Economics 2450A: Public Economics and Fiscal Policy I

Section 6: Optimal Transfers and Extensive Margin

Michael Droste

Fall 2022

Outline

1. Mid-Semester Feedback
2. Optimal Tax/Transfers with Extensive Margin (Saez 2002)
   - Setup
   - Optimal Tax/Transfers
   - Intuition
3. Minimum Wage and EITC (Lee and Saez 2012)
   - Setup
   - Minimum Wage: No Tax/Transfers
   - Minimum Wage: With Tax/Transfers

Mid-Semester Feedback

- We're almost halfway through the semester, and I'd like to get your feedback on the section component of this course!!
- End of semester feedback is always great, but unfortunately, I'll be on the job market next year and won't be teaching this course again (plus, feedback for next year doesn't help you).
- I've created an anonymous survey, totally optional (but encouraged!) to solicit your feedback on the job I've been doing. My goal is, taking as given the content we cover, to help walk through the technical parts of the class.
- Survey link: https://forms.gle/abYGfYKyubWDunRL8

Today: Motivation

- In the optimal tax models we've seen, optimal $T'(z) > 0$ for all z.

- As mentioned last week, this is a bit weird! In the real world, we have tax programs that resemble negative marginal income tax rates (i.e. EITC). What gives?

- This week: show that this result can fall apart when we add an extensive margin to the household's labor supply decision (work/don't work).

- Two papers on this topic:
  1. Saez (QJE 2002): optimal tax/transfer with extensive margins kills $T' > 0$ result
  2. Lee and Saez (JPubEc 2012): Saez 2002 + endogenous wages + minimum wage

Optimal Tax/Transfers with Extensive Margin (Saez 2002)

Saez (2002): Setup

- Households endowed with exogenous type i, which determines their wage w_i. Wage/types are discrete: $0 = w_0 < w_1 < \cdots < w_I$, where $w_0 = 0$ is the wage for those who aren't working.

- Normalize mass of households to 1 and let h_i denote the mass of type i, so that we have $h_0 + h_1 + \cdots + h_I = 1$.

- Household budget constraint is $c_i = w_i - T_i - \theta_i$, where T_i exogenous tax levied on type i. Only decision is to work or not work: household of type i compares c_i and c_0 (which depend on T).

- Interpret θ_i as a fixed cost of working, which is continuously distributed across households with some cdf $H(\theta)$ (and with $\theta_0 = 0$). Why do you think we want a fixed cost that is heterogeneous across households (even within type)?

Saez (2002): Setup

- Assume away income effects (utility linear in consumption): participation decision depends only on difference $c_i - c_0$.

- Can also see that $h_i(c_i - c_0) = 0$ if $c_i - \theta_i \leq c_0$; cannot maximize utility.

- Relevant elasticity for household behavior:

$$e_i \equiv \frac{\partial h_i}{\partial(c_i - c_0)} \cdot \frac{(c_i - c_0)}{h_i}$$

- Elasticity of participation with respect to difference in net-of-tax incomes: % of type i workers who leave (enter) labor force when difference in disposable income between employment/unemployment decreases (increases) by 1%.

Saez (2002): Government Problem

- Government wants to choose $T_0, T_1, ...T_I$ to maximize social welfare. With discrete types:

$$\max_{T_0, T_1, ..., T_I} \sum_{0}^{I} G(u^i) h_i$$

- Define marginal social welfare weight as usual: $g_i = G'(u^i) \cdot u^i_c$. With no income effects for households, $\sum h_i g_i = 1$ (weighted sum of social marginal welfare weights equals 1). Useful to know.

- Asume that government budget constraint is:

$$\sum T_i h_i = E$$

where E is an exogenous revenue requirement (can be set equal to 0 for pure tax/transfer).

Saez (2002): Optimal Tax

- Optimal tax satisfies:

$$\frac{T_i - T_0}{c_i - c_0} = \frac{1 - g_i}{e_i}$$

- Proof by perturbation argument: consider a small increase in taxes dT_i on type i workers, compute dM, dW, dB, set $dM + dW + dB = 0$, solve for optimal tax. Sound familiar?

Saez (2002): Perturbation

- Consider increase in tax dT_i on type i workers.
- Mechanical impact: $dM = h_i dT_i$ (why?)
- Welfare impact: $dW = -g_i dM = -g_i h_i dT_i$
- Behavioral impact: Always the most complicated bit.
  - High level: $dB =$ (share of workers who leave i) $\times (T_i - T_0)$
  - Share of workers who leave i: $-h_i e_i dT_i/(c_1 - c_0)$ (why? rearrange def of e_i)
  - So $dB = -(T_i - T_0) h_i e_i dT_i/(c_1 - c_0)$
- $dM + dW + dB = 0 \implies \frac{T_i - T_0}{c_i - c_0} = \frac{1 - g_i}{e_i}$

Saez (2002): Interpretation

- Optimal tax satisfies (for all i):

$$\frac{T_i - T_0}{c_i - c_0} = \frac{1 - g_i}{e_i}$$

- Precisely, this equation for all i and the gov't budget constraint characterize $T_0, T_1, ..., T_I$.

