

Intermediate public economics:

1. Introduction

Hiroaki Sakamoto

April 17, 2015

Background

Primary goals of economics

- Construct a model that can predict the outcome of real-world economic activities (how things are)
- Identify the set of “desirable” outcomes in the economy (how things should be)
- Design a policy/mechanism that can achieve the “desirable” outcome (what to do)

What does “desirable” mean?

- Depends on people’s preference
- Widely-accepted criterion is Pareto efficiency
- Another is equity (but far more controversial)
- One could argue for yet another

Pareto criterion

Pareto improvement

- Denote by $\{x_i\}_{i \in I}$ a (feasible) allocation
- Reallocation to another (feasible) allocation $\{x'_i\}_{i \in I}$ is said to be a Pareto improvement if $u^i(x'_i) \geq u^i(x_i)$ for all $i \in I$ where the inequality is strict for some $j \in I$
- Someone can be strictly better off without making anybody else worse off

Pareto efficiency

- An allocation is said to be Pareto efficient if a Pareto improvement is not possible
- If an allocation is not Pareto efficient, you can always make everybody happier!
- A necessary condition for an allocation to be “desirable”

Illustration

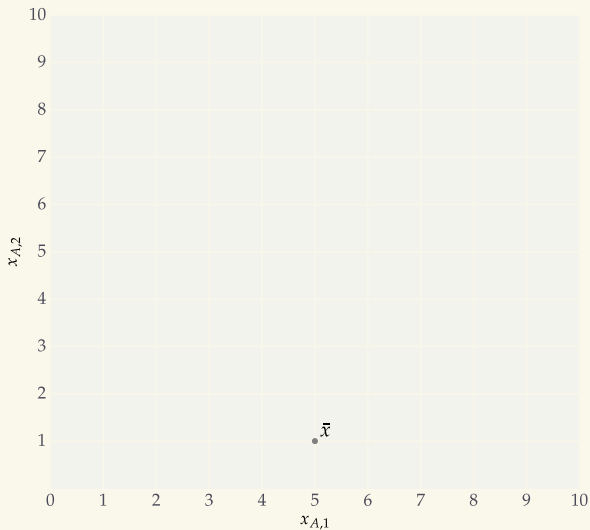
Pure exchange economy

- Two agents: $I := \{A, B\}$
- Preference: $u^i(x) := x_1^{1/2}x_2^{1/2}$ for all $i \in I$
- Initial allocation $\{\bar{x}_i\}_{i \in I} = \{\bar{x}_A, \bar{x}_B\}$, where
 - $\bar{x}_A := (\bar{x}_{A,1}, \bar{x}_{A,2}) = (5, 1)$
 - $\bar{x}_B := (\bar{x}_{B,1}, \bar{x}_{B,2}) = (5, 9)$

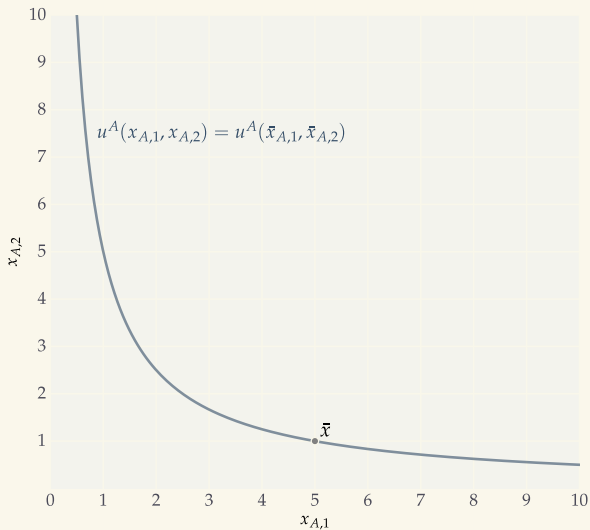
Pareto improvement

- Consider another allocation $\{x_i\}_{i \in I}$, where
 - $x_A := (x_{A,1}, x_{A,2}) = (4, 2)$
 - $x_B := (x_{B,1}, x_{B,2}) = (6, 8)$
- Notice $\sum_i x_{i,j} = \sum_i \bar{x}_{i,j}$ for each $j \in \{1, 2\}$
- Observe $u^i(x_i) > u^i(\bar{x}_i)$ for both $i \in I$

