Discussion: Generalized Compensation Principle

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Background

- How to evaluate welfare effects of economic shocks?
- Compensating variation (Kaldor [39], Hicks [39,40]):
    - Compensate agents with lump-sum transfers so U unchanged
    - Pareto improvement $\Leftrightarrow \sum$ transfers raise govt revenue
    - Compare welfare effects of shocks by comparing $\sum$ transfers
    - No need to make interpersonal comparisons of utility
- Compensation with distortionary taxes? Hendren [17]
- Compensation with distortionary taxes and GE? This paper.

Welfare compensation in PE

Consider simplest case with quasilinear utility:

$$U_i = \max_{l_i} w_i l_i - T_i - \frac{l_i^{1+\frac{1}{e}}}{1+\frac{1}{e}}$$

Let $\hat{x}$ denote a directional change in x of size μ, where $\mu \to 0$.

- $\hat{w}_i^E, \hat{T}_i \Rightarrow$

$$\hat{U}_i = \hat{w}_i^E l_i - \hat{T}_i = \frac{\hat{w}_i^E}{w_i} y_i - \hat{T}_i \quad (y_i \equiv w_i l_i),$$

$$\hat{U}_i = 0 \Rightarrow \frac{\hat{T}_i}{y_i} = \frac{\hat{w}_i^E}{w_i}$$

- Lump-sum taxes: $\hat{l}_i$ not affected by compensation through $\hat{T}_i$
- Envelope theorem: $\hat{l}_i$ has no first-order effect on $\hat{U}_i$

Welfare compensation in PE, distortionary taxes

Consider simplest case with quasilinear utility:

$$U_i = \max_{l_i} w_i l_i - T(w_i l_i) - \frac{l_i^{1+\frac{1}{e}}}{1+\frac{1}{e}}$$

Let $\hat{x}$ denote a directional change in x of size μ, where $\mu \to 0$.

- $\hat{w}_i^E$, $\hat{T}(\cdot) \Rightarrow$

  $$\hat{U}_i = \hat{w}_i^E l_i(1 - T'(w_i l_i)) - \hat{T}(w_i l_i) = \frac{\hat{w}_i^E}{w_i} y_i(1 - T'(y_i)) - \hat{T}(y_i),$$

  $$\hat{U}_i = 0 \Rightarrow \frac{\hat{T}(y_i)}{y_i} = \frac{\hat{w}_i^E}{w_i}(1 - T'(y_i))$$

- Distortionary taxes: $\hat{l}_i$ is affected by compensation — but still:
- Envelope theorem: $\hat{l}_i$ has no first-order effect on $\hat{U}_i$

Welfare compensation in GE, distortionary taxes

Consider simplest case with quasilinear utility and CES production:

$$U_i = \max_{l_i} w_i l_i - T(w_i l_i) - \frac{l_i^{1+\frac{1}{e}}}{1+\frac{1}{e}}, \quad w_i = \theta_i \left(\frac{\bar{Y}}{l_i}\right)^{\frac{1}{\epsilon^D}}$$

Let $\hat{x}$ denote a directional change in x of size μ, where $\mu \to 0$.

- $\hat{w}_i^E \Rightarrow \hat{l}_i \Leftrightarrow \hat{w}_i$

Welfare compensation in GE, distortionary taxes

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- $\hat{w}_i^E \Rightarrow \hat{l}_i \Leftrightarrow \hat{w}_i$
- $\Rightarrow \hat{T}(w_i l_i)$ to keep $\hat{U}_i = 0$
- $\Rightarrow \hat{T}'(w_i l_i) \Rightarrow \hat{l}(w_i l_i) \Leftrightarrow \hat{w}_i$

Welfare compensation in GE, distortionary taxes

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- Fixed point: integro-differential algebraic equations

