Tax Me if you Can! Optimal Nonlinear Income Tax between Competing Governments

Etienne LEHMANN[1]
Laurent SIMULA[2]
Alain TRANNOY[3]

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[1]CRED – University Paris 2 and CREST
[2]Uppsala University.
[3]Aix–Marseille School of Economics.

Motivation

Some empirical evidences that highly skilled are responsive to tax changes through migration.

- Liebig, Puhani, Sousa-Poza (2007 JRS): finds small but significant migration responses across Swiss Cantons.
- Young and Varner (2011, NTJ) studies the migration response to the *millionaire tax* in NJ and find low but significant responses.
- Kleven, Landais, Saez (2013 AER) find a migration elasticity of 0.15 for domestic football players in Europe, but around 1 for foreign players.
- Kleven, Landais, Saez and Schultz (2013 QJE) find an elasticity above 1 for foreigners in Denmark (identified using a notch created by a preferential tax scheme for high-earning foreigners).

Main question

How different is the nonlinear income tax schedule that a government finds optimal when workers can vote with their feet?

- How the optimal tax schedule is affected by tax competition?
- What sufficient statics do we need to estimate?

Main features of the model

- Two countries (not necessarily symmetric).
- Individuals differ with respect to their skills and migration costs.
- In each country, a government sets the nonlinear income tax, taking into account intensive labor supply and migration responses.
- Focus on the Nash equilibrium between two Maximin governments.
- Identify key parameters to estimate: semi-elasticity of migration and how it evolves along the skill distribution.

Definition (Migration responses at a given skill level)

- Semi-elasticity: percentage change in the density of taxpayers of a given skill level when their consumption is increased by $1.
- Elasticity: "... by 1%" = consumption × semi-elasticity.

What we show analytically

- The optimal marginal tax rate formula extends that of Diamond (1998 AER) to account for migration responses.
- Optimal Marginal Tax rates are positive if the semi-elasticity is decreasing in skill or constant.
- Optimal Marginal Tax rates may be negative for high-income earners if the semi-elasticity is increasing in skill.

Related Optimal tax literature

- Brewer, Saez and Shepard (2010) and Piketty Saez (2013): a constant *elasticity* of migration (Hence a decreasing semi-elasticity) + Pareto distribution leads to positive asymptotic Marginal Tax Rates.
- Blumkin, Sadka and Shem-Tov (2013): Optimal asymptotic marginal tax rate is zero under independent distribution of migration cost per skill level (hence, constant semi-elasticity).
- Simula Trannoy (e.g. JPubEcon 2010, SCW 2012): One migration cost per skill level. At any skill level, the migration response is 0 or ∞ (Hence a stepwise increasing semi-elasticity). Negative marginal tax rates may be optimal.

Outline of the talk

1. The model.
2. Analytical Results.
3. Numerical Illustration of the Results.

The model

- Two countries $i = A, B$ of size N_i.
- Skills $w \sim [w_0, w_1]$, with $w_1 \leq +\infty$, pdf $h_i(w)$ and cdf $H_i(w)$.
- Migration costs $m \sim \mathbb{R}_+$, with conditional pdf $g_i(m|w)$ and cdf $G_i(m|w)$.
- Individuals of skill w and migration cost m have preferences:

$$c - v\,(y; w) - \mathbb{1} \cdot m$$

where $v'_y > 0 > v'_w$ and $v''_{yy} > 0 > v''_{yw}$. For instance: $v(y; w) \equiv V\left(\frac{y}{w}\right)$

- Tax is conditioned on income y only and neither on type (w, m), nor on the native country (residence-based taxation).