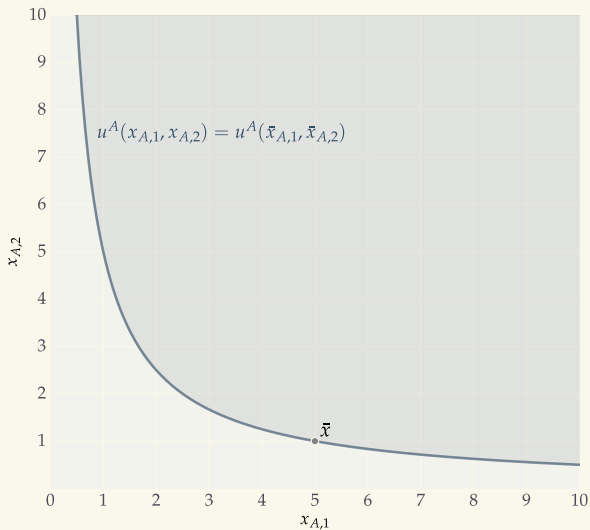
Pareto improvement



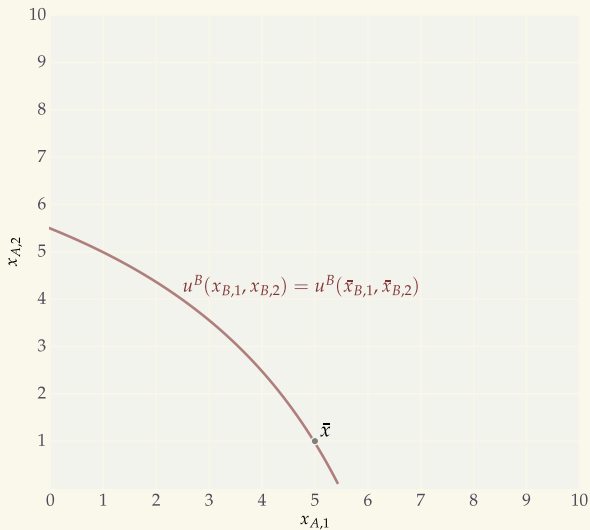
Pareto improvement



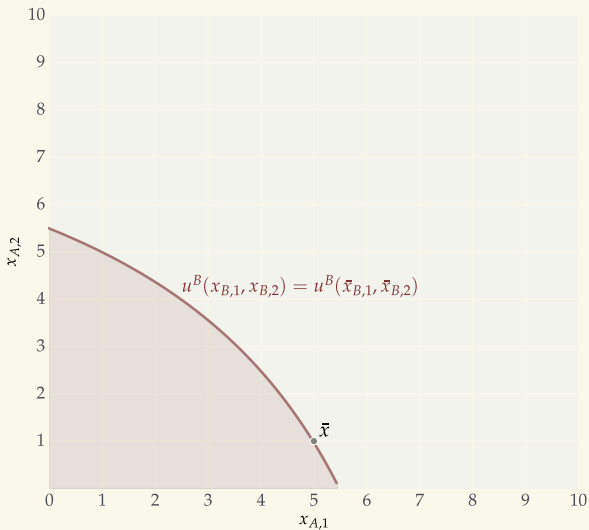
Pareto improvement



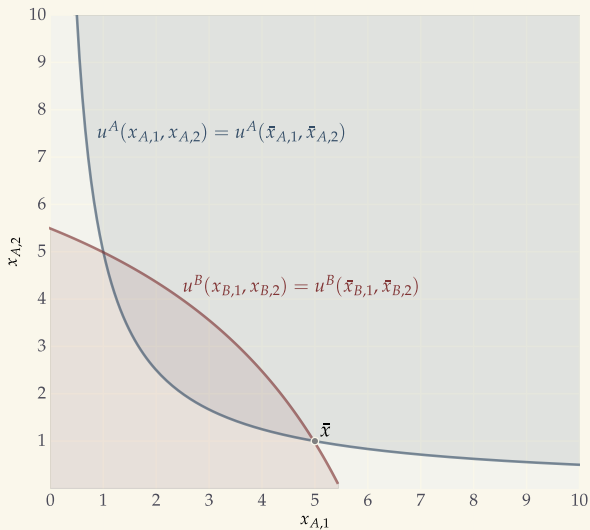
Pareto improvement



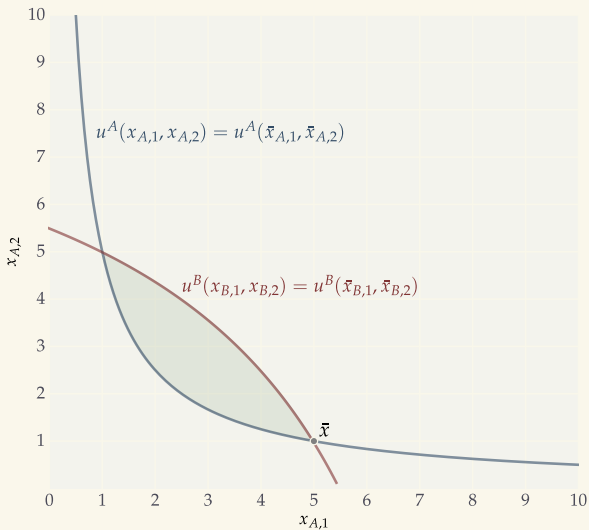
Pareto improvement



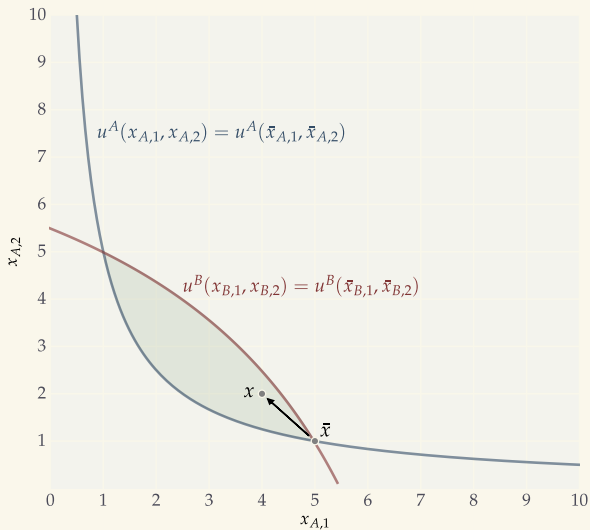
Pareto improvement



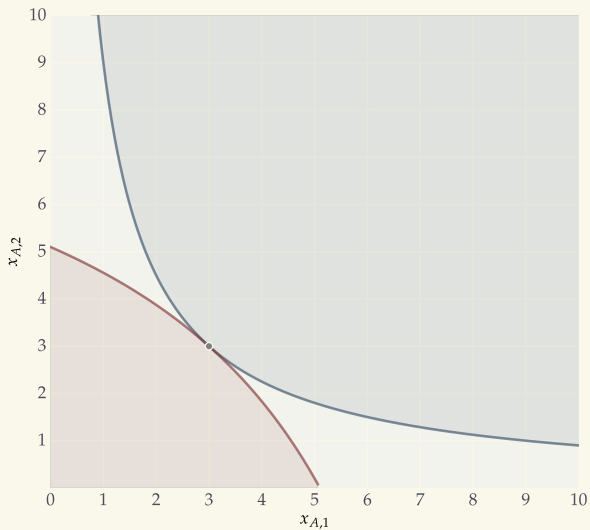
Pareto improvement



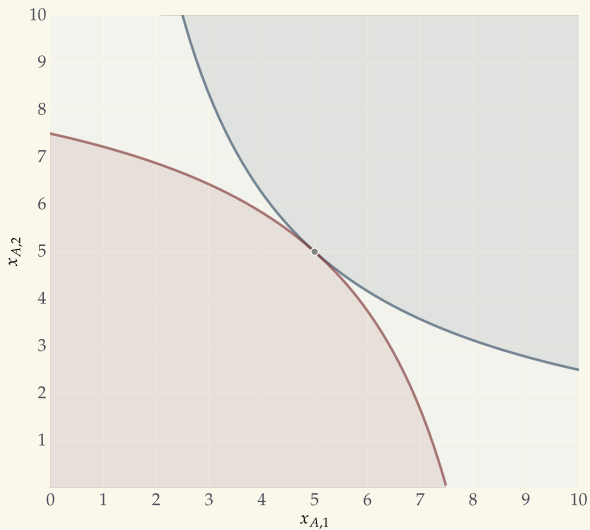
