EEA Barcelona 2023

Optimal Taxation and Other-Regarding Preferences

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This paper examines the optimal redistributive non-linear income tax structure when people have other-regarding preferences, e.g., in the sense that they dislike inequality

Why redistribution in the conventional model?

Concave utility in consumption – a dollar to the rich gives less utility than a dollar to the poor

Prioritarian SWF in utilities (as in Diamond 1998, AER) – an additional utility unit to the rich gives less welfare than an additional utility unit to the poor

More generally, welfare weights negatively related to the consumption level (Saez & Stantcheva 2016, AER)

We then often say that the government or the social planner is inequality averse

Yet, while the government may be inequality averse, Individuals are generally not assumed to care about inequality *per se* in normative public economic models

Utility is typically based on private (and sometimes public) consumption, and leisure time

Not on inequality

Ample experimental evidence suggests that people are inequality averse (e.g., from dictator games and ultimatum games)

They often prefer a more equitable allocation to an allocation which is in their narrow material self-interest

(e.g., Fehr and Schmidt 1999 *QJE*; Bolton and Ockenfels 2000, *AER*; Fisman et al. 2007, *AER*; Bellemare et al. 2008, *Econometrica*)

People may also care about potential instrumental effects

Cross-country evidence of robust positive correlation between crime and income inequality (Fajnzylber et al. 2002, *EER*)

Impact on social capital of inequality

- participation in social activities (Alesina and La Ferrara, 2000, *QJE*)
- trust (Alesina and La Ferrara, 2002, *JPubE*)
- Social polarization (Esteban and Ray 1994, *Econometrica*)

Purpose of the paper

To examine how different kinds of other-regarding preferences affect the structure and the level of optimal income taxation

We distinguish between *self-centered* inequality aversion (where aversion to inequality is based on a comparison between own consumption and other's consumption)

and *non-self-centered* inequality aversion (where people, e.g., care about the Gini coefficient or the consumption level for the worst off)

We first present a very general model of optimal income taxation and other-regarding preferences

We also present the result for four specific kinds:

Two self-centered models of inequity aversion:

- Fehr and Schmidt (1999, QJE)
- Bolton and Ockenfels (2000, AER)

Two non-self-centred types in terms of:

- The Gini Coefficient
- Maximin social preferences

Nyborg-Sjøstad and Cowell (2023, WP) is most closely related to the present paper

The analytical part of their paper is based on a Mirrleesian model of optimal taxation where agents have additively separable preferences and where people care about different versions of the Gini coefficient

Similarities with preferences for relative consumption

If the consumption of others increases, then my relative consumption decreases

Hence, private consumption always constitute a negative externality

With inequality aversion the sign of the externality varies

Increased consumption of a poor individual typically decreases inequality, implying a positive externality

The General Model

People care about a social outcome (such as inequality)

$$I_w = i(c_w, H_w)\ ,$$

where

$$H_w = \int_0^\infty h_w(c_s) f(s) ds\ .$$

Thus, H_w is a type-specific weighted mean of other people's consumption, where the weights are given by the function $h_w(\cdot)$ for an individual of exogenously given ability type *w*,

People treat H_w (but not I_w) as exogenous

Individual utility is then given by

$$U_w = v(c_w, l_w, I_w) = v(c_w, l_w, i(c_w, H_w)) = u(c_w, l_w, H_w)$$

Thus, people will take other people's consumption as given (the standard competitive assumption)

Inequality is typically not taken as given

The externalities are in general non-atmospheric

The social objective

The SWF (as in, e.g., Mirrlees 1971 RES, Saez 2001 RES)

$$W = \int_0^\infty \psi(u_w) f(w) dw$$

$\psi(\cdot)$ is an increasing and weakly concave transformation of individual utility

Thus, we allow for both a prioritarian SWF and concave utilities

The social resource constraint implies that aggregate production equals aggregate consumption:

$$\int_0^\infty w l_w f(w) dw = \int_0^\infty c_w f(w) dw$$

The incentive compatibility constraint prevents each individual from mimicking the adjacent type with lower productivity:

$$\frac{dU_w}{dw} = -\frac{l_w u_l^{(w)}}{w}$$

(Thus, no internal bunching, single-crossing assumed)