Mathematical structure

- Integro-

$$\frac{\hat{w}_i}{w_i} = -\frac{1}{\epsilon^D}\frac{\hat{l}_i}{l_i} + \int_0^1 \gamma_j \frac{\hat{l}_j}{l_j} dj$$

- differential-

$$\frac{\hat{l}_i}{l_i} = \epsilon^{S,w}\left[\frac{\hat{w}_i^E}{w_i} + \frac{\hat{w}_i}{w_i}\right] - \epsilon^{S,r}\frac{\hat{T}'(y_i)}{1 - T'(y_i)}$$

- algebraic equations

$$\hat{U}_i = (1 - T'(y_i))y_i\left[\frac{\hat{w}_i^E}{w_i} + \frac{\hat{w}_i}{w_i}\right] - \hat{T}(y_i)$$

(substituting first in others, system in $\{\hat{l}_i, \hat{T}(y_i)\}$ without $\hat{l}_i'$)

Progressivity of welfare-compensating tax reforms (1/2)

- $\hat{w}_i^E > 0$ at a single $i \Rightarrow \frac{\hat{T}(y_i)}{y_i} > 0$ in PE
- $\Rightarrow \hat{T}'(y_j) > 0$ for at least some $j < i$. Marginal matters in GE!
- $\Rightarrow \hat{l}_j < 0 \Rightarrow \hat{w}_j > 0 \Rightarrow \hat{U}_j > 0$
- $\Rightarrow \hat{T}(y_j) > 0$ to maintain unchanged utility
- Size of required $\hat{T}(y_j)$ depends on elasticities:
  - Greater labor supply response to $\hat{T}'(y_j)$
    $\Rightarrow$ raise avg tax rates by more, given change in marginal
    $\Rightarrow$ less progressive reform
  - Greater labor demand elasticity to w_j
    $\Rightarrow$ raise avg tax rates by less, given change in marginal
    $\Rightarrow$ more progressive reform

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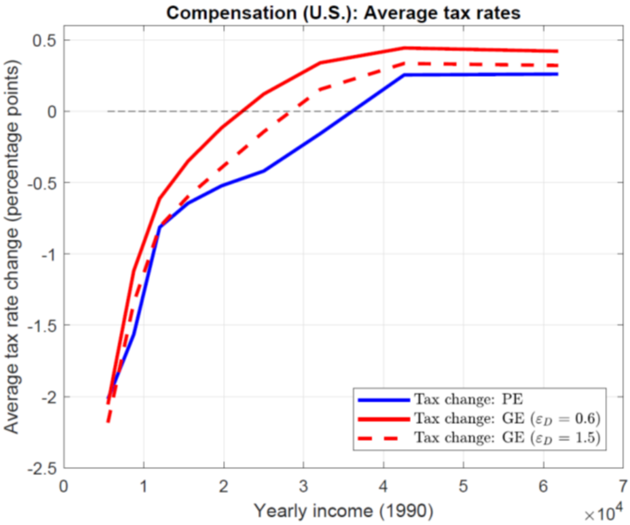
    $\Rightarrow$ raise avg tax rates by less, given change in marginal
    $\Rightarrow$ more progressive reform (empirically relevant case)

Progressivity of welfare-compensating tax reforms (2/2)



Comments

- *Very* clear and elegant, despite mathematical complexity
- Generalizing Kaldor/Hicks to GE can facilitate its use in macro as complement to SWF, optimal policy approach
- Thought experiment: use paper to study immigration or skill-biased technical change (SBTC) $\Rightarrow$
  1. What if income isn't sufficient stat for exposure to shock?
  2. What if shocks aren't small?
  3. What if GE is more than labor market clearing?

