

Using Microsimulation to Study Optimal Income Taxation

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Motivation

Policy questions looking for an answer

- Should we increase the top tax rate?
- Should we move to a flat tax system?
- Should we increase welfare benefits?
- Should we increase in-work tax credits?
- What should be the phase-in and phase-out rate?

Who are you gonna call?

Who are you gonna call?



Who are you gonna call?



Mirrlees



Diamond



Saez

Outline of the talk

- Optimal income taxation
 - Theory
 - Application to the Netherlands
- Revealed social preferences
 - Theory
 - Applications: political parties, lone parents, secondary earners
- Challenges and concluding remarks

Optimal income taxation

Theory

The optimal tax problem

- Given the skill distribution
- Given the elasticity of the tax base
- Given a social welfare function
- Determine the tax function that maximizes social welfare

- This was pioneered by Mirrlees (1971) for which he won the Nobel Prize in Economics in 1996

Individuals and the government

- Individuals:
 - Differ in earnings ability n
 - Decide how much effort to supply ('hours'), which is private information, thereby choosing earnings $z(n)$
 - This choice depends on the tax schedule $\tau(z)$
 - Assuming for simplicity that consumption c equals $z - \tau(z)$
- Government:
 - Maximizes a social welfare function $(\int g(u(c))f(z)dz)$
 - Subject to a budget constraint
 - Redistribution if either $u_{cc} < 0$ or $g'' < 0$

Peter Diamond, Nobel Prize in 2010, showed in his 1998 paper that under some simplifying assumptions optimal marginal tax rates are given by the ABC-formula:

$$\frac{\tau(z)}{1 - \tau(z)} = A(z) B(z) C(z)$$

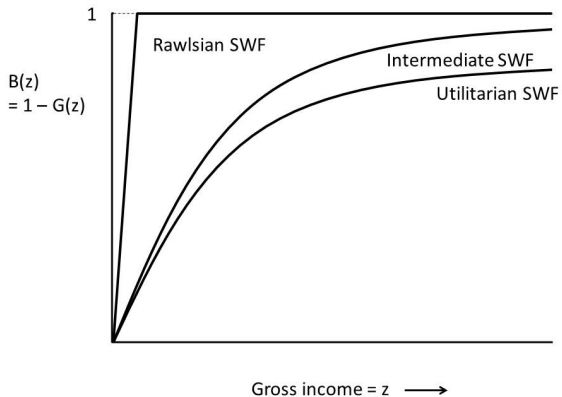
- Each income level z has an optimal marginal tax rate $\tau(z)$
- The left hand side increases in $\tau(z)$ \rightarrow if something on the right goes up, $\tau(z)$ must go up

The A term

- $A(z) = \frac{1}{\varepsilon(z)}$
- $\varepsilon(z)$ is the elasticity of the tax base at z
- The higher the elasticity of the tax base at income $z \rightarrow$ the higher the distortion of the marginal tax rate at $z \rightarrow$ the lower the optimal marginal tax rate at z
- Suppose for simplicity that $A(z)$ is constant over z

- $B(z) = 1 - G(z)$
- $G(z)$ average social value of a euro for individuals above z
- $G(0) = 1$, average social value of a euro over all people is 1
- $G(z)$ drops with income $\rightarrow B(z)$ rises with income
- $B(z)$ rises faster with Rawlsian than Utilitarian SWF

The B term for different social welfare functions



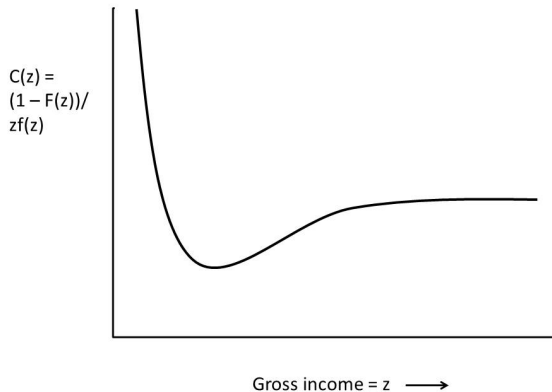
- $C(z) = \frac{1-F(z)}{zf(z)}$
- $1 - F(z)$ = number of individuals above z
- $zf(z)$ = tax base at z

- For low incomes $C(z)$ is high
- $C(z) = \frac{1-F(z)}{zf(z)}$
- $1 - F(z)$ is high: still many individuals above z
- $zf(z)$ is low: few people $f(z)$ with low income z