Migration decisions

- An individual of skill w and migration cost m, born in country A:
  - She gets $U_A(w)$ if she stays in country A.
  - She gets $U_B(w) - m$ if she move to country B.
  - She migrates to B if and only if $m < U_B(w) - U_A(w)$.
  - The mass of movers of skill w is $G_A\left(U_B(w) - U_A(w)|w\right)\ h_A(w)\ N_A$.
- Mass of residents in country A for $\Delta = U_A(w) - U_B(w)$:

$$\varphi_A\left(\Delta; w\right) \equiv \underbrace{\left(1 - G_A\left(-\Delta|w\right)\right) h_A(w)\ N_A}_{\text{Non migrants in } A} + \underbrace{G_B\left(\Delta|w\right) h_B(w)\ N_B}_{\text{Migrants from } B}$$

- We assume $m \sim \mathbb{R}^+$, so for each skill level w, there are workers for which migration is not an option and $\varphi_A(\cdot; w) > 0$

Migration decisions (2)

Definition (Semi-elasticity of migration)

$$\eta_i(w;\Delta) \equiv \frac{1}{\varphi_i(\Delta;w)} \frac{\partial \varphi_i(\Delta;w)}{\partial C(w)}$$

$=$ Percentage change in the density of taxpayers with skill w when their consumption $C(w)$ is increased by $1.

Definition (Elasticity of migration)

$$\nu_i(w;\Delta) \equiv \frac{C_i(w)}{\varphi_i(\Delta;w)} \frac{\partial \varphi_i(\Delta;w)}{\partial C_i(w)} = C_i(w) \times \eta_i(w;\Delta)$$

$\nu_i(w)$ can be increasing in w while $\eta_i(w)$ may be decreasing.

The government

- Governments are benevolent and Maximin (Rawlsian).
- Exogenous budget requirement $E \geq 0$.
- The worst-off are non-migrants of productivity w_0 (because of the support of migration cost).
- Government A takes $T_B(.)$ as given.

Nash Equilibrium (Not Necessarily Symmetric)

For country i, let $f^*(.) \stackrel{\text{def}}{\equiv} \varphi_i(U_i^*(w) - U_{-i}^*(w); w)$ and $\eta^*(w) = \eta_i(U_i^*(w) - U_{-i}^*(w); w)$.

Proposition 1: Optimal marginal tax under tax competition

$$\frac{T'(Y(w))}{1 - T'(Y(w))} = \underbrace{\frac{\alpha(w)}{\varepsilon(w)}}_{\text{Intensive}} \underbrace{\frac{1 - F^*(w)}{w\ f^*(w)}}_{\text{Distribution}} \underbrace{\left(1 - \mathbb{E}_{f^*}\left[T(Y(x))\ \eta^*(x)\,|x \geq w\right]\right)}_{\text{Decrease of tax liabilities above } Y(w)}$$

$$\mathbb{E}_{f^*}\left[T(Y(x))\ \eta^*(x)\,|x \geq w\right] = \mathbb{E}_{f^*}\left[\frac{T(Y(x))}{Y(x) - T(Y(x))}\ \nu^*(x)\,|x \geq w\right]$$

The "Tiebout" best

- The same problem as in the second best without IC constraints, i.e.: The government maximizes $U(w_0)$ subject to budget constraint and observes the skill level w, but not the migration cost m.

$\Rightarrow$ Tax distortions only come from the migration margin ("1.5 best").

- The optimal tax level for $w > w_0$ is $\tilde{T}(w) = \dfrac{1}{\eta^*(w)}$: mechanical effects are just compensated by migration responses.
- Tax revenues are used to decrease $\tilde{T}(w_0)$.
- Discontinuity of $\tilde{T}(\cdot)$ at w_0.

The Tiebout best as a "target" for the second best

Optimal marginal tax rates are given by: Formula

$$\frac{T'(Y(w))}{1-T'(Y(w))} = \frac{\alpha(w)}{\varepsilon(w)} \frac{\int_w^{\infty}\left[\tilde{T}(x) - T(Y(x))\right]\eta^*(x)\ f^*(x)\ dx}{w\ f^*(w)}$$

The second best consists in "smoothing" the Tiebout best (Jacquet *et alii* (2013)) to have tax liabilities as close as possible to the Tiebout target to minimize distortions along the migration margin (lower $\left|\tilde{T}(x) - T(Y(x)\right|$).

