

Inequality-aware Market Design

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- **Housing** (rent control; public housing; LIHTC in the US)
- **Health care** (public health care in Europe, Medicare and Medicaid in the US)
- **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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II Welfare Theorem implies that markets are a superior allocation mechanism even under redistributive preferences.

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How to design *individual* markets in the presence of socioeconomic *inequality* and *private information*?

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- But: II WT does not account for **private information**!
- **Inequality-aware Market Design (IMD):**
How to design *individual* markets in the presence of socioeconomic *inequality* and *private information*?
- Market **distortions** (price control, rationing, taxes and subsidies) may be part of the **optimal** mechanisms when the designer has strong redistributive preferences.

Example

Example

Example

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Based on ideas in: Dworczak [Ⓡ] Kominers [Ⓡ] Akbarpour (2021)

Shout-out to: **Weitzman** (1977), **Spence** (1977), **Nichols and Zeckhauser** (1982), **Condorelli** (2013)

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- However, these agents also differ in wealth w :
Ann: 8, Bob: 1, Claire: 1.

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- All agents have the same utility function

$$\log(w) + u \cdot x,$$

where x is the probability of having a house.

Example

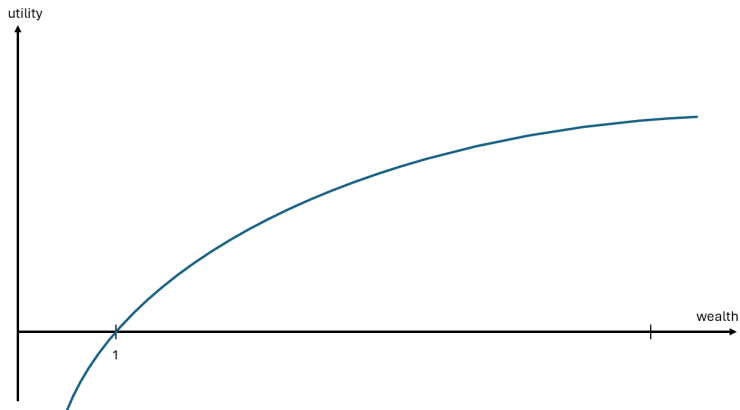
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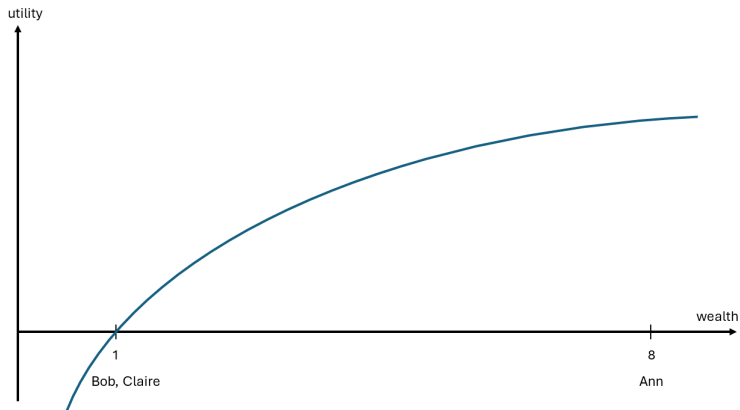
where x is the probability of having a house.

- Social planner aims to maximize the sum of utilities.

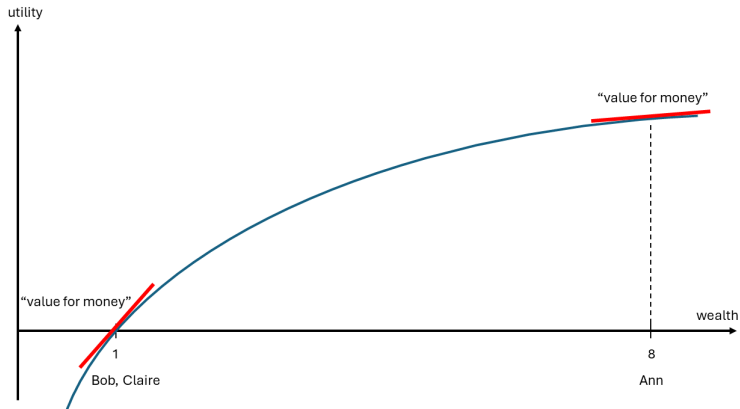
Example



Example



Example



Example

	utility for good	value for money	
Ann	6	$1/8$	
Bob	18	1	
Claire	24	1	

Example

	utility for good	value for money	willingness to pay
Ann	6	$1/8$	48
Bob	18	1	18
Claire	24	1	24

Example

	utility for good	value for money	willingness to pay
Ann	6	1/8	48
Bob	18	1	18
Claire	24	1	24

Equivalent representation of the problem:

	util. good	val. money	willing. pay	welfare weight
Ann	48	1	48	1/8
Bob	18	1	18	1
Claire	24	1	24	1

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	
Bob	18	1	18	
Claire	24	1	24	

Mechanism #1: **Market equilibrium** (+ lump-sum transfers)

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	
Bob	18	1	18	
Claire	24	1	24	

Mechanism #1: **Market equilibrium** (+ lump-sum transfers)

Market-clearing price: 24

House owners: Ann & Claire

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	
Bob	18	1	18	
Claire	24	1	24	

Mechanism #1: **Market equilibrium** (+ lump-sum transfers)

Market-clearing price: 24

House owners: Ann & Claire

Lump-sum transfer: 16

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	$6 - 1/8 \cdot (24 - 16)$
Bob	18	1	18	
Claire	24	1	24	

Mechanism #1: **Market equilibrium** (+ lump-sum transfers)