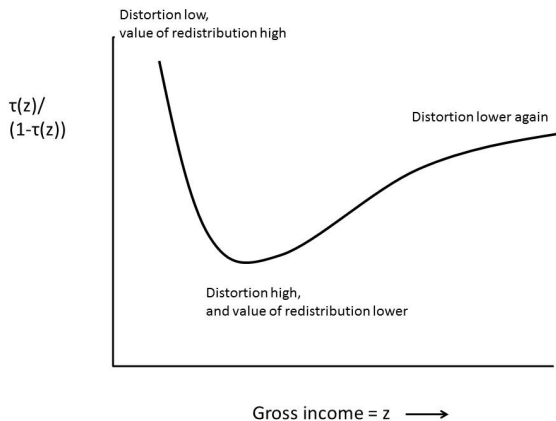
- For middle incomes $C(z)$ is low
- $C(z) = \frac{1-F(z)}{zf(z)}$
- $1 - F(z)$ is intermediate: still quite a lot of individuals above z
- $zf(z)$ is high: many people $f(z)$ with intermediate incomes z

- For high incomes $C(z)$ is higher again
- $C(z) = \frac{1-F(z)}{zf(z)}$
- $1 - F(z)$ is lower: only few individuals above z
- But $zf(z)$ is lower still: very few people $f(z)$ with high income z
- For top incomes $C(z)$ is constant (empirical regularity)

The C term empirically



Combining ABC



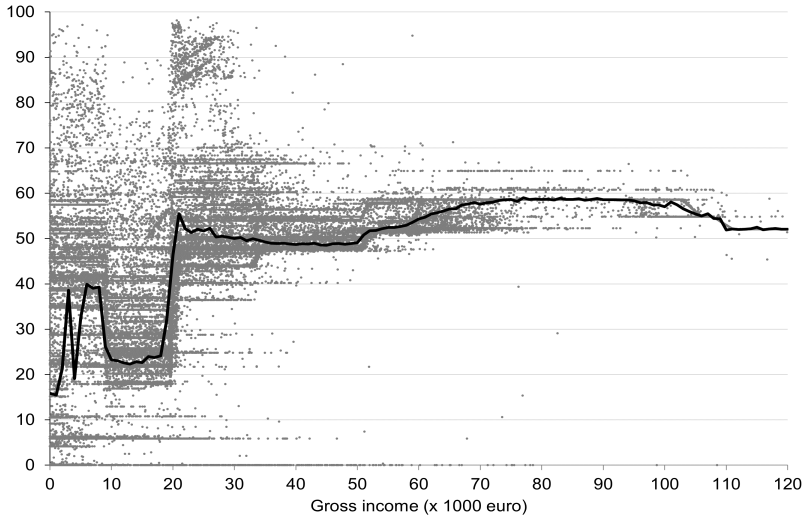
Application to the Netherlands

(Jongen, 2021)

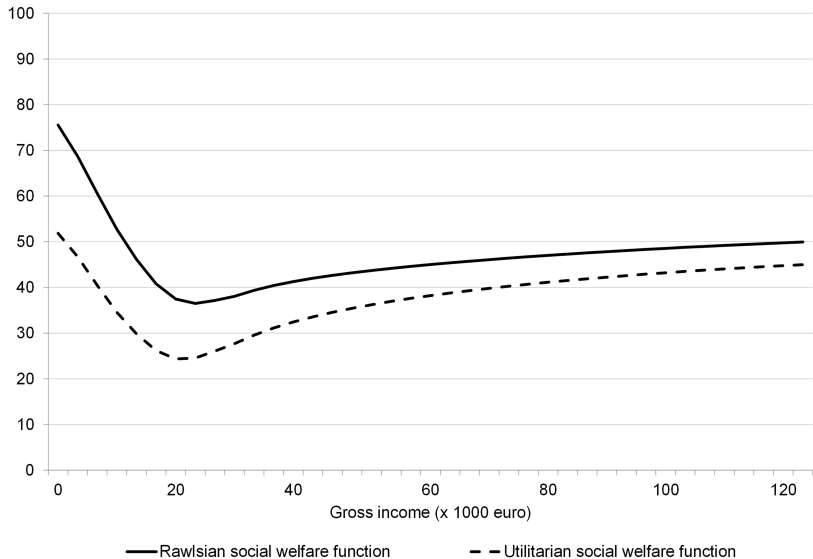
Inputs for full optimal tax analysis for the Netherlands