Since this holds for all types w we can use integration by parts:

$$\int_0^\infty \theta_w \left(\frac{dU_w}{dw} + \frac{u_l(c_w, l_w, H_w))l_w}{w} \right) dw = \int_0^\infty \left(\theta_w \frac{u_l(c_w, l_w, H_w))l_w}{w} - \dot{\theta}_w U_w \right) dw + \theta_w U_w \Big|_{=0}^{=\infty} = 0$$

where θ_w is a differentiable multiplier

A mechanism-design approach to the optimal control social decision-problem

Given a monotonic relation between ability and consumption we can (following Mirrlees) invert the utility function to obtain

$$c_w = k(l_w, H_w, U_w)$$

We will then treat U_w as a state variable, and l_w and H_w as control variables

The Lagrangean of the social decision-problem:

$$L = \int_0^\infty \psi(U_w)\, f(w)\, dw + \lambda \int_0^\infty \big(wl_w - k(l_w, H_w, U_w) \big) f(w)\, dw$$

$$+ \int_0^\infty \left(\theta_w \frac{u_l((k(l_w, H_w, U_w), l_w, H_w))l_w}{w} - \dot{\theta}_w U_w \right) dw$$

$$+ \int_0^\infty \eta_w \left(H_w - \int_0^\infty h_w(k(l_s, H_s, U_s))\, f(s) ds \right) f(w)\, dw$$

where the Lagrange multipliers

λ is attached to the resource constraint

θ_w is attached to the incentive compatibility constraint

η_w is attached to the type-specific externality, H_w

Let

$$\Gamma_w = \frac{1}{\lambda}\int_0^{\infty} \eta_s h_s'(c_w)\; f(s)\; ds$$

denote society's marginal willingness to pay to avoid the externality generated by the consumption of type *w*-individuals

Assuming that each individual chooses labor to maximize utility and combining the social and private optimality conditions we obtain the optimal marginal income tax rule:

$$\frac{T_y^{(w)}}{1-T_y^{(w)}} = A_w \tilde{B}_w C_w + \Gamma_w$$

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$$A_w = \frac{1+\varsigma_w^u}{\varsigma_w^c},$$

$$\tilde{B}_w = \int_w^\infty \big(1-(\delta_s - \Gamma_s)\big) \exp\left(-\int_w^s \frac{\partial MRS_{lc}^{(m)}}{\partial c} \frac{dy_m}{m} \right) \frac{f(s)}{1-F(w)}\, ds$$

where the welfare weight δ_s is replaced by $\delta_s - \Gamma_s$

$$C_w = \frac{1}{\varpi_w}$$

where $\varpi_w = -\frac{\partial(1-F(w))}{\partial w} \frac{w}{1-F(w)}$

The externality- term

$$\Gamma_w$$

can (and is in the paper) expanded and interpreted further, but not in an easy way

Let us instead from now on consider special cases of other-regarding preferences

Fehr and Schmidt preferences:

$$u_w = u\left(c_w - \beta\int_0^w (c_w - c_s)\,f(s)ds - \alpha\int_w^\infty (c_s - c_w)\,f(s)ds, l_w\right)$$

Then the optimal marginal income tax is given by:

$$\frac{T_y^{(w)}}{1-T_y^{(w)}} = A_w\tilde{B}_w C_w + \frac{\exp\big((\alpha+\beta)F(w)\big)-1}{\alpha+\beta\exp(\alpha+\beta)}\,\alpha$$

$$+\frac{\exp\big((\alpha+\beta)F(w)\big)-\exp(\alpha+\beta)}{\alpha+\beta\exp(\alpha+\beta)}\,\beta$$

Numerical simulations

A parametric approach following Mankiw et el. (2009, JEP), but with a Champernowne distribution implying an upper Pareto tail of the ability distribution (Pareto parameter 2.4).

