

Beyond Revealed Preference:
Toward Choice Theoretic Foundations
for
Behavioral Welfare Economics

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I

Introduction

Introduction

- How much are people willing-to-pay to avoid risk of global warming 10 years from now?
- Hard question to answer empirically:
 - WTP depends on state of mind
(Ex -- post-Katrina vs pre-Katrina)
- This valuation inconsistencies make this a question in Behavioral Welfare Economics

Introduction

- Most common mode of behavioral welfare analysis makes a distinction between:
 - Decision utility
 - "True" or "experienced utility"
- Various problems with this approach:
 - Absence of objective foundations for measures of "true utility"
 - Is the concept even meaningful?

Introduction

- Paper attempts to develop unified framework for behavioral welfare economics
- Rejects the notion that it is necessary or even desirable to recover “true utility”
- Standard welfare economics is about CHOICE, not utility or preferences
- It is based on the libertarian principle: choose for the individual

II

A Review of
STANDARD
welfare economics

Framework

- For rest of talk, look at problem of defining welfare for a single individual
- X = set of objects of choice
Ex -- set of all feasible consumption allocations for individual
- Standard choice situation (SCS):
Constraint set based on objective information available to the individual: $B \subseteq X$
- Data available to the policy analyst:
 1. $G = \{B_1, B_2, \dots\}$ environments of potential interest

The Nature of Positive Analysis

- Positive analysis seeks to describe & predict behavior
- A choice correspondence C that provided data on choice behavior for all possible subsets of X would provide a complete model of behavior
- This is never the case in practice
- Positive analysis:
 - Constraint: Choice data available only for a subset H of 2^X
 - Goal: Extend choices to full domain of interest 2^X

The Nature of Normative Analysis

- Object is to evaluate the desirability outcomes
- In normative exercise take the individual's behavior (i.e., the choice correspondence C) as a given
- In choice-based normative analysis, individual's choices govern the policy analyst evaluations
- Libertarian foundations -- analyst should makes the SAME choices than the individual would make for himself

Normative Analysis (cont.)

- Normative evaluation seeks to evaluate the desirability of allocations & policies
- If full choice correspondence C known the STANDARD normative exercise is trivial
- B_p = set of allocations generated by set of feasible policies
- Government should choose a policy that induces an allocation in $C(B_p)$

Normative Analysis (cont).

- STANDARD welfare analysis is rooted in choice
- Evaluate individual welfare by applying a binary relation R defined on X
 - xRy means that, if x and y belong to B , and if y is in $C(B)$
 - then x is also in $C(B)$
 - Called "revealed preference", but it is just a summary of the choice data
- When we evaluate welfare based on ordering

Common misconception

- Economics assumes that:
 1. Individuals always have well-defined preferences
 2. They make choices by maximizing those preferences

Modern view of utility and preferences

- We do not know how people make choices

In fact, the brain might use complex processes that do

not resemble AT ALL utility maximization

- Neoclassical assumption:
 - The choice correspondence satisfies WARP

- WARP basically says that the revealed preference relation R is complete AND consistent

Very Important !

- WARP does not imply that utility functions exist, only that they are a useful way of summarizing choice data
- I.e., preferences and utility functions are **POSITIVE TOOLS**, not normative tools
 - Describe choices in data $H \subseteq 2^X$, and then to extend choice to other situations using those preferences
- Preferences and utility functions (estimated from the data) can't resolve normative questions!!!!

Summary of STANDARD Welfare Economics

- Begin with some choice data C defined \underline{R} :
- Construct a "revealed preference relation" R a
 bc
- As long as C satisfies WARP, then R^d provides a consistent evaluation of f, g policies that **is consistent with how the individual would choose for himself**

III

Why do we need

BEHAVIORAL WELFARE ECONOMICS ?

Framework

- Generalized choice situation:
 - $G = (B, d)$
 - $B \subseteq X$ -- a budget (as before)
 - d -- ancillary conditions
- \mathbf{G} -- set of all environments of interest
- Examples of ancillary conditions:
 - Time @ which decision is made
 - Order in which decision is made
 - Labeling of a "status-quo" or default

Problem

- Choices in different GCSs may conflict:
 - same budget B
 - different ancillary condition d
 - different choice
- Example:
 - B = feasible lifetime consumption paths from $t=1$ onwards
 - d_1 =choose future savings @ $t=0$ (I.e., pre-commit)
 - d_2 =choose savings every period
 - $C(B, d_1)$ entails high saving rate
 - $C(B, d_2)$ entails low savings rates

Another example

- $X = \{a, b, c\}$
- $C(\{a, b\}, d_1) = \{a\}$
- $C(\{a, b\}, d_2) = \{b\}$

Why a problem?