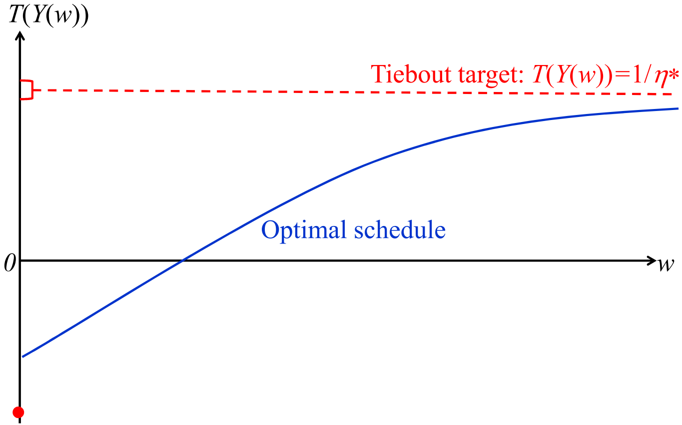


Figure: Constant Semi-Elasticity of Migration

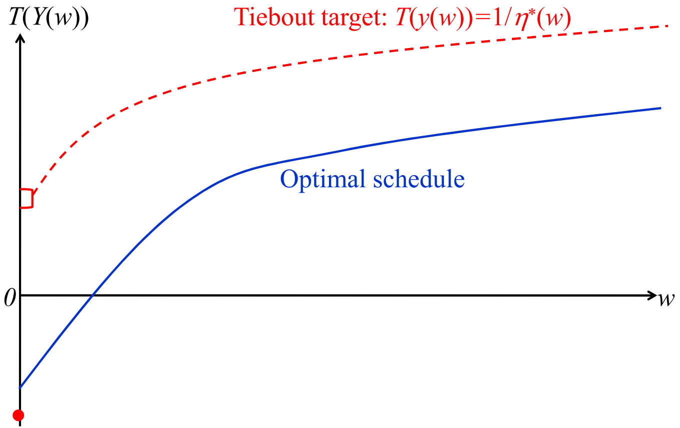


Figure: Decreasing Semi-Elasticity of Migration

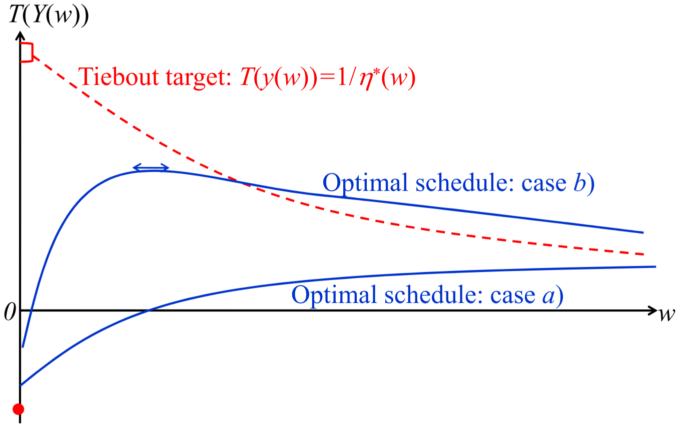


Figure: Increasing semi-elasticity of Migration

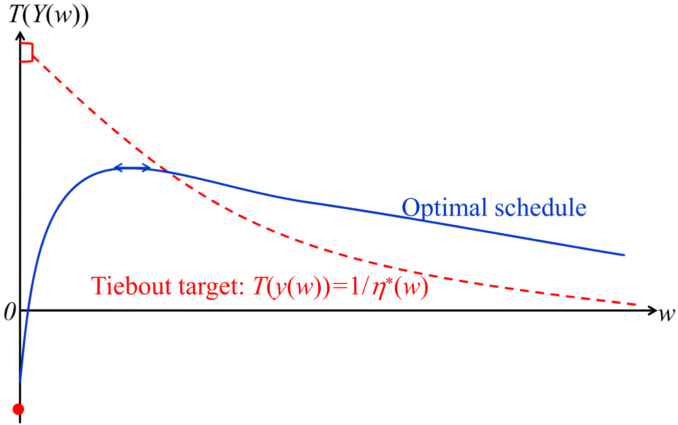


Figure: The semi-elasticity of Migration increases to infinity

Parameters

- Constant labor supply elasticity $c - \left(\frac{y}{w}\right)^{1+\frac{1}{\varepsilon}}$, with $\varepsilon = 0.25$.
- We use the CPS 2007 distribution of earnings for singles without kids.
- The skill distribution is recovered using the federal and Californian income tax schedules for singles without dependent.
- Following Diamond (1998), Saez (2001), we extend the obtained kernel estimation by a *truncated* Pareto distribution (+ a mass at $w_1 =$ \$1 534 6660).

⇒ The top 1% gets a fraction 17.6% of total income in our economy, instead of 18.3% (Alvarado, Atkinson, Piketty and Saez (2013)).

- Public expenditures E are kept at their initial level \$18,157, which represents 33.2% of total gross earnings of singles without kids.
