The Policy Elasticity

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  - Only the compensated effect matters

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- But moving from positive to normative analysis is difficult
  - Goolsbee (1999): *"The theory largely relates to compensated elasticities, whereas the natural experiments provide information primarily on the uncompensated effects"*

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  - In the broad class of models where taxes are the only distortion, the causal impact of the policy on the government budget (a.k.a. "Fiscal Externality") is sufficient for **all** behavioral responses
- **Key message:** Calculate the fiscal implications of behavioral responses
  - e.g. "The behavioral response to the EITC expansion increased government outlays by 5%"
  - These readily nest into general normative framework
    - (Even though they are not technically a measure of deadweight loss)

1. Model
2. The Marginal Value of Public Funds
3. Applications to Top Tax Rate, EITC, Job Training, Food Stamps, Housing Vouchers

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     - Includes virtual income of nonlinear schedules

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- Utility of type i

$$u_i\left(\mathbf{x}_i, \mathbf{l}_i, \mathbf{G}_i\right)$$

Utility Maximization

- Indirect Utility:

$$V_i\left(\left\{\tau_{ij}^l\right\}_j, \left\{\tau_{ij}^x\right\}_j, T_i, \mathbf{G_i}, y_i\right)$$
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- Let λ_i denote marginal utility of income

Social Welfare

- Social welfare, W, given by:

$$W\left(\left\{\left\{\tau_{ij}^{l}\right\}_j, \left\{\tau_{ij}^{x}\right\}_j, T_i, \mathbf{G_i}, y_i\right\}_i\right) = \sum_i \psi_i V_i\left(\left\{\tau_{ij}^{l}\right\}_j, \left\{\tau_{ij}^{x}\right\}_j, T_i, \mathbf{G_i}, y_i\right)$$

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- **What is the welfare impact of local changes to taxes, transfers, or publicly-provided goods?**

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  - First, start with the positive questions...

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  - $\frac{d\hat{t}_i}{d\theta}$ captures distributional impact
- Behavioral response affects budget

$$\frac{d}{d\theta}\left(\sum_{j=1}^{J_X} \hat{\tau}_{ij}^x(\theta)\hat{x}_{ij}(\theta) + \sum_{j=1}^{J_L} \hat{\tau}_{ij}^l(\theta)\hat{l}_{ij}(\theta)\right) = \underbrace{\left(\sum_j^{J_X} \frac{d\hat{\tau}_{ij}^x}{d\theta} x_{ij} + \sum_j^{J_L} \frac{d\hat{\tau}_{ij}^l}{d\theta} l_{ij}\right)}_{\text{Mechanical Impact on Govt Revenue}} + \underbrace{\left(\sum_j^{J_X} \tau_{ij}^x \frac{d\hat{x}_{ij}}{d\theta} + \sum_j^{J_L} \tau_{ij}^l \frac{d\hat{l}_{ij}}{d\theta}\right)}_{\text{Behavioral Impact on Govt Revenue}}$$

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  - Money metric utility measure
  - Equivalent to marginal EV and marginal CV Appendix

Characterization of Marginal Willingness to Pay for Policy

- The envelope theorem implies:

$$\frac{\frac{d\hat{V}_i}{d\theta}|_{\theta=0}}{\lambda_i} = \sum_{j=1}^{J_G} \frac{\frac{\partial u_i}{\partial G_{ij}}}{\lambda_i} \frac{d\hat{G}_{ij}}{d\theta} + \frac{dT_i}{d\theta} + \sum_{j}^{J_X} \frac{d\hat{\tau}_{ij}^x}{d\theta} x_{ij} + \sum_{j}^{J_L} \frac{d\hat{\tau}_{ij}^l}{d\theta} l_{ij}$$

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$$\frac{\frac{d\hat{V}_i}{d\theta}|_{\theta=0}}{\lambda_i} = \sum_{j=1}^{J_G} \frac{\frac{\partial u_i}{\partial G_{ij}}}{\lambda_i} \frac{d\hat{G}_{ij}}{d\theta} + \frac{dT_i}{d\theta} + \sum_j^{J_X} \frac{d\hat{\tau}_{ij}^x}{d\theta} x_{ij} + \sum_j^{J_L} \frac{d\hat{\tau}_{ij}^l}{d\theta} l_{ij}$$