What if income isn't sufficient stat for exposure? (1/2)

- In paper, exposure to shock differs only by $y_i = w_i l_i$
- In practice, other determinants of exposure to immigration:
  - Residence: in 1990, 33% of immigrants in NY, LA, Miami (vs. 12% of natives in top 3)
  - Education: immigrants concentrated in tails
  - Experience (Borjas [94])
  - Occupation (Card [01]
- Indeed, differential exposure *used* to estimate effects of shock

What if income isn't sufficient stat for exposure? (2/2)

- Sachs-Tsyvinski-Werquin [17] study incidence w/ N groups
- Challenge in welfare compensation: $T(w_i l_i)$ not sufficiently rich to ensure $\hat{U}_{i,n} = 0 \; \forall i, n$
- Two suggestions:
  1. Suppose $T_n(w_i l_i)$. Generalize results accounting for cross-n interactions.
  2. Characterize $\hat{T}(\cdot)$ needed to ensure $\sum_n \hat{U}_{i,n} = 0$: welfarist across n, but not across i.

What if shocks aren't small? (1/2)

- Immigration: Borjas [94] estimates that 10% rise in immigrant share associated with 6.4% fall in $w_i l_i$
- SBTC: Goldin-Katz [07] estimate college wage premium increased by 0.24 log points over 80-05
- Are these well captured by first-order approximations?

What if shocks aren't small? (2/2)

- Irrelevance of dl_i in PE arises from Envelope Theorem:

$$\frac{\partial U_i(w_i, l_i)}{\partial l_i} = w_i(1 - T'(w_i l_i)) - l_i^{\frac{1}{e}} = 0.$$

- But second-order term:

$$\frac{\partial^2 U_i(w_i, l_i)}{\partial l_i^2} = -w_i^2 T''(w_i l_i) - \frac{1}{e} l_i^{\frac{1}{e}-1}.$$

- $\Rightarrow$ even in PE, changes in $l_i \rightarrow U_i \rightarrow$ welfare compensation

- If authors' mathematical apparatus can be used to solve this problem, useful even in PE settings with large shocks

What if GE is more than labor market clearing?

- GE summarized by

$$w_i = \theta_i \left(\frac{\mathcal{F}(\{L_i\}_{i\in[0,1]})}{L_i} \right)^{\frac{1}{\epsilon^D}} = \frac{\partial}{\partial L_i} \mathcal{F}(\{L_i\}_{i\in[0,1]})$$

- Additional margins of adjustment relevant to applications (immigration, SBTC):

  1. Mobility
  2. Physical capital accumulation
  3. Human capital accumulation

- Possible to generalize framework to accommodate?

Concluding thoughts

- Elegant paper generalizing Kaldor-Hicks to distortionary taxation + GE, facilitating its use in macro
- Encourage authors to consider in this / future work
  1. What if income isn't sufficient stat for exposure to shock?
  2. What if shocks aren't small?
  3. What if GE is more than labor market clearing?

APPENDIX

Key economic insights

$$\frac{\hat{T}(y_i)}{y_i} = \underbrace{}_{}\quad \underline{\text{PE}}: (1 - T'(y_i))\frac{\hat{w}_i^E}{w_i} \qquad \underline{\text{GE}}: (1 - T'(y_i))\int_{y_i}^{\overline{y}} \mathcal{E}_{y_i,y_j}\left[\hat{\Omega}_{y_j}^E + \lambda\right] dj$$

1. Modified wage disruption $\hat{\Omega}_{y_j}^E$
   - Maps $\frac{\hat{w}_i^E}{w_i}$ to GE adjustment in wages
   - Key: labor demand, supply elasticities
2. Progressivity $\mathcal{E}_{y_i,y_j}$
   - Reflects fact that $\uparrow T'(y_i) \Rightarrow \downarrow l_i \Rightarrow \uparrow w_i \Rightarrow \uparrow U_i$
   - Key: labor demand, supply elasticities + progressivity of $T(\cdot)$
3. Compensation-of-compensation λ
   - Reflects fact that $\hat{T}'(y_i) \Rightarrow \hat{l}_i \Rightarrow \hat{w}_j \;\forall j \Rightarrow \hat{U}_j \;\forall j$
   - Key: ?