Pareto improvement



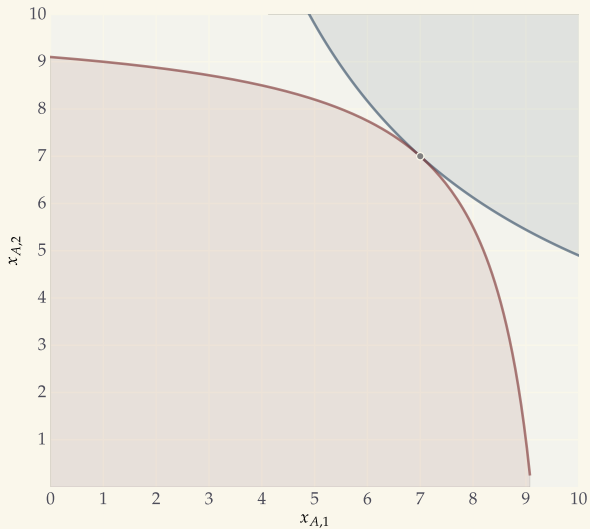
Pareto efficient allocations



Pareto efficient allocations



Pareto efficient allocations



Market as a mechanism

Market has advantages as a reallocation mechanism

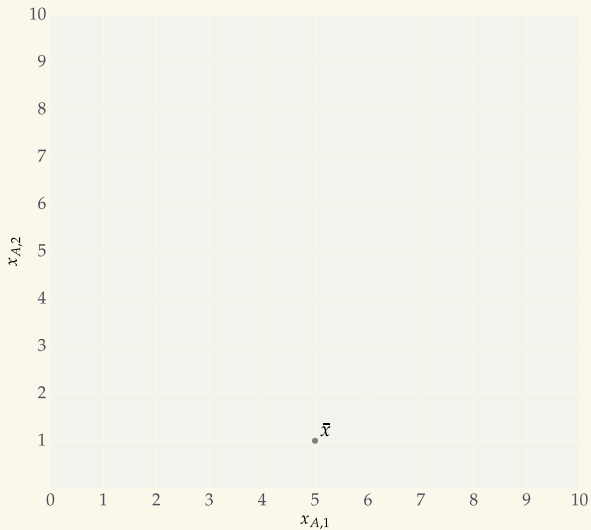
First fundamental theorem

- Competitive equilibrium is Pareto efficient
- Hence, market mechanism can achieve efficiency
- Informationally less demanding (highly scalable)