Utility function

$$u_w = \log\left(c_w - \beta\int_0^w (c_w - c_s) f(s) ds - \alpha\int_w^\infty (c_s - c_w) f(s) ds\right) - l_w^4 / 4$$

Parameters chosen to generate empirically realistic outcomes

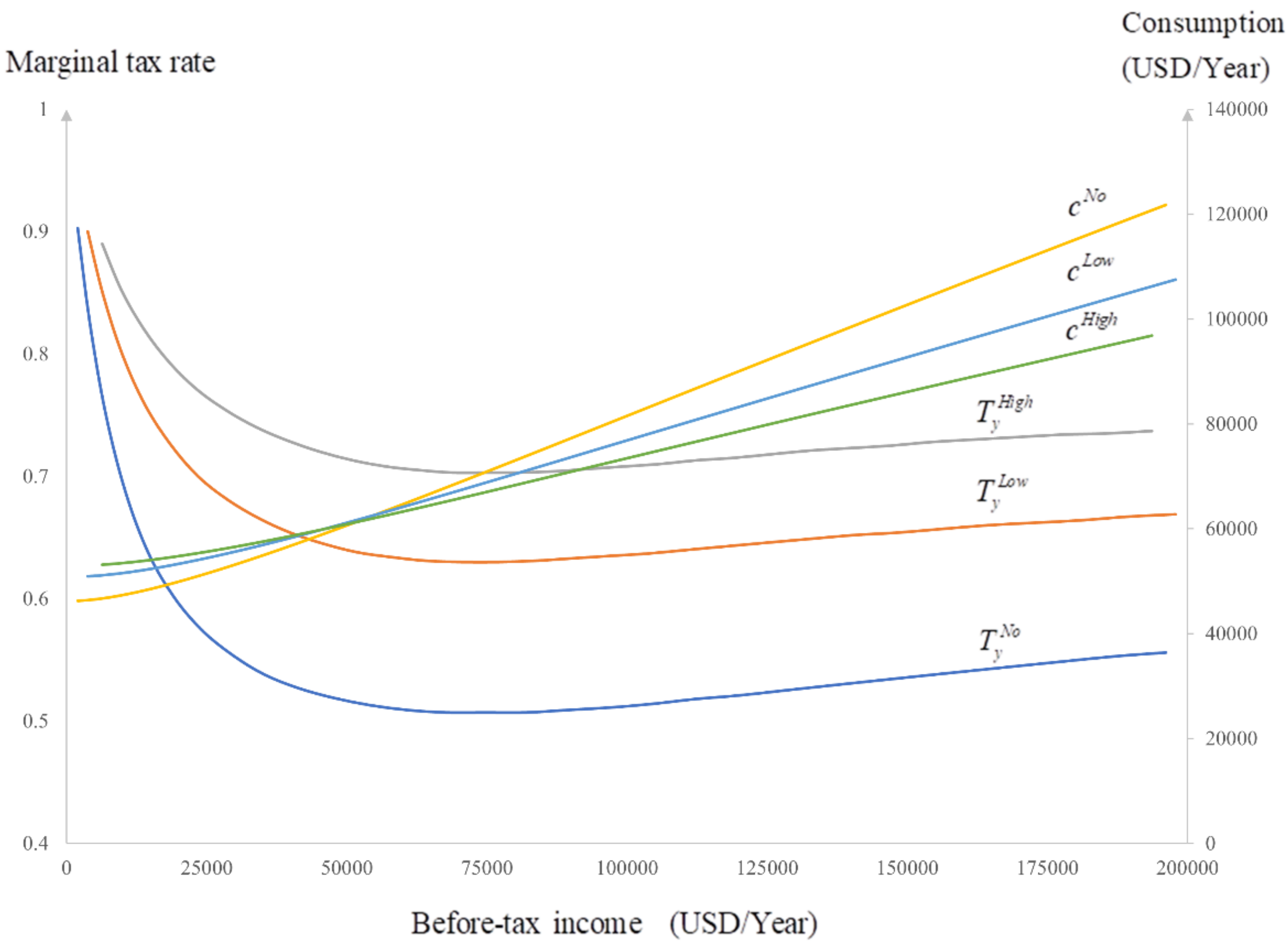
The parameters of the Fehr and Schmidt model are based on extensive meta-analysis by Nunnari and Pozzi (2022):