- Suppose government has taste for redistribution, i.e. marginal social welfare weights strictly decreasing in i: $g_0 > g_1 > \cdots > g_I$. No income effects $\implies$ average social welfare weight is one, so there exists i^*: $g_i \geq 1$ for $i \leq i^*$, $g_i < 1$ for $i > i^*$.

- This implies higher transfer to low-skill workers ($i < i^*$ or $g_i > 1$), $T_i < T_0$.

- Optimal tax takes form of a transfer (i.e. UBI) at the bottom ($-T_0$) and a negative marginal tax rate near the bottom, so the transfers are increasing with income for low i.

Saez (2002): Intuition

- What's the intuition behind negative income taxes being optimal?
- Consider tax schedule where transfers for unemployed are more generous than transfers to the working poor, i.e. $T_1 - T_0 > 0$.
- Increasing transfer to the working poor (e.g. $i = 1$) costs one dollar in tax revenue, provides welfare benefit valued at g_i dollars. If $g_1 > 1$, welfare impact exceeds mechanical cost ($dM + dW > 0$).
- Furthermore, increase in transfer to poor induces some unemployed to work, offsetting the mechanical cost of the reform through behavioral response. So $dB > 0$.
- Reform is unambiguously welfare-improving, so $T_1 - T_0 > 0$ could not have been optimal.

Saez (2002): Intuition

- Review question: What do you think happens to the optimal tax/transfer scheme in this model with Rawlsian social welfare weights, $g_0 = 1, g_i = 0$ for all $i > 0$?
- Review question:What about when social welfare weights are constant across types?
- It is useful to think about how our intuition from the previous slide changes in these cases.

Lee and Saez (2012)

Lee and Saez (2012): Motivation

- Last week in section, Toren (?) asked a really great question about whether important results like our optimal tax formulas, Atkinson-Stiglitz, etc. go through when prices aren't fixed/there are firms.
- All the models we've seen have been simple partial equilibrium models of consumer behavior. In many cases, this is all we need to think about equity-efficiency tradeoffs.
- In many cases, the optimal policy problems we consider are still quite tractable if we were to add firms/production, dynamics, market imperfections, behavioral elements, etc.
- Lee and Saez is a good example of this. They ask whether a minimum wage would be a useful tool for policymakers on top of a nonlinear income tax. They need to model both sides of the labor market, and therefore production of goods.

Lee and Saez (2012): My View

- This model was not covered in detail in lecture, and so is unlikely to be emphasized on an exam per se.
- Still, the intuition (as on the lecture slides) is still testable content and I think it's good practice to see how we could do optimal policy in a more complicated general equilibrium environment.

Lee and Saez (2012): Production

- Representative firm produces a consumption good using two labor inputs, h_1 and h_2, low- and high-skill labor. Production function $F(h_1, h_2)$ has constant returns to scale, $F(\lambda h_1, \lambda h_2) = \lambda F(h_1, h_2)$ for any (h_1, h_2) and any λ.

- Firms choose labor inputs h_1, h_2 to maximize profit, taking wages as given:

$$\max_{h_1, h_2} \; F(h_1, h_2) - w_1 h_1 - w_2 h_2$$

- First-order conditions for firm profit maximization: hire until wage is equal to marginal product for each type:

$$w_i = \frac{\partial F}{\partial h_i}$$

  assume that marginal product is higher for high type; $\frac{\partial F}{\partial h_2} > \frac{\partial F}{\partial h_1} \implies w_2 > w_1$

Lee and Saez (2012): Labor Supply

- All households can make a labor supply decision to (1) not work; (2) work in low-skill occupation; (3) work in high-skill occupation.

- Individual faces fixed costs $\theta = (\theta_1, \theta_2)$ of working in occupations 1 and 2 (assume $\theta_0 = 0$ as before, no cost to not working), where θ smoothly distributed across individuals with distribution H.

- Household has linear utility over consumption (No income effects), and budget constraint says $c_i = w_i - \theta_i - T_i$. Thus, $u_i = w_i - \theta_i - T_i$.

- Letting $c = (c_0, c_1, c_2)$ denote the consumption vector for each occupation, can write $h_i(c)$ as aggregate supply function (fraction of people working in occupation i).

Lee and Saez (2012): Competitive Equilibrium

- Competitive equilibrium here consists of an allocation (h_1, h_2, w_1, w_2) such that:
  1. Households are behaving optimally (choosing the occupation $i = 0, 1, 2$ that maximizes utility)
  2. Firms are behaving optimally (FOCs hold: hire until wage equals marginal product of each type)
  3. The labor market and goods market clear

  taking tax/transfer parameters T_0, T_1, T_2 as given.