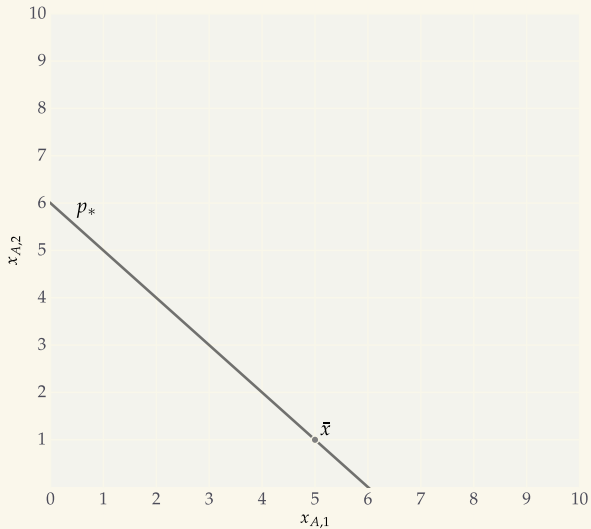
Second fundamental theorem

- Any Pareto efficient outcome can be achieved as a competitive equilibrium
- Another advantage of market mechanism, yet informationally (and technically) more demanding
- Personalized lump-sum taxes/subsidies required

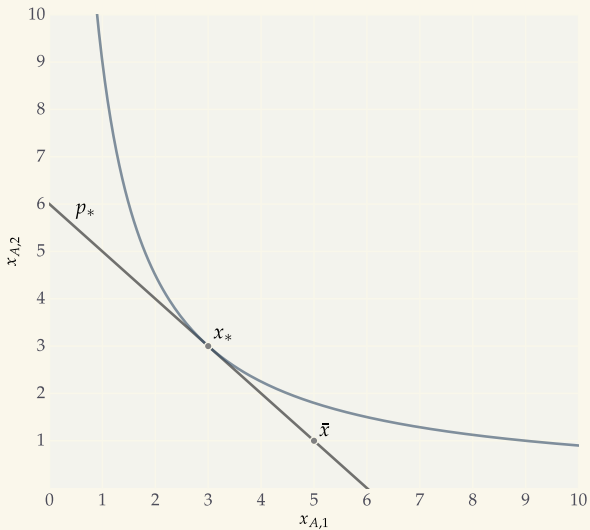
First fundamental theorem



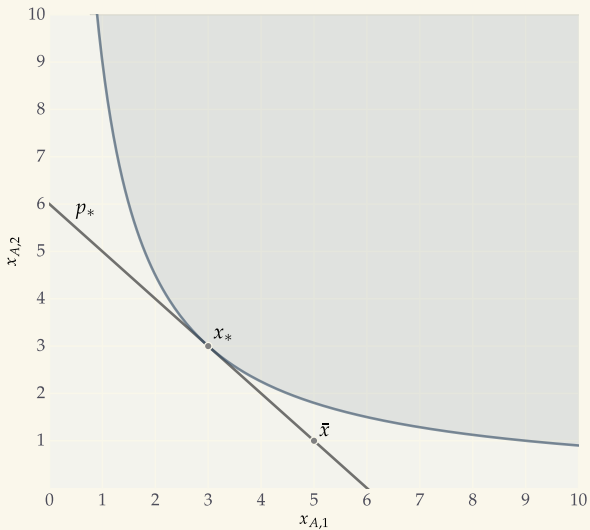
First fundamental theorem



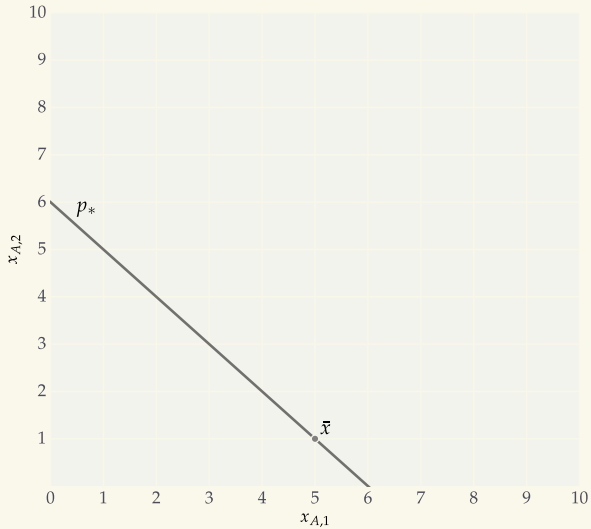
First fundamental theorem



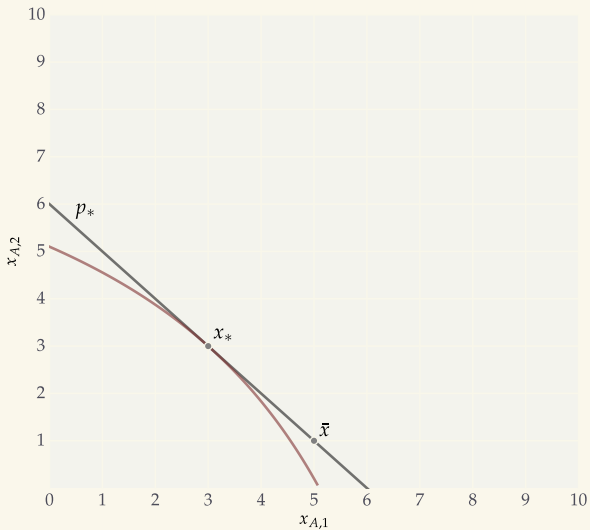
First fundamental theorem



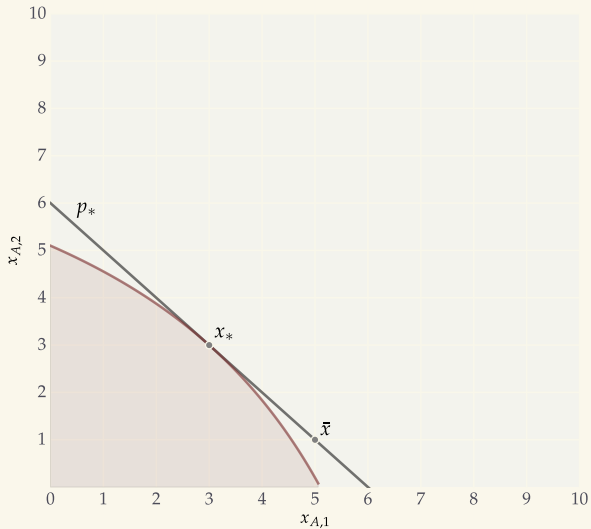
First fundamental theorem