- Behavioral responses matter in keeping track of net resources

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  - Behavioral responses matter to the extent to which individuals impose resource costs for which they don't pay Non-Marginal GE

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- If government taxation is only wedge between social and private costs, a single causal effect is sufficient
  - Impact on government revenue is sufficient for all behavioral responses

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  - *How much additional revenue could the government obtain if the policy is implemented but individuals' utilities are held constant using lump-sum transfers?* Alternative MEB Definitions

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    - Conceptually, it's a reasonable measure of welfare; just hard to estimate...

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3. Applications to Top Tax Rate, EITC, Job Training, Food Stamps, Housing Vouchers

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  - Section 8 Housing Vouchers
    - Lotteried access to Section 8 in Illinois (Jacob and Ludwig 2012)

Top Tax Rate Increases

- Large literature studying causal impact of top tax rate increases / decreases
  - Saez, Slemrod, and Giertz (2012) provide review
    - Many estimates of causal effect of changes to top income tax rate
    - Tax-weighted taxable income elasticity
  - Suggests 25-50% of mechanical revenue lost (lots of disagreement/uncertainty!)
    - Fiscal cost is \$0.50-\$0.75 for \$1 in transfer
  - Suggests MVPF of \$1.33-\$2

$$MVPF = \frac{1}{1 - .25} = 1.33$$

Detailed Setup

EITC Expansions

- Large literature studying causal impact of EITC expansions (Hotz and Scholz 2003, Chetty et al 2013)
  - Intensive + extensive calculations suggest fiscal cost of EITC is ~14% higher because of labor supply impacts
  - Fiscal cost is \$1.14 for \$1 in mechanical EITC benefits
  - Suggests MVPF of \$0.88

$$MVPF = \frac{1}{1 + .14} = 0.88$$

Food Stamps

- Hoynes and Schanzenbach (2012) use variation across counties in introduction of food stamp program (1960-70s)
  - Tax impact of earnings reduction equal to ~51% of the size of the mechanical transfer (albeit imprecisely estimated)
    - Total fiscal cost is \$1.51 for \$1 in food stamps (using 1970s tax rates)

$$MVPF = \frac{\frac{\frac{\partial u}{\partial G}}{\lambda}}{1 + .51} = 0.66 * \frac{\frac{\partial u}{\partial G}}{\lambda}$$

  - Food stamps are in-kind, "G"
    - May be that $\frac{\frac{\partial u}{\partial G}}{\lambda} < c^G$ because goods are in kind
    - Smeeding (1982) estimates 0.97; Moffitt (1989) estimates ~1
    - Whitmore (2002) estimates 0.80 for marginal/distorted recipients
- Assuming food stamps valued as cash, MVPF is 0.66
  - Also, causal effect in 1970 = causal effect now?

Job Training

- Job Training Partnership Act of 1982 provided job training services to low income youth and adults
- Bloom et al (1997) report results from RCT (I focus on adult women impact)
  - Increased labor supply + reduction in welfare benefits (Food stamps + AFDC) reduce costs by \$0.34 for every \$1 in direct program cost
  - Implies $MVPF = \frac{1}{1-.34} = 1.52$ if program costs are valued at its costs
- No estimates of $\frac{\frac{\partial u}{\partial G}}{\lambda}$ for the program
  - Bloom et al (1997) implicitly assume earnings is fully valued
    - Earnings increase of \$1,683 for marginal cost of \$1,381 -> $\frac{\frac{\partial u}{\partial G}}{\lambda} = 1.22$
    - Suggests MVPF of 1.85 if increase was entirely productivity
  - But could be MVPF = 0 if no one valued it

