Pareto Concepts

The Project

Consider something much less ambitious than complete agreement on what we mean by good policy

Identify limited instances of unequivocally good policy

- Makes some people better off and no one worse off

Outline

Utility Functions

Each individual's preferences can be represented with a **utility function**

The utility function, U_i, represents person i's preferences if:

1. If person i preferes a policy x to another policy y, then $U_i(x) > U_i(y)$
2. If person i is indifferent between x and y, then $U_i(x) = U_i(y)$

Pareto Dominance

A policy x ***Pareto dominates*** another policy y if two conditions are satisfied:

1. No one strictly prefers y to x—that is, for all i, $U_i(x) \geq U_i(y)$.
2. At least one person strictly prefers x to y—that is, for at least one i, $U_i(x) > U_i(y)$.

If one policy Pareto dominates another, everyone should be able to agree that policy is better

Pareto Improvement

The move from a policy y to an alternative policy x is a ***Pareto improvement*** if x Pareto dominates y.

From any reasonable welfarist perspective, a policy change that is a Pareto improvement is unambiguously good

Pareto Efficiency

A policy x is ***Pareto efficient*** if no other policy Pareto dominates it.

A policy x is ***Pareto inefficient*** if at least one other policy Pareto dominates it.

Pareto efficiency is important for two reasons

1. The set of policies from which there is no unambiguously good policy move

2. We know a lot about how to achieve Pareto efficiency

Outline

Pareto Efficiency and Pareto Improvements

$$U_1(x) = 5 \quad U_1(y) = 2 \quad U_1(z) = 4$$

$$U_2(x) = 1 \quad U_2(y) = 3 \quad U_2(z) = 7$$

$$U_3(x) = 4 \quad U_3(y) = 1 \quad U_3(z) = 1$$

- What are the Pareto efficient policies?

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- What are the Pareto efficient policies?
- Is there a Pareto improvement from x

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Pareto Efficiency and Pareto Improvements[2]

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Outline

Efficiency vs. Improvement

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- y is not Pareto efficient
- x and z are Pareto efficient
- Move from y to x *not* Pareto improvement

The Problem

We care about achieving Pareto improvements

We know how to achieve Pareto efficiency

Moving from a Pareto inefficient to a Pareto efficient policy need not result in a Pareto improvement

- Distributional concerns

Let's see if we can build a bridge between Pareto efficiency and Pareto improvements

Outline

The Model of Policy

A policy has two components

- An action
- A transfer scheme

Think of the action as the policy lever to be pulled

- Free trade, high stakes testing, carbon tax, sanctions

The transfer scheme is a redistribution of money

Formalizing the Model

Society has n people

A is the set of possible actions

$t = (t_1, t_2, \ldots, t_n)$ is a transfer scheme

- Individual transfers can be positive or negative
- Transfer schemes must have *balanced budgets*

$$\sum_{i=1}^{n} t_i = 0$$

A policy is a pair (a, t)

Individual Preferences

A person i's preferences over policies, (a, t) are given by that person's utility function, $U_i(a, t)$

If person i prefers (a, t) to (a', t'), then $U_i(a, t) > U_i(a', t')$

If person i is indifferent between (a, t) and (a', t'), then $U_i(a, t) = U_i(a', t')$

An Example

Consider a society made up of two people: The Mayor (M) and the Teacher's Union (T)

There are two actions under consideration

- Using test scores to evaluate teacher performance and determine pay, called *Pay for Performance* (PP)
- Paying teachers solely based on education and seniority, called *Seniority Pay* (SP)

Example, continued

The Mayor prefers pay for performance

$$U_M(PP, (0,0)) = 10 \qquad U_M(SP, (0,0)) = 2$$

The Teacher's Union prefers seniority pay

$$U_T(PP, (0,0)) = 1 \qquad U_T(SP, (0,0)) = 6$$

Example, continued[2]

It may be possible to get both to agree to a move to performance pay by transferring money to the teachers (e.g., raising the average salary)

Enough of a transfer might compensate the teachers union for the utility loss from adopting performance pay

$$U_M(PP, (-10,000,000, \quad 10,000,000)) = 5$$

$$U_T(PP, (-10,000,000, \quad 10,000,000)) = 7$$

Outline

Quasi-Linear Preferences

Suppose you can separate person i's utility from a policy (a, t) into two components

- Payoff from action a is $v_i(a)$
- Payoff from transfer t_i is simply t_i

$$U_i(a, t) = v_i(a) + t_i$$

Two important assumptions

- Payoffs from money are linear, so money = utility
- Additive separability of transfers and policy

Splitting the Problem

QL preferences is a model that allows us to split policy problems into two components:

1. **Efficiency**: Use action to maximize total utility.
2. **Distribution**: Use transfers to compensate any losers.