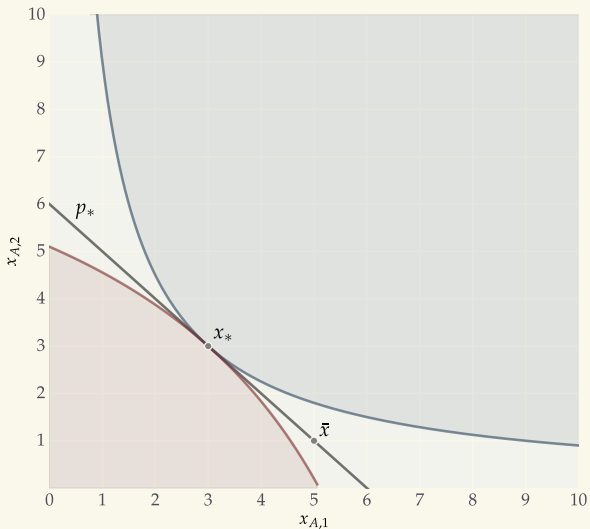
First fundamental theorem



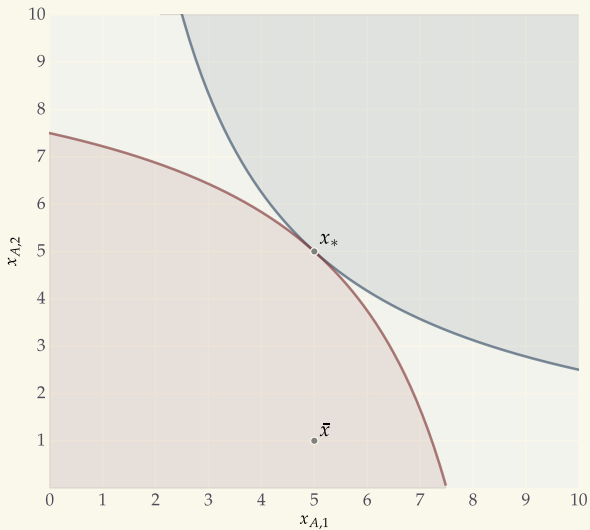
First fundamental theorem



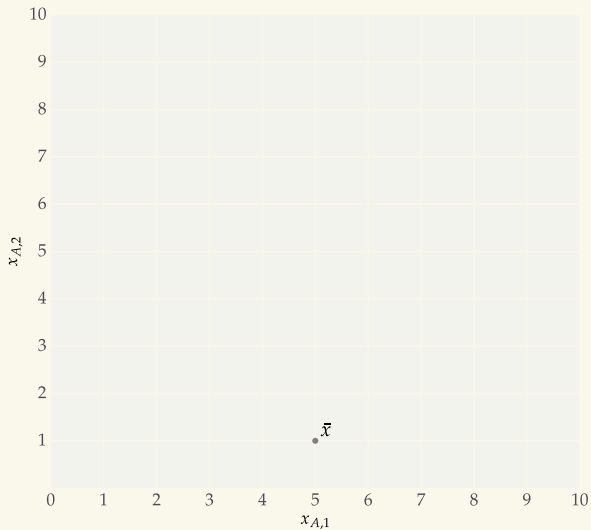
First fundamental theorem



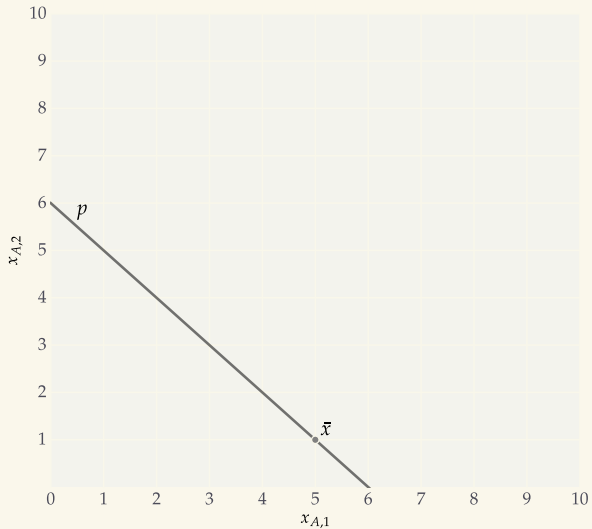
Second fundamental theorem



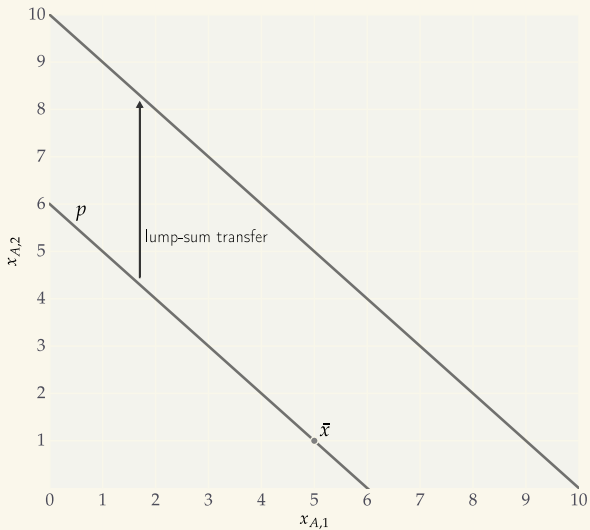
Second fundamental theorem



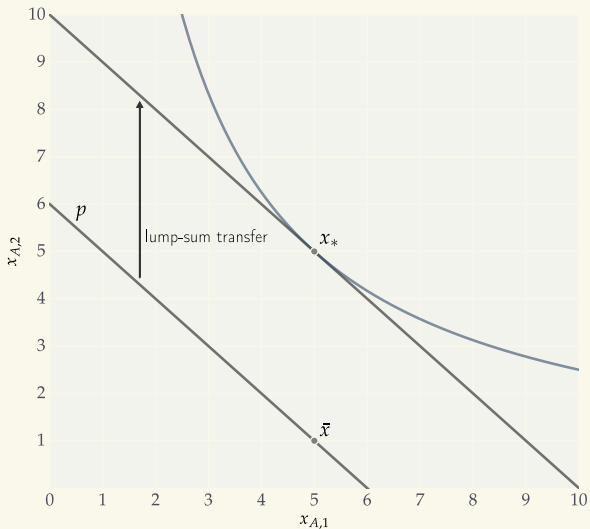
Second fundamental theorem



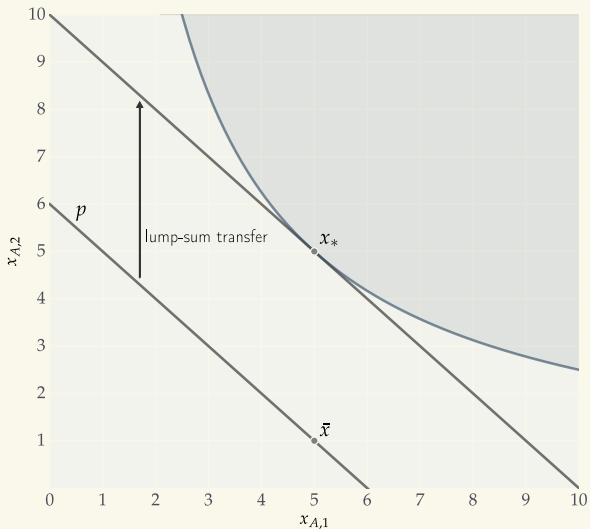
Second fundamental theorem



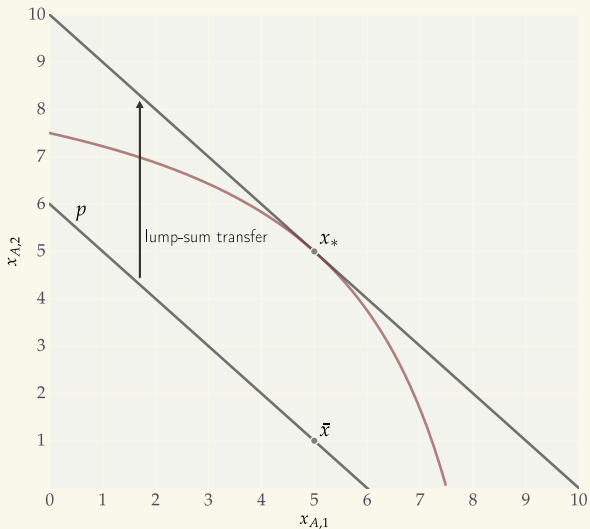
Second fundamental theorem



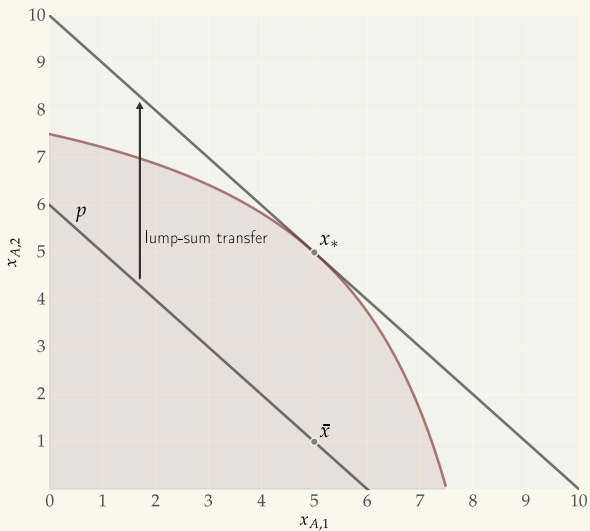
Second fundamental theorem



