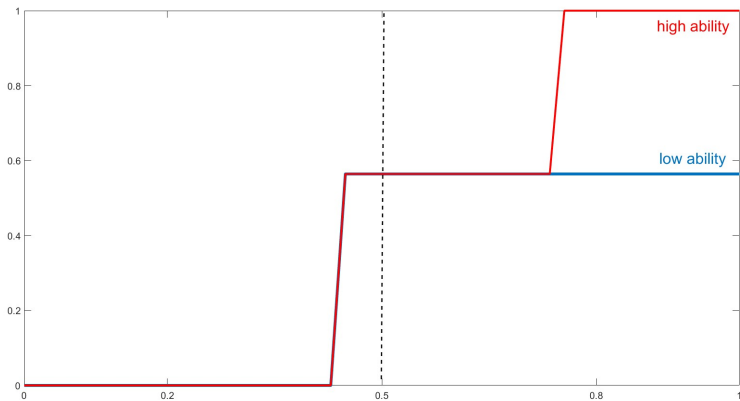
- Suppose that u is a strictly increasing, strictly concave, continuously differentiable function.
- We prove that:
 - Any optimal mechanism distorts the goods allocation away from efficiency;
 - The goods allocation of low-ability agents is distorted upwards;
 - The goods allocation of high-ability agents with high enough taste type is distorted downwards.

Relaxing Assumption 1



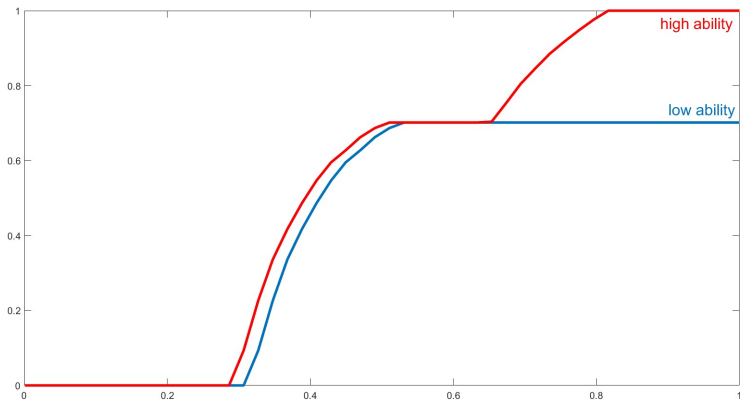
Goods allocation in optimal mechanism

Relaxing Assumption 1



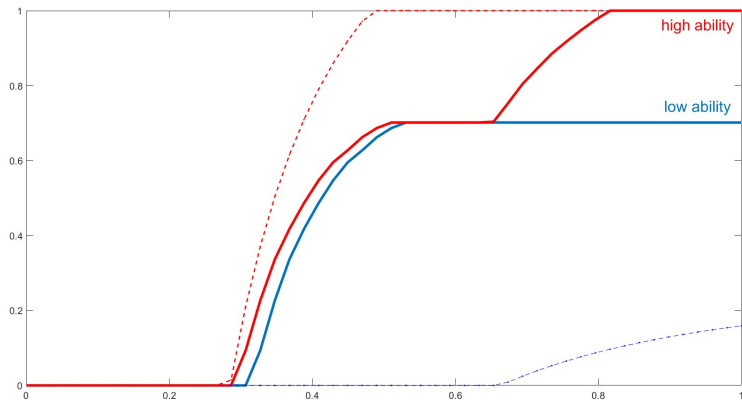
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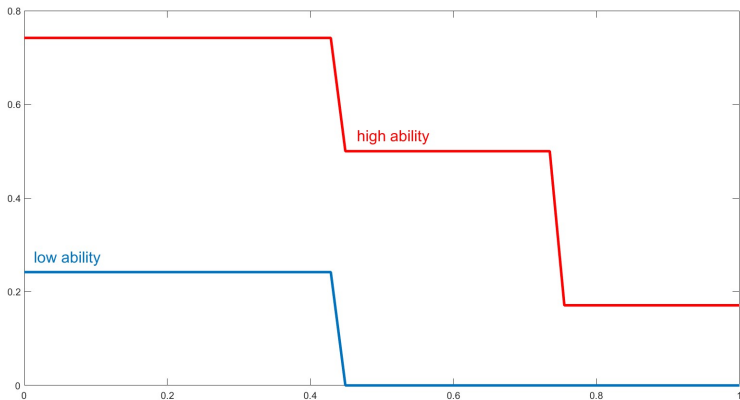
Goods allocation in optimal mechanism ($u(c) = \sqrt{c}$)

Relaxing Assumption 1



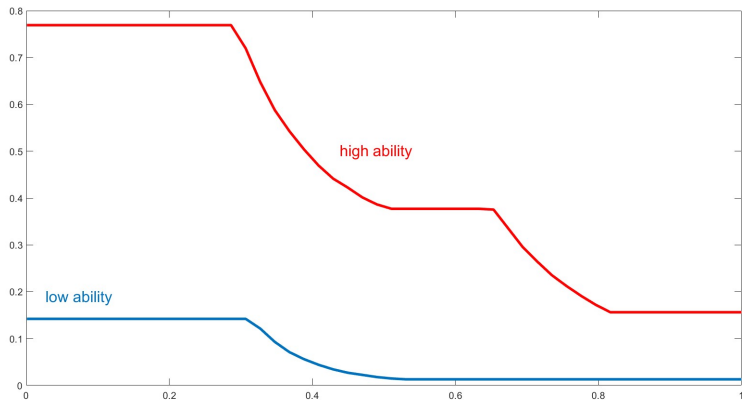
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Numeraire consumption in optimal mechanism

Relaxing Assumption 1



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