Market-clearing price: 24

House owners: Ann & Claire

Lump-sum transfer: 16

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	5
Bob	18	1	18	$0 + 1 \cdot 16$
Claire	24	1	24	

Mechanism #1: **Market equilibrium** (+ lump-sum transfers)

Market-clearing price: 24

House owners: Ann & Claire

Lump-sum transfer: 16

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	5
Bob	18	1	18	16
Claire	24	1	24	$24 - 1 \cdot (24 - 16)$

Mechanism #1: **Market equilibrium** (+ lump-sum transfers)

Market-clearing price: 24

House owners: Ann & Claire

Lump-sum transfer: 16

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	5
Bob	18	1	18	16
Claire	24	1	24	16

Mechanism #1: **Market equilibrium** (+ lump-sum transfers)

Market-clearing price: 24

House owners: Ann & Claire

Lump-sum transfer: 16

Total utility: 37

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	
Bob	18	1	18	
Claire	24	1	24	

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	
Bob	18	1	18	
Claire	24	1	24	

Mechanism #2: **Random allocation**

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	
Bob	18	1	18	
Claire	24	1	24	

Mechanism #2: **Random allocation**

Price: 0

House owners: $\frac{2}{3}$ Ann & $\frac{2}{3}$ Bob & $\frac{2}{3}$ Claire

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	
Bob	18	1	18	
Claire	24	1	24	

Mechanism #2: **Random allocation**

Price: 0

House owners: $\frac{2}{3}$ Ann & $\frac{2}{3}$ Bob & $\frac{2}{3}$ Claire

Lump-sum transfer: 0

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	$2/3 \cdot 6$
Bob	18	1	18	
Claire	24	1	24	

Mechanism #2: **Random allocation**

Price: 0

House owners: $\frac{2}{3}$ Ann & $\frac{2}{3}$ Bob & $\frac{2}{3}$ Claire

Lump-sum transfer: 0

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	4
Bob	18	1	18	$2/3 \cdot 18$
Claire	24	1	24	

Mechanism #2: **Random allocation**

Price: 0

House owners: $\frac{2}{3}$ Ann & $\frac{2}{3}$ Bob & $\frac{2}{3}$ Claire

Lump-sum transfer: 0

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	4
Bob	18	1	18	12
Claire	24	1	24	$2/3 \cdot 24$

Mechanism #2: **Random allocation**

Price: 0

House owners: $\frac{2}{3}$ Ann & $\frac{2}{3}$ Bob & $\frac{2}{3}$ Claire

Lump-sum transfer: 0

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	4
Bob	18	1	18	12
Claire	24	1	24	16

Mechanism #2: **Random allocation**

Price: 0

House owners: $\frac{2}{3}$ Ann & $\frac{2}{3}$ Bob & $\frac{2}{3}$ Claire

Lump-sum transfer: 0

Total utility: 32 (< 37)

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	4
Bob	18	1	18	12
Claire	24	1	24	16

Mechanism #2: **Random allocation**

Price: 0

House owners: $\frac{2}{3}$ Ann & $\frac{2}{3}$ Bob & $\frac{2}{3}$ Claire

Lump-sum transfer: 0

Among all mechanisms charging a single price p , $p = 24$ is optimal.

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Ann	6	1/8	48	
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Example

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Mechanism #3: Allocate 1st unit by **lottery**, sell 2nd unit in **market**

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	
Bob	18	1	18	
Claire	24	1	24	

Mechanism #3: Allocate 1st unit by **lottery**, sell 2nd unit in **market**

Market-clearing price for 2nd unit: 24

(Ann's indifference: $6 - 1/8 \cdot 24 = 1/2 \cdot 6$)

House owners: Ann & 50% Claire & 50% Bob

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	
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House owners: Ann & 50% Claire & 50% Bob

Lump-sum transfer: 8

Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	$6 - 1/8 \cdot (24 - 8)$
Bob	18	1	18	
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Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	4
Bob	18	1	18	$1/2 \cdot 18 + 1 \cdot 8$
Claire	24	1	24	

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Bob	18	1	18	17
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Example

	val. good	val. money	WTP	utility
Ann	6	1/8	48	4
Bob	18	1	18	17
Claire	24	1	24	20

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Total utility: 41 (> 37)

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(Ann's indifference: $6 - 1/8 \cdot 24 = 1/2 \cdot 6$)

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Lump-sum transfer: 8

This is in fact the **optimal mechanism!** (subject to IC constraints)

Example

	val. money	WTP	utility—market	utility—hybrid
Ann	1/8	48	5	4
Bob	1	18	16	17
Claire	1	24	16	20

Example

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Ann	1/8	48	5	4
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Intuition:

- Values for money (welfare weights) are **negatively correlated** with willingness to pay.

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- Values for money (welfare weights) are **negatively correlated** with willingness to pay.
- Market **behavior** can be **used to screen**: Choosing the lottery reveals a high value for money.

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- Designer can increase the utility of agents with high values for money by **reducing the price of the rationed option**.

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Intuition:

- Values for money (welfare weights) are **negatively correlated** with willingness to pay.
- Market **behavior** can be **used to screen**: Choosing the lottery reveals a high value for money.
- Designer can increase the utility of agents with high values for money by **reducing the price of the rationed option**.
- Mathematically, rationing results from Myerson's (1981) **ironing**.

Inequality-aware Market Design—literature

- 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), ...

IMD and Public Finance

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- We address this issue in Doligalski ^① al (2025):
 - We build a bridge to PF by considering joint problem of designing a market and income taxes.
 - Consistent with PF literature, consumption taste heterogeneity breaks the conclusion of the AS theorem.
 - Optimal mechanism—found under simplifying assumptions using a mechanism-design approach—combines redistributive taxation with IMD.