At the low limits of the 95% confidence intervals

$\alpha = 0.302$; $\beta = 0.266$

At the high limits of the 95% confidence intervals

$\alpha = 0.642$; $\beta = 0.396$


Marginal tax rate
Consumption
(USD/Year)
1
0.9
0.8
0.7
0.6
0.5
0.4
140000
120000
100000
80000
60000
40000
20000
0
0
25000
50000
75000
100000
125000
150000
175000
200000
c^{No}
c^{Low}
c^{High}
T_y^{High}
T_y^{Low}
T_y^{No}
Before-tax income (USD/Year)

Bolton and Ockenfels (2000) preferences

$$u_w = u\left(c_w, z_w, \frac{c_w}{E(c)}\right),$$

where $\dfrac{\partial u}{\partial (c / E(c))} > 0$ for $c < E(c)$, and $\dfrac{\partial u}{\partial (c / E(c))} < 0$ for $c > E(c)$

Here we have atmospheric externalities where an individual prefers that the average consumption level is as close as possible to her own consumption level, *ceteris paribus*

Suppose

$$U_w = v\left(c_w - \phi\left(\frac{E(c)}{c_w} - 1 \right)^2, l_w \right),$$

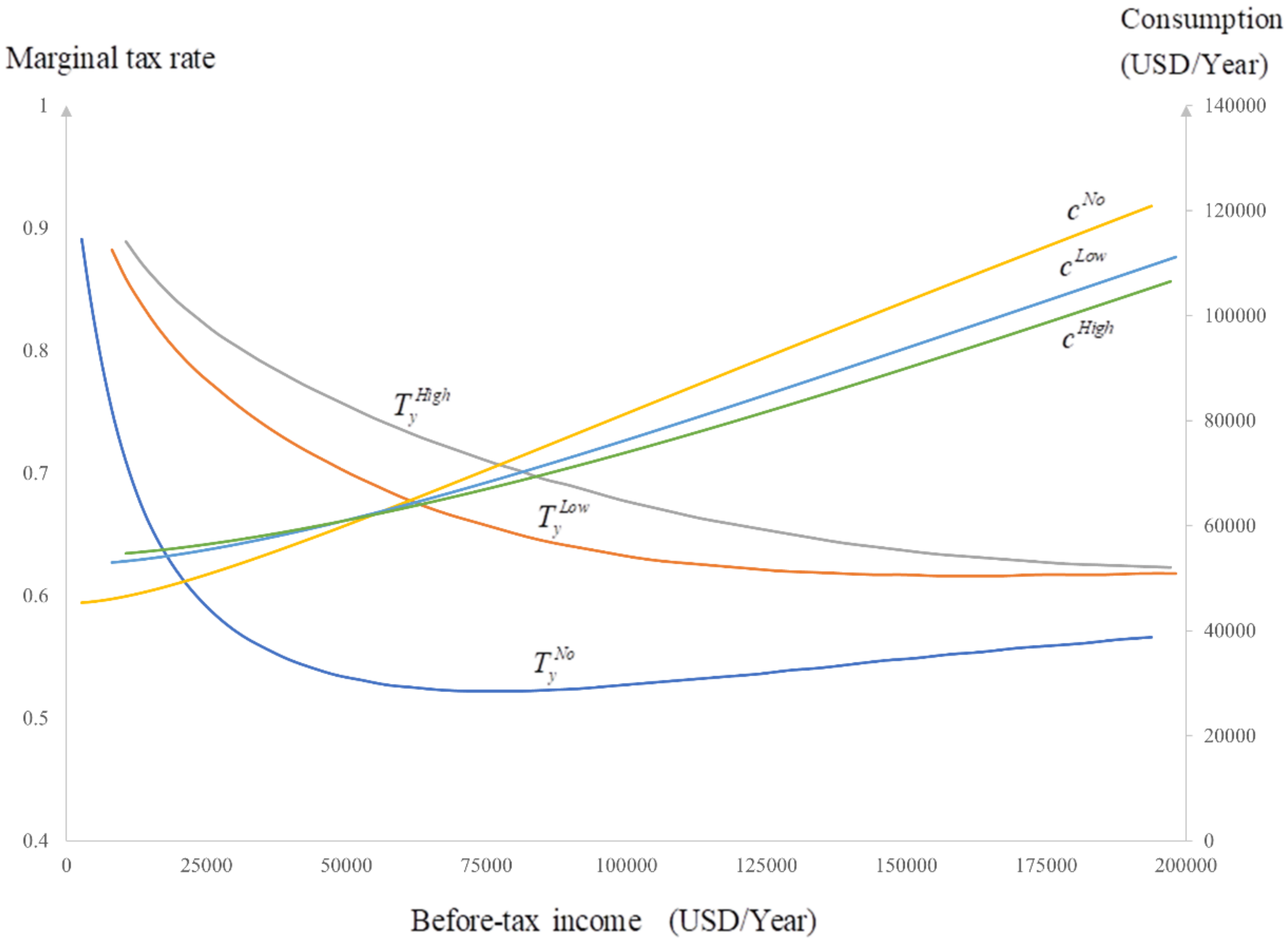
then

$$\frac{T_y^{(w)}}{1-T_y^{(w)}} = A_w \tilde{B}_w C_w + \frac{E(c)E\left(1/c^2\right) - E\left(1/c\right)}{1/2 - \phi\left(E(c)E\left(1/c^2\right) - E\left(1/c\right)\right)}\phi$$

For the numerical simulations, the same approach and assumption as for the Fehr and Schmidt model,

$$u_w = \log\left(c_w - \phi\left(\frac{E(c)}{c_w} - 1 \right)^2 \right) - l_w^4 / 4$$

We calibrate to obtain a high and low B-O inequity aversion model corresponding to the two Fehr and Schmidt models



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Preferences with respect to the Gini coefficient