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> *Congress created Trade Adjustment Assistance (TAA) in the Trade Expansion Act of 1962 to help workers and firms adjust to dislocation that may be caused by increased trade liberalization. It is justified now, as it was then, on grounds that the government has an obligation to help the 'losers' of policy-driven trade opening.*
>
> *–Congressional Research Service*

QL and Utilitarianism

Under utilitarianism, prefer (x, t) to (y, t') if and only if

$$U_1(x, t) + U_2(x, t) > U_1(y, t') + U_2(y, t')$$

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$$v_1(x) + t_1 + v_2(x) + t_2 > v_1(y) + t'_1 + v_2(y) + t'_2$$

Given a balanced budget, this is equivalent to:

$$v_1(x) + v_2(x) > v_1(y) + v_2(y)$$

With QL preferences, transfers don't matter for utilitarianism, all that matters is the utility implications of the action

QL and Pareto Efficiency

A Pareto efficient policy is one that is not Pareto dominated

Suppose there is a policy (x, t) such that there is some other $y \neq x$ with $\sum_{i=1}^{n} v_i(x) < \sum_{i=1}^{n} v_i(y)$

Under QL, if all budget balanced transfer schemes are possible, (x, t) cannot be Pareto efficient

- Switch action to y and then choose transfers to make up the difference to any losers
- There is still utility "left over"

QL, Pareto Efficiency, and Utilitarianism

A policy is only Pareto efficient if it uses the action that maximizes the sum of the v_i's

Any policy that does so is Pareto efficient

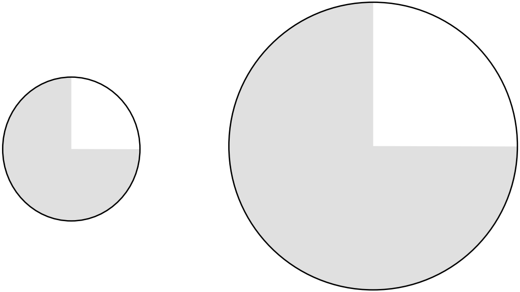
- Transfers take from one person and give to another, which doesn't affect Pareto efficiency

Think about the sum of the v_i's as the amount of "utility pie"

- One action yields a small pie the other yields a large pie

- Transfers affect the division of the pie

Any Division of a Small Pie is Pareto Dominated



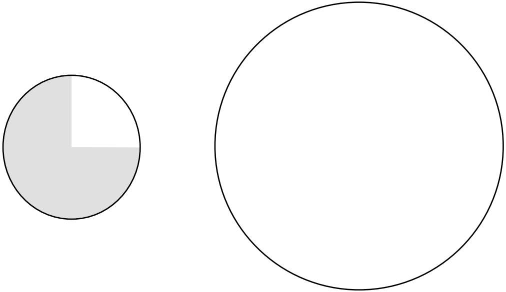
2 Possible Actions

Small pie divided 25% to person 1 and 75% to person 2

Large pie all going to person 1

Suppose no transfers are made

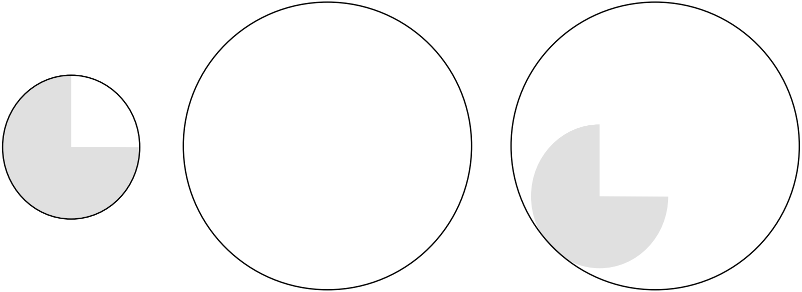
- Move from the small pie to the large pie is a move to Pareto efficiency
- Move from small pie to large pie is not a Pareto improvement