- $C(\{a, b\}, d_1) = \{a\} \rightarrow a$ revealed strictly preferred to b
- $C(\{a, b\}, d_2) = \{b\} \rightarrow b$ revealed strictly preferred to a
- Inconsistent: a cycle
- Standard logic of welfare analysis breaks down: Which is better a or b ?

The problem (cont.)

- Rapidly growing body of evidence that these types of inconsistencies are pervasive and economically important
- How do we do welfare analysis when individuals choices do not lead to consistent revealed preferences (i.e., when standard welfare economics break down)?

Is this a problem for environmental economics

- Conjecture: the problem is specially strong in the environmental domain
- Why?
 - Externalities and public goods might be particularly responsive to framing, social situations and other ancillary conditions
 - Complex problems where individuals unlikely to have good information
 - Diffused costs may lead to rapid and non-reasoned

IV

Basics of
Choice Theoretic Behavioral Welfare
Analysis

The Basic Idea

- Behavioral welfare analysis can also be rooted in choice
- Evaluate individual welfare by applying a binary relation R , defined on X
 - Don't pretend that it "reveals" a hidden "true preference",
it is simply a summary of what is chosen
 - xRy means that, if x and y belong to B , and y is in $C(G)$,
then x is also in $C(G)$
- While this type of relation need not be

The Basic Idea (continue)

R:

1	6	3
2	7	2
4	8	
3		

- Relationship incomplete & intransitive
- But 1 and 6 natural candidates for best outcomes out since everything else seems "better"

The Welfare Relations

- xRy means x is chosen for some G where x is available, and there is no G for which y is chosen but x isn't when it is available
- xPy means x is chosen without y for some G where both are available, and there is no G for which y is chosen without x when both are available
- xP^*y means x is chosen without y for some G , and y is never chosen when x is available

The Welfare Relations (cont.)

	xPy	xIy	xP^*y	x & y non-comparable
B1	x	xy	-	x
B2	-	xy	x	xy
B3	xy	-	x	y
...

Individual Welfare Optima

- Weak optimum: x such that there is no y in X with yP^*x
- Strict optimum: x such that there is no y in X with yPx
- Any x in $C(X,d)$ is a weak optimum within X
There may be others
- Any unique x in $C(X,d)$ is a strict optimum within X
But there may be others