- 3 different scenarios for $\eta(w) = g(0|w)$ where the elasticity of migration within the top 1% is on average 0.25.

Numerical illustration of the results

- Consider 3 US economies that are identical but their migration responses.
- Identical mean elasticity of migration among the top 1% (0.25) but 3 different scenarios for how the semi-elasticity varies. The 3 illustrative scenarios

⇒ Numerical illustration: Optimal Marginal Tax Rates Optimal Tax levels Welfare Losses and Gains from tax competition

- The empirical literature should not only estimate the elasticity of migration among the top 1%.
- We also need to know how the semi–elasticity of migration is changing along the skill/income distribution.

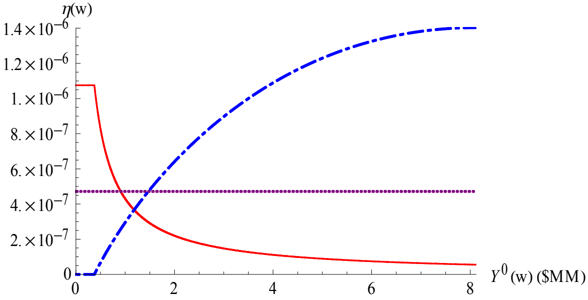
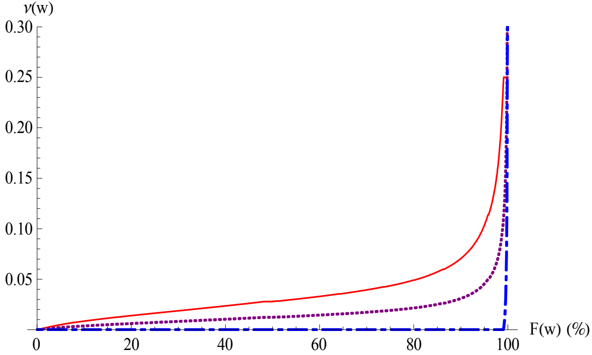


Figure: The three profiles of semi-elasticities
Constant elasticity (Brewer Saez Shepard (2010))
Independent distribution (Blumkin, Sadka and Shem-Tov (2012))
Increasing semi-elasticity Back



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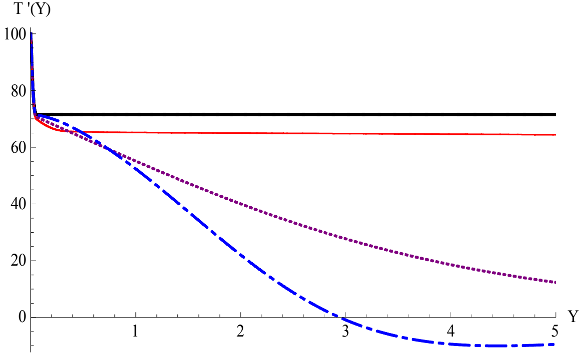