- Income distribution in 2015 (Income Panel)
 - With estimated Pareto-tail for the top 10%
- Marginal tax rates using the tax-benefit calculator MIMOSI
 - To compare with the optimum
 - To recover the skill distribution from the income distribution
- Intensive margin:
 - Uncompensated elasticity of 0.2 (Jongen and Stoel, 2019)
 - Income elasticity of -0.05 (literature)
 - Calibrated using the parameters of the utility function
- Extensive margin:
 - Elasticity of 0.2 (Mastrogiacomo et al., 2017)
 - Calibrated using a fixed costs of work distribution

Effective marginal tax rates in the Netherlands



Optimal marginal tax rates in the Netherlands



Conclusions optimal tax analysis for the Netherlands

- There is no unique optimal income tax structure
- Flat tax rate is not optimal
- Effective marginal tax rates rather high for middle incomes
- Higher top tax rate will not generate much revenue

Revealed social preferences

Theory

Two approaches

- Optimal income taxation
 - Given the ability distribution
 - Given the elasticity of the tax base
 - Given a set of social welfare weights
 - Find the tax system that maximizes social welfare
- Revealed social preferences
 - Given the ability distribution
 - Given the elasticity of the tax base
 - Given the tax system
 - Find the set of social welfare weights that makes that tax system optimal
- Pioneered by Francois Bourguignon, Olivier Bargain and Amadeo Spadaro for income taxation

ABC-formula for optimal marginal tax rates

Starting from Diamond (1998):

$$\frac{T'(z(n))}{1 - T'(z(n))} = A(n) B(n) C(n)$$

where

$$A(n) = \frac{1}{\varepsilon^l s}$$
$$B(n) = \frac{\int_n^{\bar{n}} (1 - g(m)) f(m) dm}{1 - F(n)}$$
$$C(n) = \frac{1 - F(n)}{nf(n)}$$

Inverting the optimality conditions

Rewriting gives

$$\int_n^{\bar{n}} (1 - g(m)) f(m) dm = \frac{T'(z(n))}{1 - T'(z(n))} \varepsilon^{ls} nf(n).$$

Taking the derivative with respect to n

$$g(n) = 1 + \frac{T'}{1 - T'} \varepsilon^{ls} \left(\varepsilon^{\frac{T'}{1 - T'}} + \varepsilon^{nf} \right)$$

where

$$\begin{aligned} \varepsilon^{\frac{T'}{1 - T'}} &= \frac{\partial \left(\frac{T'}{1 - T'} \right)}{\partial n} \frac{n}{\frac{T'}{1 - T'}} \\ \varepsilon^{nf} &= \frac{\partial (nf(n))}{\partial n} \frac{n}{nf(n)} \end{aligned}$$

Consider optimality by looking for anomalies

- Negative social welfare weights
- Social welfare weights that rise with income
- Spikes in social welfare weights

Application 1: Social welfare weights political parties

(Jacobs, Jongen and Zoutman, 2017)

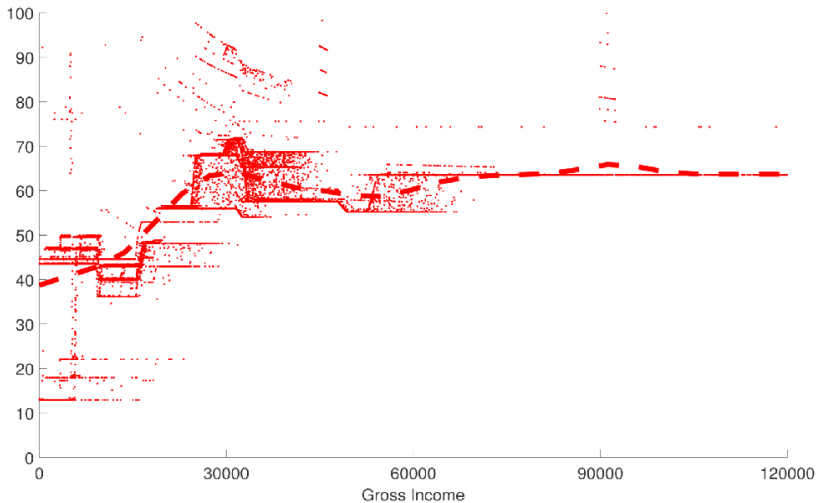


“Don’t tell me what you value.
Give me your budget and I will tell you what you value!”