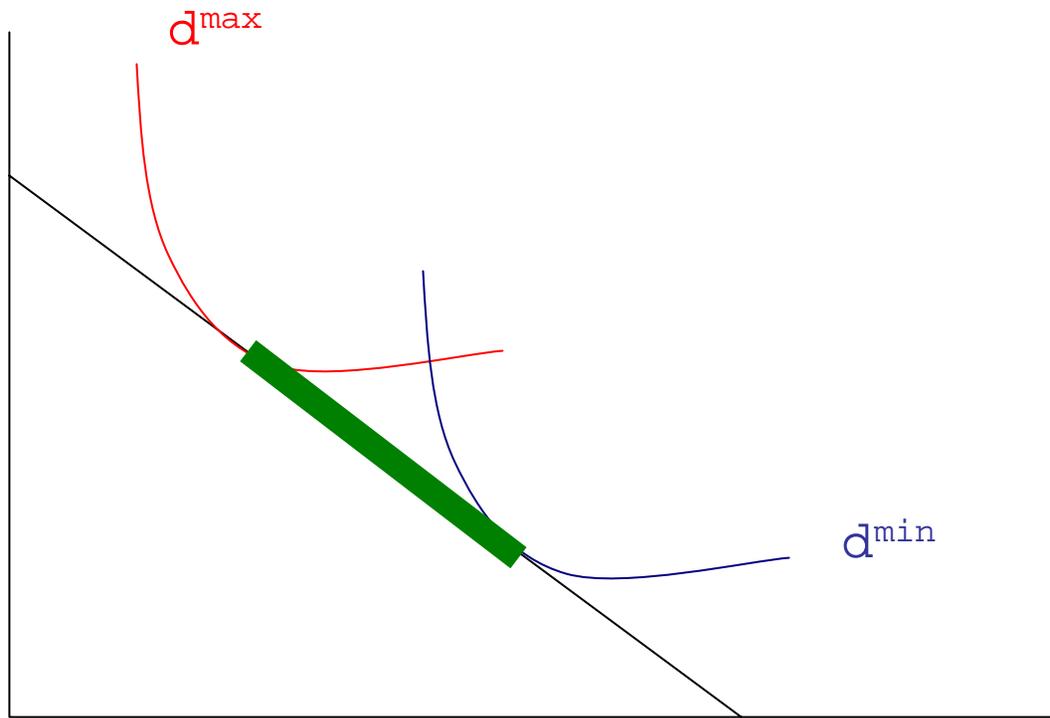
Existence of Individual Welfare Optima

- Weak individual welfare optima always exist
- Strict individual welfare optima may not exist

Example

- $G_1 = \{x, y\}$ -- x chosen
 - $G_2 = \{y, z\}$ -- y chosen
 - $G_3 = \{x, z\}$ -- z chosen
 - $G_4 = \{x, y, z\}$ -- x chosen
-
- Implies: xP^*y , yP^*z , x and z unranked
 - Weak & strict welfare optima: x
 - Intransitivity of P^* is a problem for standard positive analysis (since choice data inconsistent with WARP), but not for normative analysis!

Example



Relation to multi-self Pareto Optima

- Assume:
 - G is the Cartesian product of X and D (a set of ancillary conditions)
 - For each D, choices follow WARP
- Then: Weak/Strict Individual Welfare Optima =
Weak/Strict multi-self Pareto Optima
- Result justifies this criterion without reference to questionable psychological assumptions