- Let $D_i(w_i)$ and $S_i(w_i)$ denote labor supply/demand for low and high skill ($i = 1, 2$) labor markets.

- Define the low-skill labor demand elasticity as $\eta_1 = -(w_1/h_1) \cdot D_1'(w_1)$, where we use the minus sign so that $\eta_1 > 0$.

Lee and Saez (2012): Social Welfare

- Governments maximize a social welfare function of the form:

$$\int G(u)dH(\theta)$$

where $G(u)$ assumed to be increasing, concave function (gives rise to marginal social welfare weights $g_i = G'(u)$)

Lee and Saez (2012): Minimum Wage Without Taxes

- First, consider what happens when we introduce a minimum wage in this model without tax/transfers, i.e. $T_i = 0$.

- Start from some initial equilibrium (w_1, w_2, h_1, h_2), introduce a small minimum wage by perturbing w_1 upwards by dw.

- Minimum wage causes loss of employment: either become unemployed (earn 0) or shift to high-skill (earn w_2).

- Efficient rationing: We say that efficient rationing holds if the workers who lose their jobs due to the introduction of a minmum wage are those with the least surplus from working in the low-skilled sector.

Lee and Saez (2012): Minimum Wage Without Taxes

- **Proposition 1**: Under efficient rationing, if the government values redistribution from high-skilled to low-skilled workers ($g_1 > g_2$), the demand elasticity η_1 for low-skill workers is finite, and the supply elasticity for low-skilled workers is positive, then introducing a minimum wage increases social welfare.

- Formal proof beyond this course, in appendix A2 of paper. But intuition is simple!

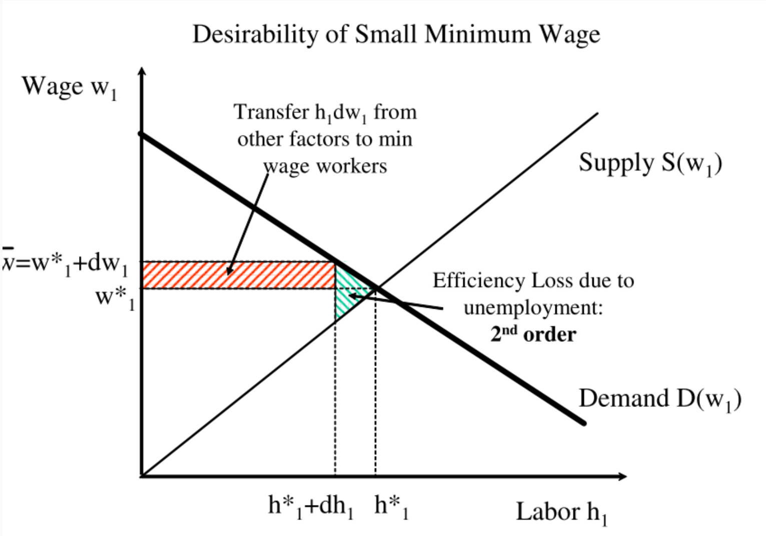
- Change in profit due to minimum wage: $-h_1 dw_1 - h_2 dw_2$. Zero profit implies:

$$h_1 dw_1 + h_2 dw_2 = 0$$

- Earnings gains forlow skilled workers $h_1 dw_1 > 0$ exactly offset by earnings loss of high-skilled workers. If $g_1 > g_2$, this implies a first-order increase in welfare.

- Efficient rationing + finite demand elasticity + positive supply elasticity $\implies$ job-losers have negligible surplus, creating second-order loss in welfare.

Lee and Saez (2012): Minimum Wage Without Taxes



Lee and Saez (2012): Commentary

- This is kind of a surprising result!
- There is a rationale for a minimum wage as a tool for redistribution even when we have assumed perfectly competitive markets.
- Relies heavily on efficient rationing assumption. Without efficient rationing, welfare loss from unemployed is first-order and the overall welfare effect of minimum wage is ambiguous (depends on parameters).
- Can you think of any model assumptions that would likely cause this to be violated? (hint: think of firm-side)

Lee and Saez (2012): Minimum Wage With Taxes

- What if the government has access to a tax? Is a minimum wage still a useful tool for redistribution?

- **Proposition 2**: Under efficient rationing, if $\eta_1 < \infty$ and $g_1 > 1$ at the optimal tax allocation without a minimum wage, then introducing a minimum wage is social welfare-improving. Moreover, at the optimal minimum wage and tax, $g_1 = 1$ and $h_0 g_0 + h_1 g_1 + h_2 g_2 = 1$.

- Note: introducing a minimum wage is still welfare-improving if the tax is not optimal.

- Left to the reader: walk through the intuition in Lee and Saez (2012) for Prop 2!