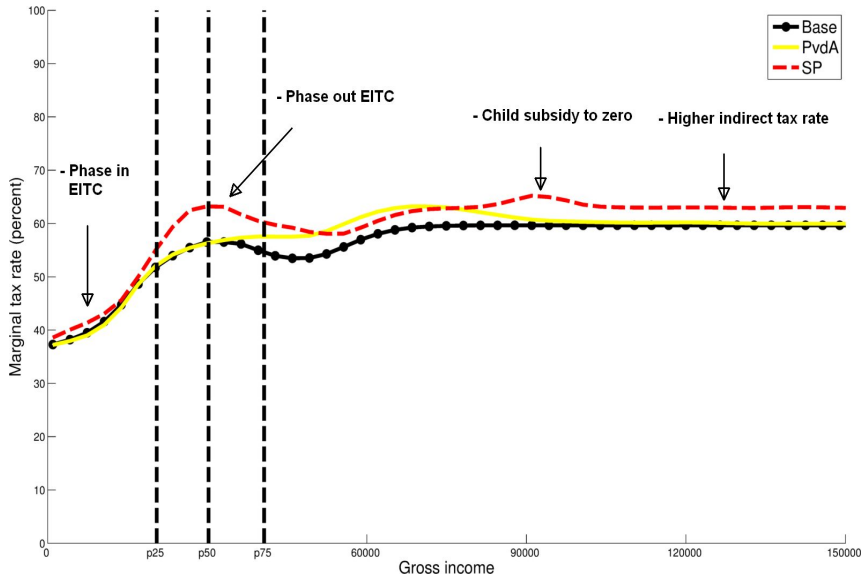
- We recover the social welfare weights of the four largest political parties for the 2002 elections in the Netherlands
- Study whether social welfare weights are 'well-behaved'
 - Do parties care about everybody?
 - Do parties care more about the poor than the rich?
 - Do left-wing parties care more about poor than right-wing p.?
 - Do right-wing parties care more about rich than left-wing p.?
- Some results are in line with expectations
- But we also find some anomalies

Effective marginal tax rates: Socialist Party (SP)

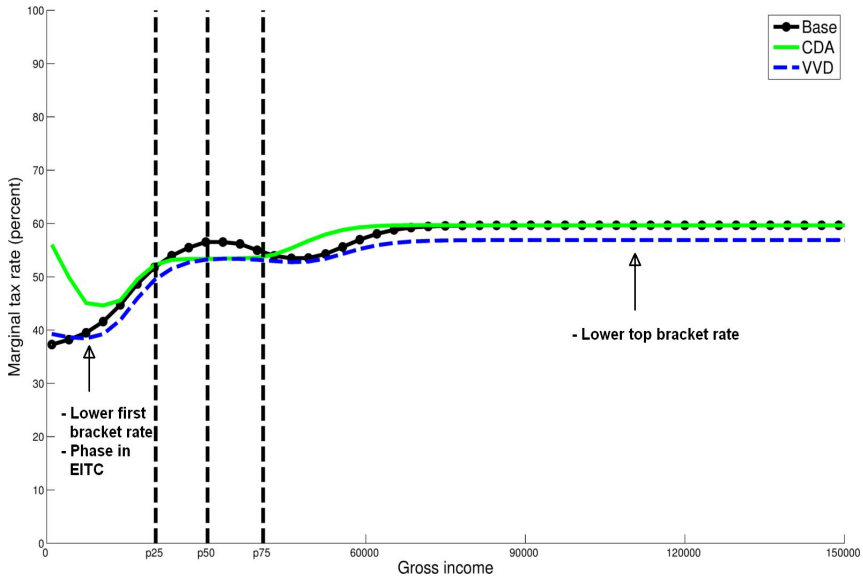
(a) Socialist party (SP)



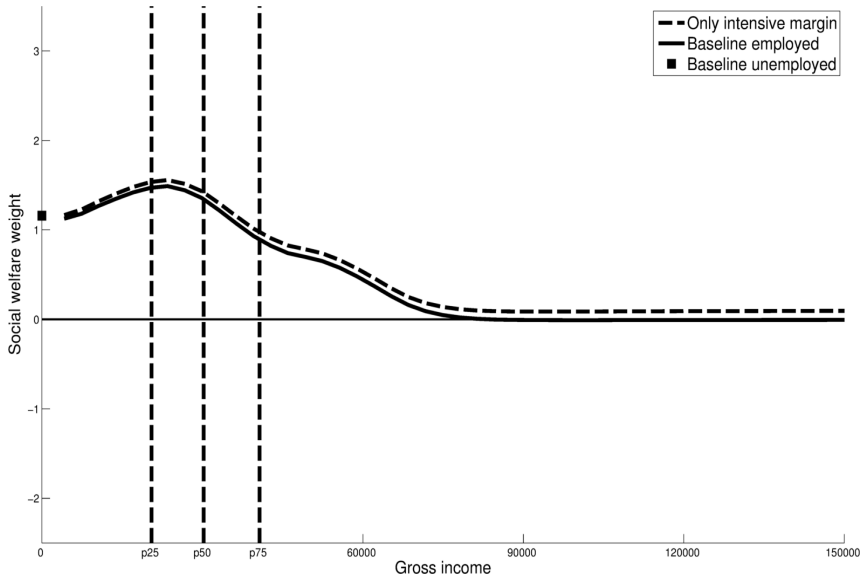
Effective marginal tax rates: Socialist Party (SP)