Section 8 Housing Vouchers

- Section 8 is largest low-income housing program in US
- Jacob and Ludwig (2012) exploit excess applications in Illinois
  - Allocated via lottery
  - Estimate significant impact on labor supply and welfare take-up
    - Earnings decrease implies fiscal externality of \$129 per voucher
    - Welfare programs increase sum to \$432 (mostly medicaid)
    - But vouchers are a lot of money (\$8,400/yr)
    - Voucher cost \$1.05 for every \$1 of vouchers

$$MVPF = 0.95 \frac{\frac{\partial u}{\partial G}}{\lambda}$$

  - Reeder (1985) suggests \$1 vouchers valued at $\frac{\frac{\partial u}{\partial G}}{\lambda} = 0.83$
- Suggests MVPF of 0.79
- ASIDE: Chetty, Hendren, and Katz (2015) suggests $MVPF \approx \infty$ for MTO vouchers targeted to families with young children becuase of increased tax revenue when children grow up

Summary

Policy	$\frac{\frac{\partial u}{\partial G}}{\lambda}$	$\frac{1}{1+FE}$	*MVPF*
Top Tax Rate	1	1.33 - 2	1.33 - 2
EITC Expansion	1	0.88	0.88
Food Stamps	0.8 - 1	0.66	0.53 - 0.66
Job Training	0 - 1.22	1.52	0 - 1.85
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- \$0.66 to a poor person or \$1 to a rich person?

Summary

- Causal effects can readily be translated into a canonical welfare framework (but not MEB)
- No need to decompose the response into substitution and income effects
- If government is only distortion, a single causal effect is sufficient:
  - Impact of behavioral response on government budget
  - Remains sufficient in cases when ETI is not
- Model motivates particular benefit-cost ratio (MVPF) for non-budget neutral policies (Mayshar 1990) that relies only on causal effects
- In contrast to MEB, can compare across people using social marginal utilities of income ("Okun's Bucket")

4 Appendix

Compensated (Hicksian) Elasticity

Return

- Previous literature implicitly suggests normative analysis of government policies is difficult because it requires compensated (Hicksian) elasticities

  While decisions on the appropriate size of government must be left to the political process, economists can assist that decision by indicating the magnitude of the total marginal cost of increased government spending. That cost depends on the structure of taxes, the distribution of income, and the ***compensated elasticity*** *of the tax base with respect to a marginal change in tax rates. (Feldstein, 2012)*

  Graduate textbooks teach that the two central aspects of the public sector, optimal progressivity of the tax-and-transfer system, as well as the optimal size of the public sector, depend (inversely) on the ***compensated elasticity*** *of labor supply with respect to the marginal tax rate. (Saez, Slemrod, and Giertz, 2012)*

Feldstein Quote

- Feldstein (2012, JEL)
  - *Despite the centrality of the concept of excess burden, the Mirrlees Review fails to provide a clear explanation that the excess burden is the difference between the loss to taxpayers caused by the tax (e.g., the amount that taxpayers would have to receive as a lump sum to be as well off as they were before the imposition of the tax) and the revenue collected by the government. There are instead several alternative definitions at different points in the text, some of which are vague and some of which are simply wrong. For example, the Mirrlees Review states "it is the size of this revenue loss that determines the 'excess burden' of taxation" (61). That is not correct since the excess burden depends only on the substitution effects while revenue depends also on the income effects.*

Compensated (Hicksian) Elasticity

Return

- Equivalent Variation MEB from Auerbach (1985) handbook
  - Hypothetically close each individual's budget constraint using individual-specific lump-sum transfers
    - Define an augmented policy path:

$$P^{1985} = \left\{ \left\{ \hat{\tau}_{ij}^{I}(\theta) \right\}_j, \left\{ \hat{\tau}_{ij}^{X}(\theta) \right\}_j, \hat{T}_i(\theta) - \hat{t}(\theta), \widehat{\mathbf{G}}_{\mathbf{i}}(\theta) \right\}_i$$

      where individual is forced to pay for net resources, $\hat{t}_i(\theta)$
    - Still requires individual-specific lump-sum transfers to close the resource constraint
  - MEB is defined as

$$MEB_i^{1985} = \frac{\frac{d\hat{V}_i^{P^{1985}}}{d\theta}\Big|_{\theta=0}}{\lambda_i}$$

    - Depends on compensated elasticities (but not "fully" compensated)