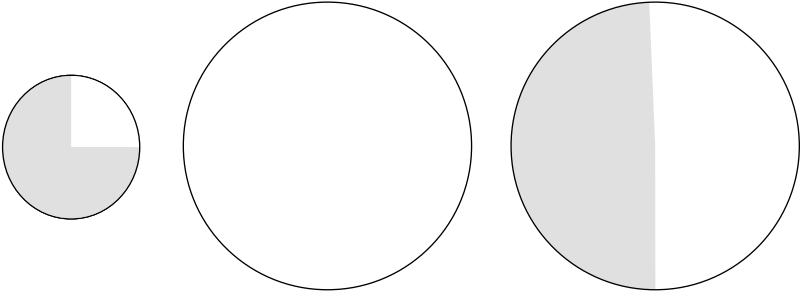


Creating a Pareto Improvement

If we choose transfers correctly we can always create a Pareto improvement after we move to Pareto efficiency

More total utility, so can compensate any distributional losers from action change





An Example

2 actions: Free Trade (FT) or Protectionism (P)

2 People: Capital (C) and Labor (L)

$$v_C(\text{FT}) = 12 \quad v_C(\text{P}) = 4$$
$$v_L(\text{FT}) = 2 \quad v_L(\text{P}) = 9$$

Free trade is the utilitarian optimum

Example, continued

Suppose status quo is $(P, t_C = 0, t_L = 0)$

- Not Pareto efficient

Pareto improving change: $(FT, t_C = -7.5, t_L = 7.5)$

Use transfers to compensate Labor for the utility loss associated with free trade

Outline

The Bridge

We have built a bridge that allows us to first achieve Pareto efficiency and then insure ourselves that we can achieve Pareto improvements

This bridge leans on two critical assumptions

1. Correct transfers will be chosen
2. Quasi-linear preferences

Limited Transfers

Many factors might get in the way of making transfers

- Technological constraints (collecting transfers is hard or expensive)
- Informational constraints (who are the winners and losers)
- Economic constraints (transfers may induce other kinds of inefficiency)
- Political constraints (what if losers from action change lack power)

If transfers are not made, Pareto efficiency on its own need not be normatively compelling

Non Quasi-Linear Preferences

Money is not equal to utility

For instance, diminishing marginal utility in money

Transfer of equal amount of money from one person to another does not imply transfer of equal amount of utility

Suppose the action hurts those who value money very little

- Have to transfer a lot of money to make up for utility loss
- Take the money from people who value it a lot
- See Example 3.4.1 in the book

Outline

Relationship to Cost-Benefit Analysis

In cost-benefit, we ask something like whether a proposal, on net, increases total utility relative to status quo

A policy that fails cost-benefit can't be a Pareto improvement

A policy that passes cost-benefit need not be a Pareto improvement

Be cautious about using cost-benefit as a normative criterion for good policy

Are Pareto Improvements Really Uncontroversial

We've slipped in a welfarist consequentialism

- This is not as bad as having slipped in consequentialism about wealth

Pareto improvements are unequivocally good if the only thing we care about is utility

There are perfectly sensible normative frameworks that would reject some policies that raise everyone's utility

- Values beyond welfare

Take Aways

A policy change that is a Pareto improvement is (maybe) unambiguously good

We know a lot about how to achieve Pareto efficiency, but a move to efficiency need not be unambiguously good

QL model suggests thinking about achieving Pareto improvements in two steps.

1. Take policy action that improves efficiency (size of pie).
2. Compensate any 'losers' with transfers.

Takeways[2]

There are important caveats

- Will transfers be made?
- Since preferences aren't actually QL, how justified am I in separating efficiency and distribution?

Sometimes you might want to pursue policies that are not Pareto improvements

- Distributional effects, political effects
- You are on more tenuous normative grounds

Where We Are Going?

Are there really any Pareto improvements to be had?

Social dilemmas

- Fundamental facts about human interactions that create opportunities for good policy
- We'll need to learn some game theory

Governance dilemmas

- The government is not a Pareto improving machine