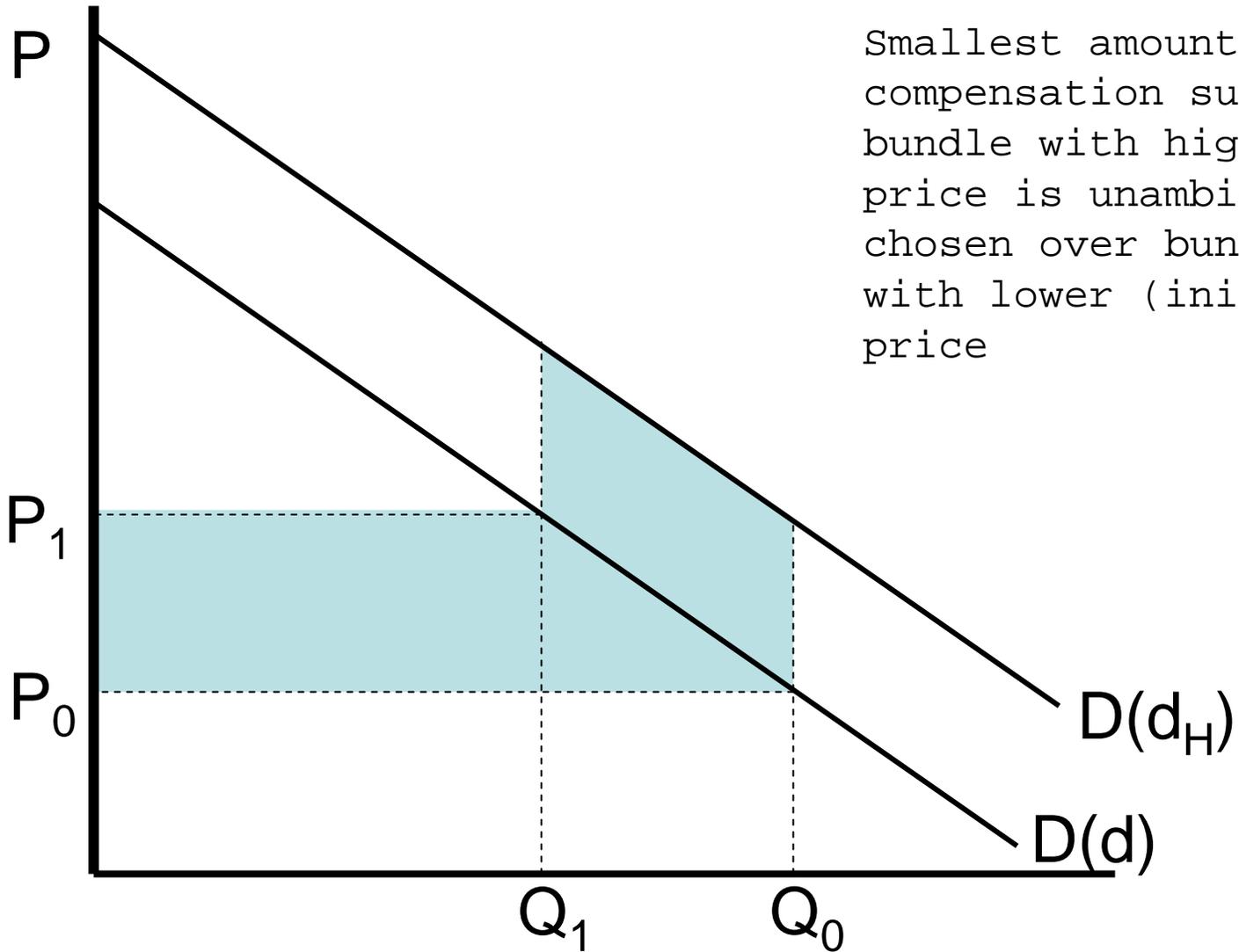
Applied Welfare Analysis

- Possible to define counterparts to tools such as compensating and equivalent variation
- CV-A: the smallest amount of compensation such that the new outcome (+ the compensation) is unambiguously chosen over the initial outcome
- CV-B: the largest amount of compensation such that the initial outcome is chosen over the new outcome (+ the compensation)

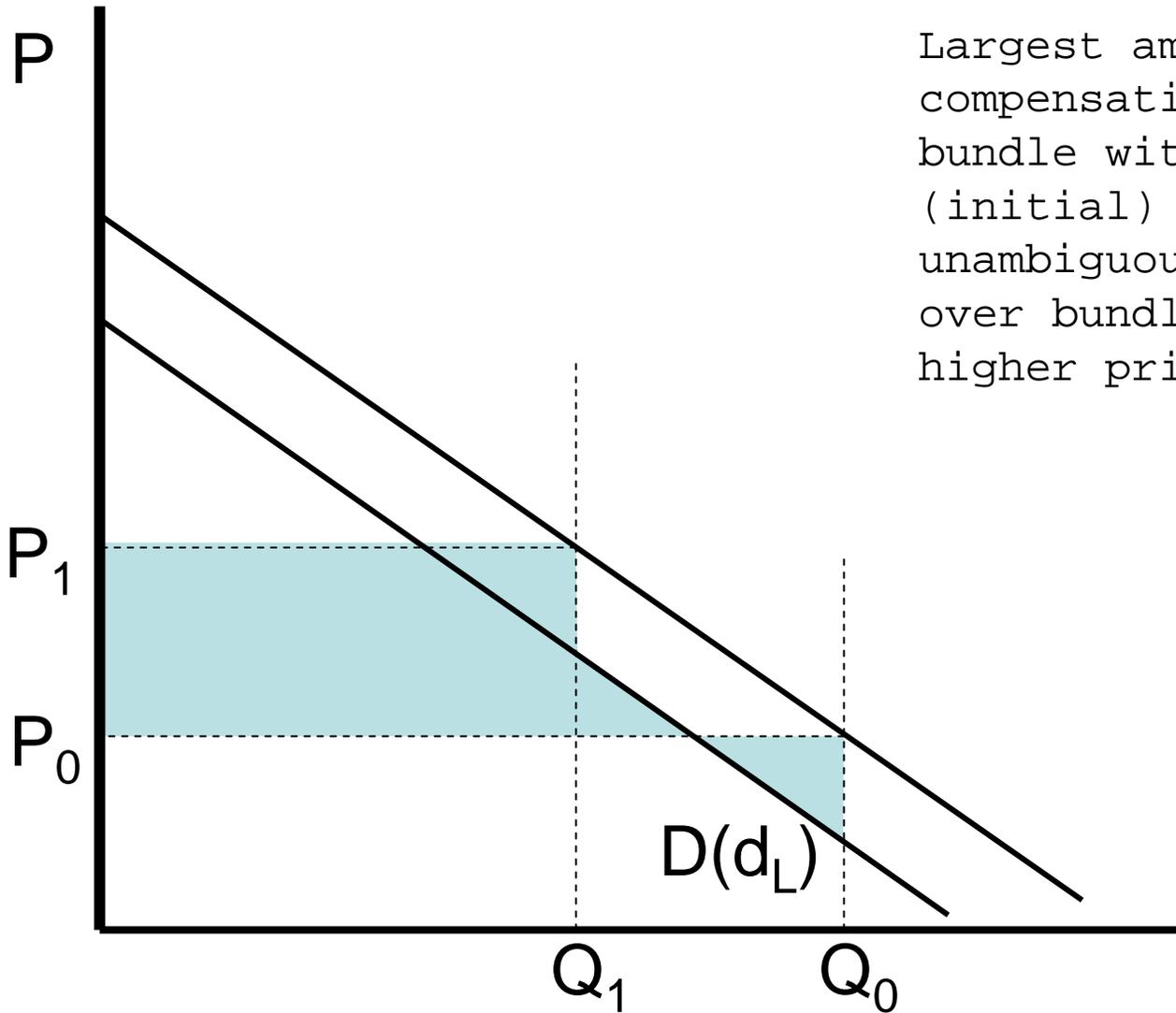
Applied Welfare Analysis (cont.)