$$u_w = u(c_w, G, l_w)$$

Under the utility specification

$$U_w = u\left(\log c_w - \xi G\right), l_w)$$

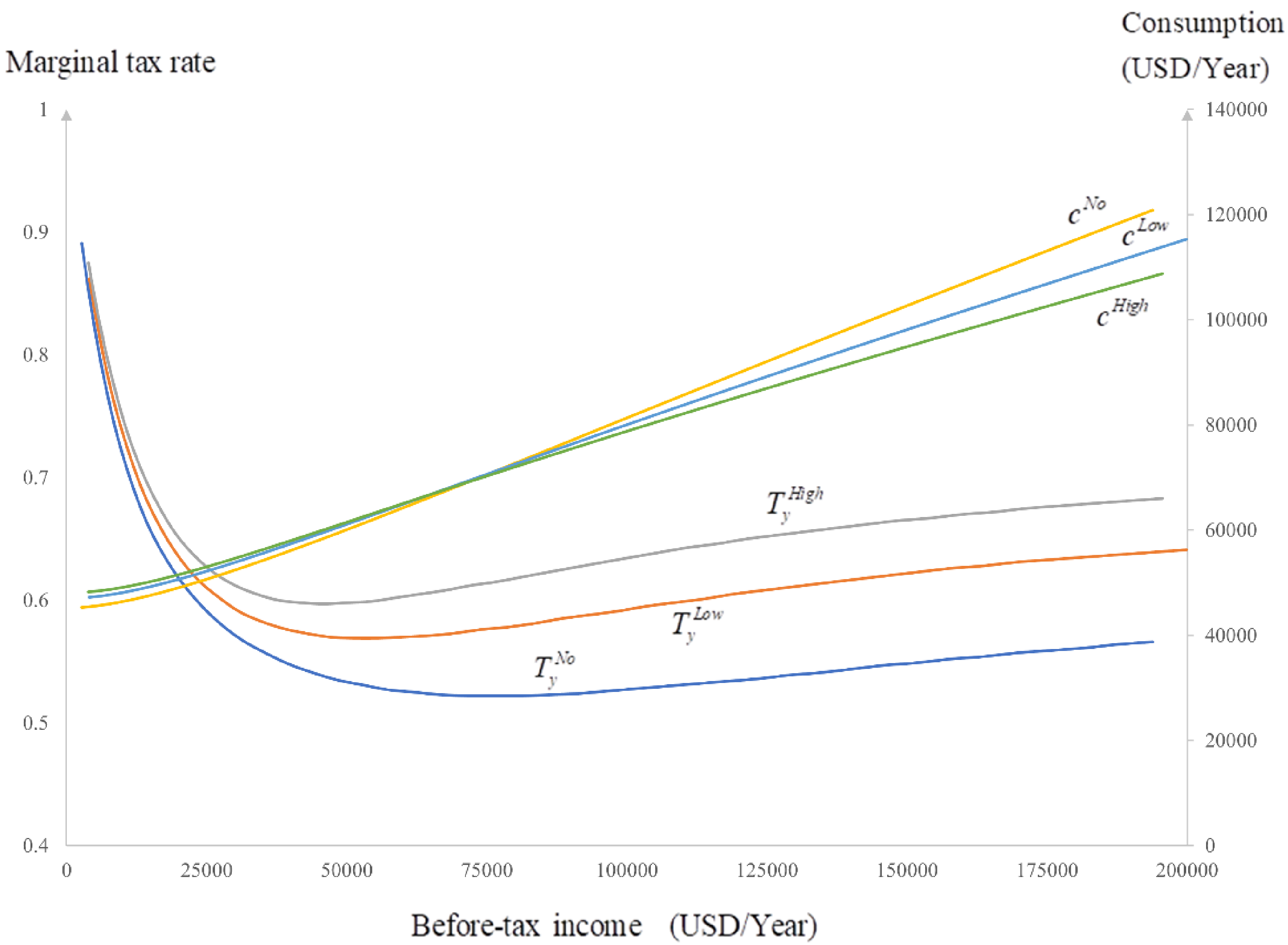
we obtain

$$\frac{T_y^{(w)}}{1-T_y^{(w)}} = A_w \tilde{B}_w C_w + \left(2F(w) - 1 - G\right)\xi$$