Figure: Optimal marginal tax rates
Constant elasticity (Brewer Saez Shepard (2010))
Independent distribution (Blumkin, Sadka and Shem-Tov (2012))
Increasing semi-elasticity Back

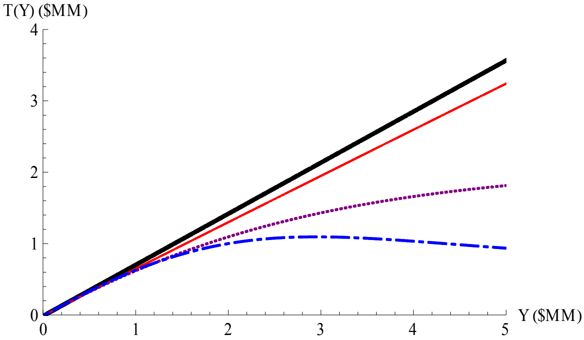

Figure: Optimal tax liabilities
Constant elasticity (Brewer Saez Shepard (2010))
Independent distribution (Blumkin, Sadka and Shem-Tov (2012))
Increasing semi-elasticity Back

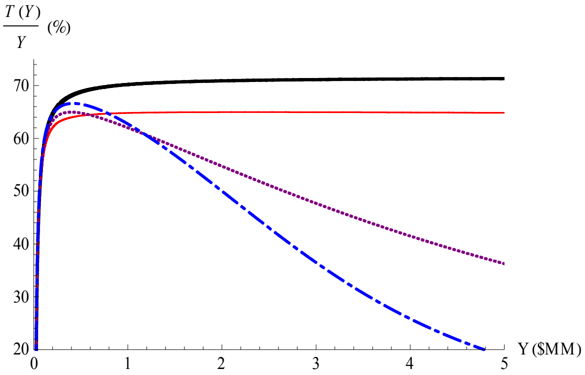

Figure: Optimal average tax rates
Constant elasticity (Brewer Saez Shepard (2010))
Independent distribution (Blumkin, Sadka and Shem-Tov (2012))
Increasing semi-elasticity Back

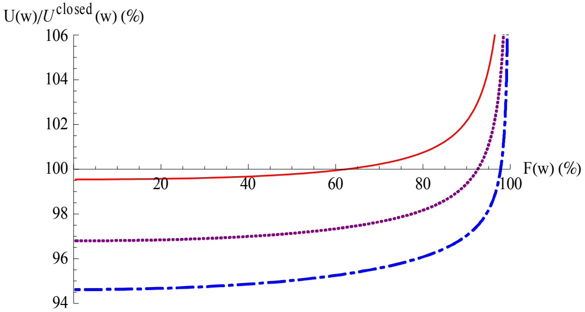

Figure: Welfare gains and losses from tax competition
Constant elasticity (Brewer Saez Shepard (2010))
Independent distribution (Blumkin, Sadka and Shem-Tov (2012))
Increasing semi-elasticity Back

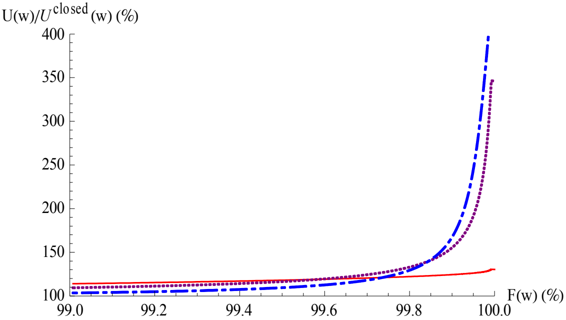

Figure: Welfare gains and losses from tax competition in the top 1%
Constant elasticity (Brewer Saez Shepard (2010))
Independent distribution (Blumkin, Sadka and Shem-Tov (2012))
Increasing semi-elasticity Back

Conclusion

- With a numerical example. 3 economies that are identical, including mean migration elasticity among the top 1% but different profiles of the migration responses have very different optimal tax policies.
- A challenge of empirical research: investigating how migration responses are changing within the top 1%.