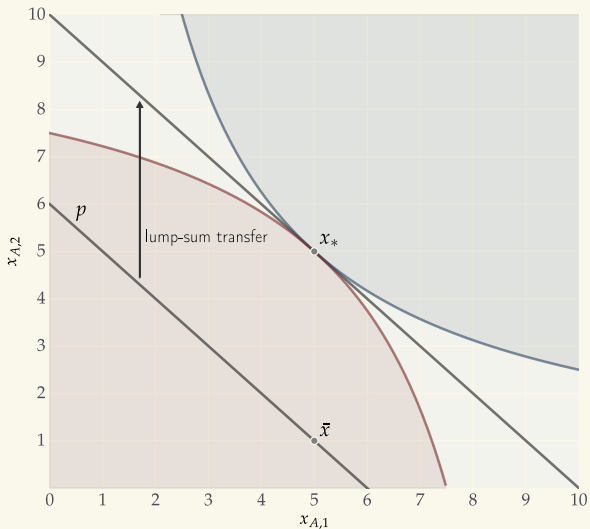
Second fundamental theorem



Second fundamental theorem



Second fundamental theorem



When markets fail

Market failures

- Imperfect competition
 - Incomplete/asymmetric information
 - Externalities (pollution, spillover)
- Market does work, but only in the ideal situations (which might be rather exceptional)

Not all goods provided in the market

- Market only exists for marketable goods
- What about clean air, military, distributional concern?
- These goods and services need to be provided through other mechanism (based on people's preference, which in general is also unknown!)