- Can also examine a counterpart to consumer surplus
- Special case (with no income effects):
 - Positive model: $U = x + d v(y)$
 - Ancillary condition lies in $[d_L, d_H]$
- Consider an increase in price from P_0 to P_1 , fixing some ancillary condition d

CV-A



CV-B



Largest amount of compensation such that bundle with lower (initial) price is unambiguously chosen over bundle with higher price

Generalized Pareto Optima

- X = set of social alternatives
- Alternative x in X is a weak generalized Pareto optimum if there does not exist y in X with $y P_i x$ for all individuals i
- Subject to a weak technical condition, we can guarantee the existence of weak generalized Pareto optima
- Application: Pareto optimality of behavioral competitive equilibria (1st

Summary

- Possible to extend choice based welfare analysis to environments with choice inconsistencies
- Standard tools extend to this world (and converge to standard answers) for the case of "small inconsistencies"
- Key differences with STANDARD framework:
 - some alternatives may not be comparable
 - multiple (weak) individually optimal

V

Refinements

The logic of refinements

- Basic intuition: There are many Weak optima because choice correspondence has inconsistencies
- Logic of refinement: If can eliminate some GCSs G from the set of relevant choice data, then R and P^* become weakly finer, and the set of optima become smaller

Refinement agenda

- Officiate where possible between conflicting data (when $C(x, d_1) \neq C(x, d_2)$)
- Try to find an OBJECTIVE basis for disqualifying some of the conflicting data
- This shrinks G , reducing the set of Pareto optima

Suspect conditions

- Premise:
 - Information processing is imperfect
(attention, memory, forecasting, learning)
 - Under some conditions, set X may be misperceived
- Suppose individual:
 - perceives (X, d_1) as X, chooses x
 - perceives (X, d_2) as Y, chooses y
- Basic principle: If planner is

Agenda for Behavioral Welfare Economics

- Develop evidence on brain's DM and information processing systems and their malfunctions
- Identify certain GCSs as suspect on the grounds that one or more processes work poorly
- Add new GCSs (e.g., carefully constructed field experiments in which good information processing is facilitated)
- Possibly deconstruct suspect GCSs (requires better information than

Types of valid evidence

- Officiating between GCSs requires the use of non-choice evidence. Where will it come from?

- Neuroeconomics: direct evidence about performance of information processing and other DM systems

 - Application: Addiction

 - (Bernheim and Rangel

 - AER, 2004)

- Validation and elicitation protocols

Food for Thought

- In some environmental domains, most GCSs available from data might be suspect
- Welfare analysis in those cases might require the elimination of most GCSs (using objective criteria) and the creation of new data sources using carefully design field experiments

VI

Discussion

Summary

- Application of the libertarian principle to define a choice based welfare economics does not require all choices to be consistent
- Possible to extend welfare economics to circumstances when individuals make inconsistent choices
- Resulting methodology can provide unambiguous guidance in some circumstances, even if guidance is ambiguous in others

Summary (cont.)

- New tools converget to standard answers in the case of "small choice inconsistencies"
- Evidence about information processing failures during DM suggests that some choice data cannot be used to evaluate policy
- Neuroeconomics provides an objective way to officiate when choice evidence is suspect for normative purposes