Numerically

$$U_w = \log c_w - \xi G - l_w^4 / 4$$

The same approach and assumption as for the Fehr and Schmidt model



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T_y^{No}

Maximin social preferences

$$u_w = u(c_w, l_w, c_{\min})$$

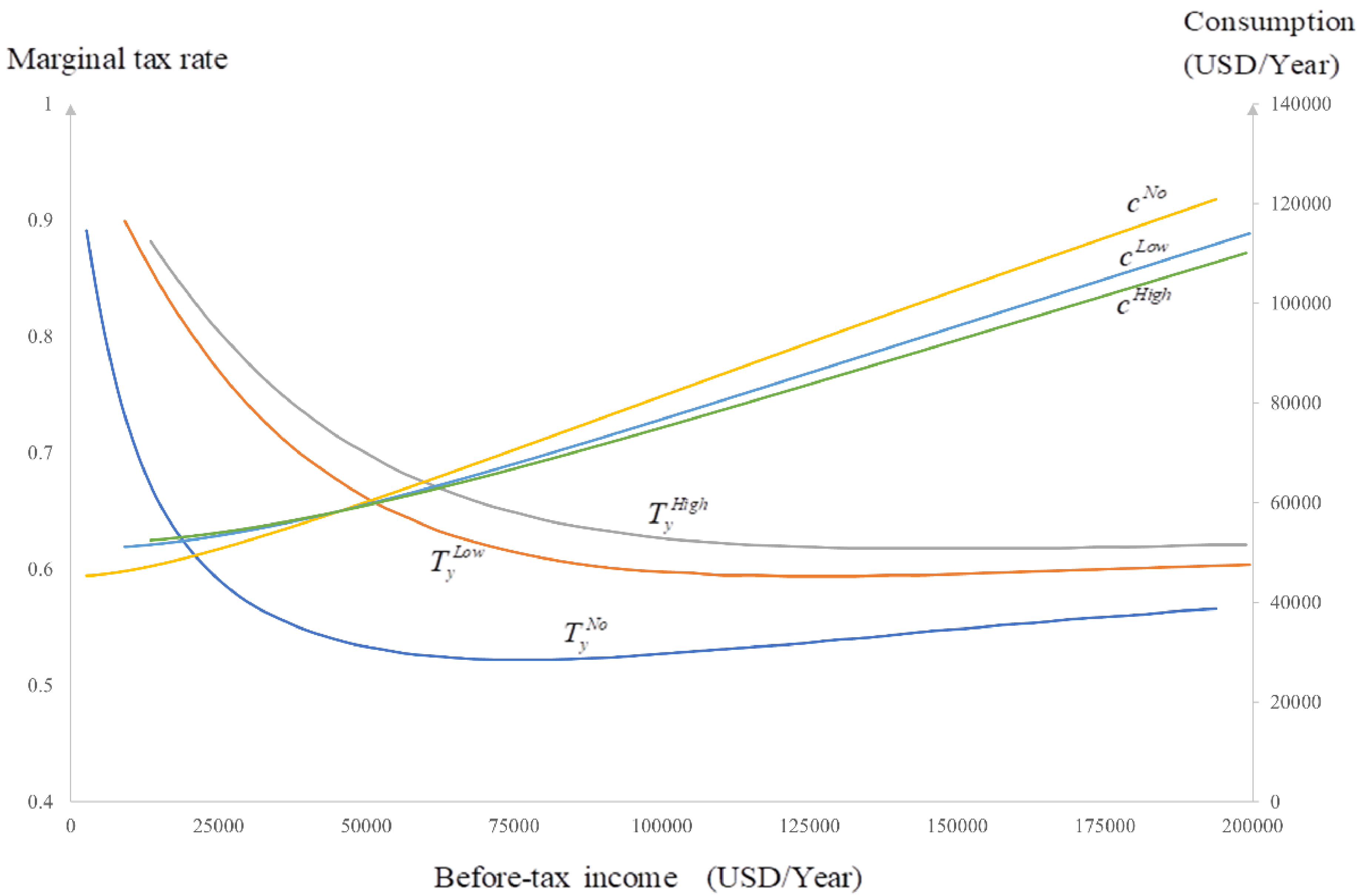
In our model it is optimal that the indiduals of the lowest types are (voluntarily) unemployed

Thus, $c_{\min}$ constitutes the consumption level of the unemployed, and there are no consumption externalities:

$$\frac{T_y^{(w)}}{1 - T_y^{(w)}} = A_w \tilde{B}_w C_w$$

Numerically

$$U_w = \log c_w + \zeta \log c_{\min} - l_w^4 / 4$$



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T_y^{Low}
T_y^{No}
Before-tax income (USD/Year)

Top income Taxation

For quasi-linear utility functions

$$T_y^{(\infty)} = \frac{\left(1+1/\varsigma_\infty\right)(1+\Gamma_\infty)+\varpi_\infty\Gamma_\infty}{\varpi_\infty+\left(1+1/\varsigma_\infty\right)(1+\Gamma_\infty)+\varpi_\infty\Gamma_\infty}.$$

Same as in Diamond (1998) except for the externality at the top Γ_∞

Yet, strictly speaking ability and income can of course not be infinite in a finite world

Suppose ability and income is bounded, then

$$T_y^{(Max)} = \frac{\Gamma_{Max}}{1+\Gamma_{Max}}$$

Thus, the zero-at-the-top result of Sadka (1976) and Seade (1977) does not hold anymore

For example, assume Fehr-Schmidt preferences, then

$$\Gamma_{Max} = \frac{\exp(\alpha+\beta)-1}{\alpha+\beta\exp(\alpha+\beta)}\alpha$$

If, as before in the low parameter case: $\alpha = 0.302$, $\beta = 0.266$

$$\Gamma_{Max} \approx 26\%$$

If, as before in the high parameter case: $\alpha = 0.642$, $\beta = 0.396$

$$\Gamma_{Max} \approx 46\%$$

Conclusion

As far as we know, this is one of the first paper to analyze optimal income taxation in economies where people have other-regarding preferences, e.g., that they are inequality averse

Take home messages:

- Different kinds of inequality aversion have potentially very important implications for the optimal income taxation
- The exact nature of the inequality aversion, and measures of inequality used, matter a great deal for the structure of optimal income taxation

Thank you for listening!