Example of imperfect competition

Monopoly

- Consumer: $\max_{x,y} u(x,y) := v(x) + y$ s.t. $px + y = m$
- Firm: $\max_x \pi(x) := px - c(x)$, where $c(x) := cx$
- Equilibrium (x^m, p^m) is characterized by

$$v'(x^m) = p^m \quad \text{and} \quad p^m = c - v''(x^m)x^m > c \quad (1)$$

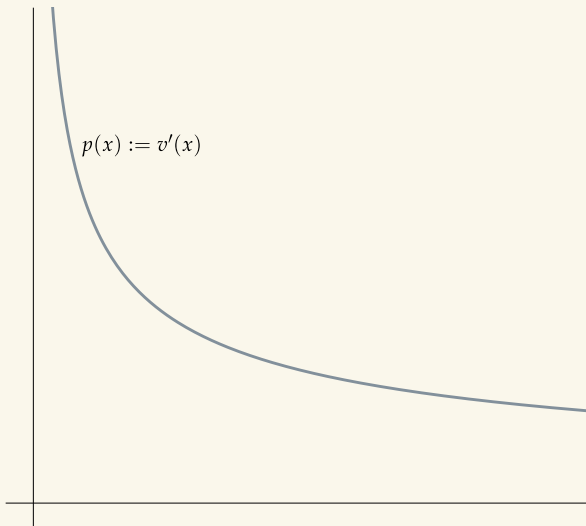
Inefficiency

- Welfare criterion:

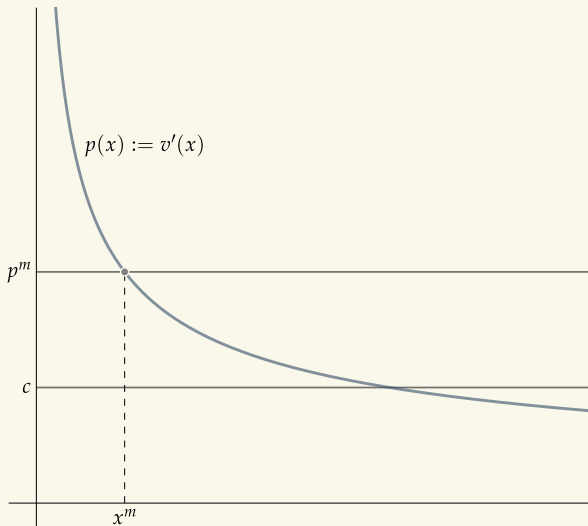
$$u(x,y) + \pi(x) = \int_0^x v'(s)ds - cx + \underbrace{(m + v(0))}_{\text{const.}} \quad (2)$$

- Consider another allocation $v'(x^*) = p^* = c$
- Easy to see $u(x^*, y^*) + \pi(x^*) > u(x^m, y^m) + \pi(x^m)$

