GR 6307
Public Economics and Development

1.1 Detour:
Applied Welfare Analysis

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Outline

2 Approaches to Policy Evaluation

Theory: Welfare Concepts and Sufficient Statistics

An Application

Outline

Chetty (2009): 2 Competing Paradigms

- We can characterize 2 competing paradigms for policy evaluation & welfare analysis

1. **Structural:** specify a *complete* model, and estimate or calibrate the model's primitives.
2. **Reduced form:** prioritize clean *identification* of causal effects. Accept narrower scope of analysis.

- PRO structural / CON reduced form:
  1. Estimate statistics that are policy-invariant parameters of models.
  2. Can simulate effects of changes in policies on behavior and welfare.
- PRO reduced form / CON of structural approach:
  1. (quasi-)experimental research designs achieve compelling estimates of treatment effects
  2. Need to estimate all primitive parameters. Impossible to be compelling (selection, simultaneity, omitted variables etc)

Chetty (2009): A Bridge Between the 2

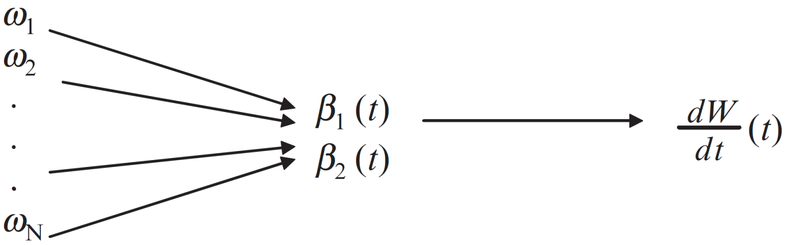
- Public Economics has pioneered an approach to compromise between the two: **Sufficient Statistics.**
- Setup:
  - Policy instrument t
  - Social welfare $W(t)$ (e.g. $\sum_h \gamma_h V_h(t)$)

$$\text{What is } \frac{dW(t)}{dt}??$$

- Structural approach:
  1. Write model with primitives $\boldsymbol{\omega} = (\omega_1, \ldots, \omega_N)$
  2. Derive
  $$\frac{dW(t)}{dt} = f(\boldsymbol{\omega})$$
  3. Estimate $\boldsymbol{\omega}$
  4. Calculate $dW(t)/dt$

Chetty (2009): A Bridge Between the 2

Primitives | **Sufficient statistics** | **Welfare change**



ω = preferences, constraints

$\beta = f(\omega, t)$
$y = \beta_1 X_1 + \beta_2 X_2 + \varepsilon$

dW/dt used for policy analysis

ω not uniquely identified

β identified using program evaluation

Chetty (2009): Benefits

1. Simpler to estimate.
   1.1 Less data and variation needed to identify marginal treatment effects than full structural model
   1.2 Especially beneficial with heterogeneity and discrete choice (lots of primitives, still few MTEs)
2. Weaker assumptions and design-based empirical methods.
   2.1 more transparent and empirically credible estimates.
3. Can be implemented even when we're uncertain about what the right model is.

Chetty (2009): Costs

1. Each question requires its own sufficient-statistics formula
    1.1 e.g. unemployment benefit level vs duration of unemployment benefits; tax rate vs tax base etc.
    1.2 In some settings it might be hard to characterize the sufficient statistics formula.
2. More potential to be misapplied: A little bit of knowledge is a dangerous thing!
    2.1 One can draw policy conclusions from a sufficient-statistics formula without evaluating the validity of the model it is based on. Structural requires full estimation of the model so can only draw conclusions from models that fit the data.

Precedent: Harberger (1964)

- Remember Harberger's deadweight loss triangle?
- That's the first sufficient statistics formula!
- The sufficient statistic is the elasticity of equilibrium quantity of the taxed good wrt its after-tax price
- The structural primitives are the demand- and the supply-elasticities of all the goods in the economy

Precedent: Harberger (1964)

- Consider a static, general equilibrium model.
- An individual is endowed with Z units of numeraire good y (think of it as labor)
- Firms use the numeraire as input to production of J consumption goods $\boldsymbol{x} = (x_1, \ldots, x_J)$ with convex cost functions $c_j(x_j)$
- Total cost of production is $c(\boldsymbol{x}) = \sum_{j=1}^{J} c_j(x_j)$. Production is perfectly competitive.
- Government taxes good 1 at rate t. $\mathbf{p} = (p_1, \ldots, p_J)$ is the vector of (endogenous) pretax prices

Precedent: Harberger (1964)

- Consumer takes prices as given and maximizes quasi-linear utility:

$$\max_{\boldsymbol{x},y} u\left(x_1,\ldots,x_J\right)+y$$
$$\text{s.t. } \boldsymbol{p}\cdot\boldsymbol{x}+tx_1+y=Z$$

- Firms take prices as given and solve

$$\max_{\boldsymbol{x}} \boldsymbol{p}\cdot\boldsymbol{x}-c\left(\boldsymbol{x}\right)$$

- These two problems give us demand and supply of the J goods: $\boldsymbol{x}^D\left(\boldsymbol{p}\right)$ and $\boldsymbol{x}^S\left(\boldsymbol{p}\right)$
- Markets clear to close the model: $\boldsymbol{x}^D\left(\boldsymbol{p}\right)=\boldsymbol{x}^S\left(\boldsymbol{p}\right)$

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Theory: Welfare Concepts and Sufficient Statistics

- Kleven (2019) *Sufficient Statistics Revisited*
- Finkelstein (2019) *Welfare Analysis Meets Causal Inference: A Suggested Interpretation of Hendren*

Kleven (2019)

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Finkelstein (2019): Overview

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An Application

Hendren & Sprung-Keyser (2019) *A Unifierd*

Hendren & Sprung-Keyser (2019): Overview

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