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1. Equivalent variation, $EV_i(\theta)$, of policy $P(\theta)$:

$$V_i\left(\left\{\tau_{ij}^{l}\right\}_j, \left\{\tau_{ij}^{x}\right\}_j, T_i, \mathbf{G_i}, y_i + EV_i(\theta)\right) = \hat{V}_i(\theta)$$

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3. $\frac{\frac{d\hat{V}_i}{d\theta}|_{\theta=0}}{\lambda_i}$

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3. Aggregate across those with same social marginal utility of income

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4. (More subtle) aggregate impacts on budget from those to whom policy does not change,

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- With one tax rate on income and equal social marginal utility of income, taxable income elasticity is sufficient (Feldstein (1999))
  - In general, need to know responses to capital income, SSDI, etc.
  - Impact of behavioral response on government budget remains sufficient

MCPF Expression

Return

$$\begin{aligned}\frac{\frac{\partial \hat{V}_{\hat{i}}^{P}}{\partial \theta}|_{\theta=0}}{\lambda_{\hat{i}}} &= \frac{d\hat{t}_{\hat{i}}}{d\theta} + \left(\sum_{j}^{J_X} \tau_{\hat{i}\hat{j}}^{x} \frac{d\hat{x}_{\hat{i}\hat{j}}}{d\theta} + \sum_{j}^{J_L} \tau_{\hat{i}\hat{j}}^{l} \frac{d\hat{l}_{\hat{i}\hat{j}}}{d\theta}\right) \\ &= \sum_{j} \frac{d\hat{\tau}_{\hat{i}\hat{j}}^{x}}{d\theta} x_{\hat{i}\hat{j}} + \frac{d\hat{\tau}_{\hat{i}\hat{j}}^{l}}{d\theta} l_{\hat{i}\hat{j}}\end{aligned}$$

and

$$-\int \frac{d\hat{t}_i}{d\theta} di = \sum_{j} \left(\frac{d\hat{\tau}_{\hat{i}\hat{j}}^{x}}{d\theta} x_{\hat{i}\hat{j}} + \frac{d\hat{\tau}_{\hat{i}\hat{j}}^{l}}{d\theta} l_{\hat{i}\hat{j}}\right) + \int_i \left(\sum_{j}^{J_X} \tau_{\hat{i}\hat{j}}^{x} \frac{d\hat{x}_{\hat{i}\hat{j}}}{d\theta} + \sum_{j}^{J_L} \tau_{\hat{i}\hat{j}}^{l} \frac{d\hat{l}_{\hat{i}\hat{j}}}{d\theta}\right) di$$

so that

$$MCPF_P = \frac{1}{1+x}$$

SMU Definition

Return

We have

$$\frac{\eta^{Rich}}{\eta^{Poor}} = \frac{\frac{d\hat{W}}{dy_i}|_{\theta=0}}{\frac{d\hat{W}}{dy_j}|_{\theta=0}} \quad \forall i \in Rich,\ j \in Poor$$

Non-Marginal Analysis

Return

- General equivalent variation formula:

$$EV(1) = \int_0^1 \frac{\lambda\left(\hat{P}(\theta), y\right)}{\lambda\left(P, y + EV(\theta)\right)} \left[\left(\frac{\frac{\partial \hat{u}}{\partial G}}{\lambda\left(\hat{P}(\theta), y\right)} - c_G \right) \frac{d\hat{G}}{d\theta} + \frac{d\hat{t}}{d\theta} + \sum_j \hat{\tau}_j \frac{d\hat{x}_j}{d\theta} \right] d\theta$$

- Suppose:
  - Causal effects are linear in θ.
  - Marginal utility of income under the policy = marginal utility of income if instead of policy you get the EV:

$$EV(1) = \underbrace{\sum_j \Delta\hat{G}_j * D_j}_{\text{Public Goods}} + \underbrace{\Delta\hat{t}}_{\text{Net Transfer}} + \underbrace{\sum_j \bar{\tau}_j^x \Delta\hat{x}_j + \sum_j \bar{\tau}_j^l \Delta\hat{l}_j}_{\text{Behavioral Reponse}}$$

where $\Delta\hat{x}_j = \hat{x}_j(1) - \hat{x}_j(0)$ are the non-local causal effects and D_j is the avg net WTP for G