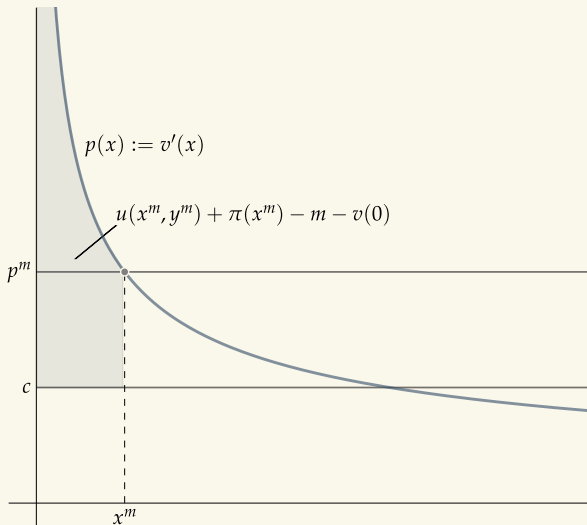
Inefficiency of monopoly



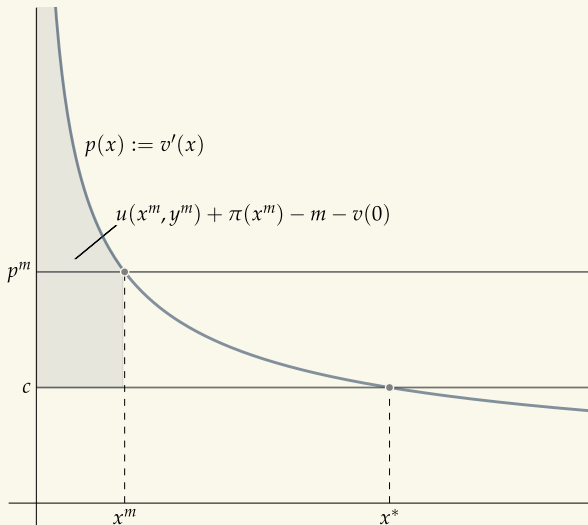
Inefficiency of monopoly



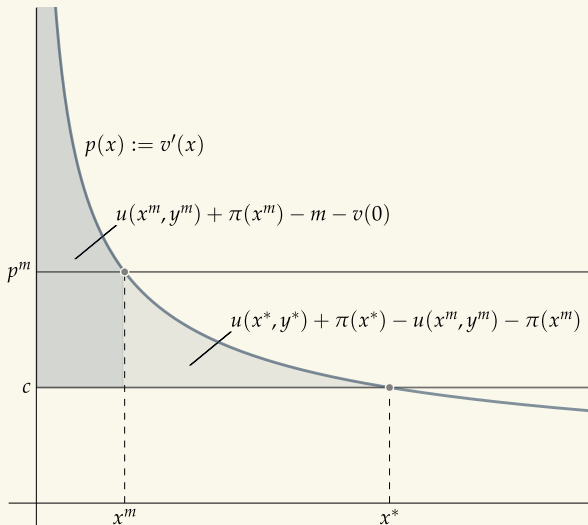
Inefficiency of monopoly



Inefficiency of monopoly



Inefficiency of monopoly



Example of asymmetric information

Second-hand market

- Agent A has $\bar{x}_A = (x_1^h, x_1^l)$ while B has $\bar{x}_B = (x_2^h, x_2^l)$
- Preference:

$$(x_1^h, x_2^h) \succ_A (x_1^l, x_2^h) \succ_A (x_1^h, x_2^l) \succ_A (x_1^l, x_2^l) \succ_A (x_1^h, x_1^l)$$

$$(x_1^h, x_2^h) \succ_B (x_1^h, x_2^l) \succ_B (x_1^l, x_2^h) \succ_B (x_1^l, x_2^l) \succ_B (x_2^h, x_2^l)$$

- Exchange x_1 and x_2 in a second-hand market where you cannot tell the 'quality' (l or h) of goods

Inefficiency

- Equilibrium is $x_A = (x_1^h, x_2^l)$ and $x_B = (x_1^l, x_2^h)$
- Alternative allocation: $x_A^* = (x_1^l, x_2^h)$ and $x_B^* = (x_1^h, x_2^l)$
- Observe: $x_A^* \succ_A x_A$ and $x_B^* \succ_B x_B$

Payoff-matrix representation

		Player B	
		x_2^h	x_2^l
Player A	x_1^h	$u_A(x_1^l, x_2^h), u_B(x_1^h, x_2^l)$	$u_A(x_1^l, x_2^l), u_B(x_1^h, x_2^h)$
	x_1^l	$u_A(x_1^h, x_2^h), u_B(x_1^l, x_2^l)$	$u_A(x_1^h, x_2^l), u_B(x_1^l, x_2^h)$

Table 1: Payoff matrix

		Player B	
		x_2^h	x_2^l
Player A	x_1^h	3, 3	1, 4
	x_1^l	4, 1	2, 2

Table 2: Numerical example

Roles of government

Public economics is the study of roles of government

Policy implementation

- Tax/subsidy for correcting inefficiency/inequity
- Regulations to remove market frictions
- Creating markets where possible
- Providing non-market goods

Preference aggregation

- Social decisions are made based on the “aggregated preference”
- Need to aggregate people’s preference somehow
- Politics (and voting) plays an important role

Plan for this course

Part I: Catch-up

- Consumers and firms
- Strategic environment
- Intertemporal decision making

Part II: Policy design and assessment

- Externalities and public goods
- Pigouvian tax, Coase theorem, VCG mechanism
- Cost-benefit analysis

Part III: Political economy

- Voting rules
- Median voter theorems
- Impossibility theorem