GE Effects

Return

- Suppose the policy affects wages, $w_i(\theta)$
- Need to keep track of resource transfers induced by GE effects
- Replace $\frac{d\hat{t}}{d\theta}$ with

$$\frac{d\hat{t}}{d\theta} + \frac{d\hat{w}_i}{d\theta} l_i$$

- Require causal effects of policy on prices and implied resource transfers
- No need for income and substitution effects conditional on causal effect

Social Marginal Cost of Public Funds

- Marginal social welfare impact of a policy in units of $\hat{i}$'s income:

$$SMCPF_P^{\hat{i}} = \frac{\int_i \frac{\eta_i}{\eta_{\hat{i}}} \frac{\frac{d\hat{V}_i^P}{d\theta}|_{\theta=0}}{\lambda_i} di}{\int_i \frac{d\hat{t}_i^P}{d\theta} di}$$

- Translating benefits to i into units of $\hat{i}$ requires $\frac{\eta_i}{\eta_{\hat{i}}}$.
- If programs have some non-overlapping beneficiaries, then ok to have some programs with lower MCPF iff they have higher social marginal utilities of income
  - Kaplow (2008) inverse relationship between MCPF and social marginal utility of income at optimum.
  - Difference in MCPF reveals implicit ratio of social marginal utilities
    - Any added cost of getting resources to people should be socially worthwhile

Accounting for Distributional Incidence

- Ratios of MCPF reveals implicit social welfare weights on different subsets of population
  - e.g. $\eta^{Rich} = 0.44\eta^{Poor}$ to someone indifferent to status quo tax policy
- Can use ratio of social welfare weights to re-weight government programs based on distributional incidence (Kaplow, 2008)
  - R&D subsidies increase incomes of rich vs. poor
  - Welfare impact of allowing Walmart to expand? (*need to expand model for pecuniary externalities)
  - Incidence of benefits matters (e.g. R&D increase incomes of rich vs. poor?)
  - Can use ratio of social welfare weights to re-weight government programs based on distributional incidence (Kaplow, 2008)

Beyond Government Policy

- Nothing required θ to be a government policy
- Evaluate welfare impact of GDP growth
  - Use $\eta^{rich} = 0.44\eta^{Poor}$ to construct "Inequality Deflator"
    - Existing tax policies suggest social value of GDP growth is much higher if accrues to the poor
  - Can collapse changes in income distribution over time into single number representing welfare impact to social planner
    - Instead of mean GDP growth + distributional measures (e.g. GINI)

Setup

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  - Social marginal utility of income rich earning above $\bar{l}$ is constant, η^{Rich}.

Precise Definition

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- Note: Such a relationship does not hold if one were instead to use MEB instead of MVPF

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     - Reduction in other program expenditure would reduce fiscal externality

MVPF of Raising Taxes on Rich

- MCPF simplifies to

$$MVPF^{Rich}_{P^{Tax}} = \frac{1}{1+r} \quad , \quad MVPF^{Poor}_{P^{EITC}} = \frac{1}{1+p}$$

where

$$r = \frac{\int_{i \in Rich} \tau_i^I \frac{d\hat{I}_i^{Tax}}{d\theta} di}{\int_{i \in Rich} \frac{d\hat{\tau}_{Rich}^{Tax}}{d\theta} \left(\hat{I}_i^{Tax} - \bar{I}\right) di} \quad , \quad p = \frac{\int_{i \in Poor} \tau_i^I \frac{d\hat{I}_i^{EITC}}{d\theta} di}{\int_{i \in Poor} \left(\frac{d\hat{T}_i^{EITC}}{d\theta} + \frac{d\hat{\tau}_{ij}^{EITC}}{d\theta} I_i \right) di}$$

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  - r is the fraction of mechanical income tax revenue lost from behavioral responses to the tax increase (generally, $r < 0$) Derivations
  - p is the fraction of the mechanical credit that is increased due to behavioral distortions in taxable labor income

Evidence on Behavioral Responses

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- Back to Results

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