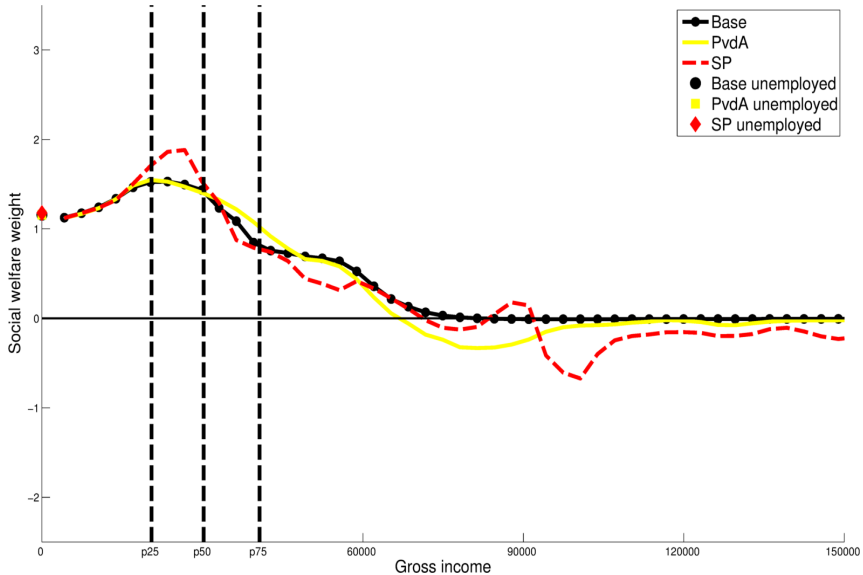
Effective marginal tax rates: Liberal Party (VVD)



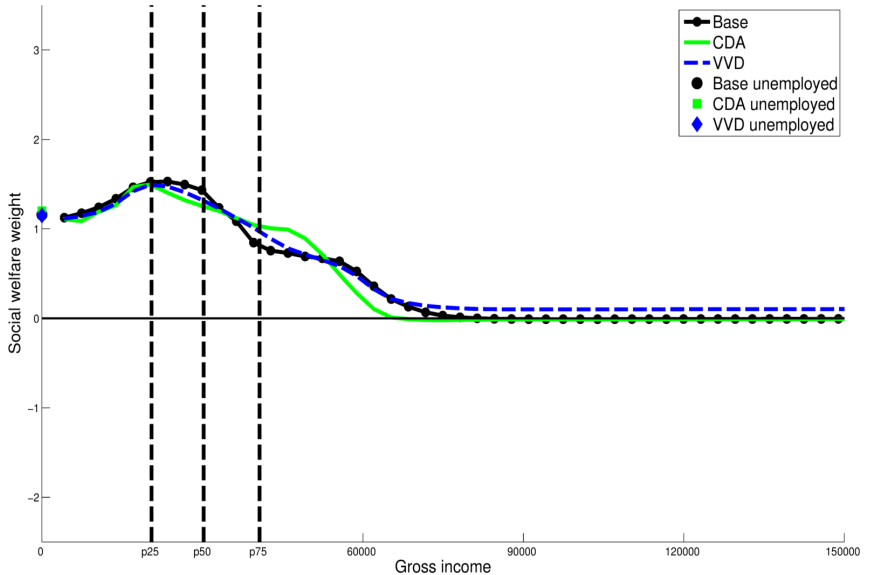
Social welfare weights: baseline



Social welfare weights: Socialist Party (SP)



Social welfare weights: Liberal Party (VVD)



Conclusions social welfare weights political parties

- Some results are in line with expectations, grosso modo:
 - All parties care more about the poor than the rich
 - Left-wing parties care more about poor than right-wing parties
 - Right-wing parties care more about rich than left-wing parties
- But we also uncover some anomalies
 - All parties care more about middle incomes than the poor
 - Left-wing parties give a negative weight to (part of) the rich
 - Differences in welfare weights across parties are rather small

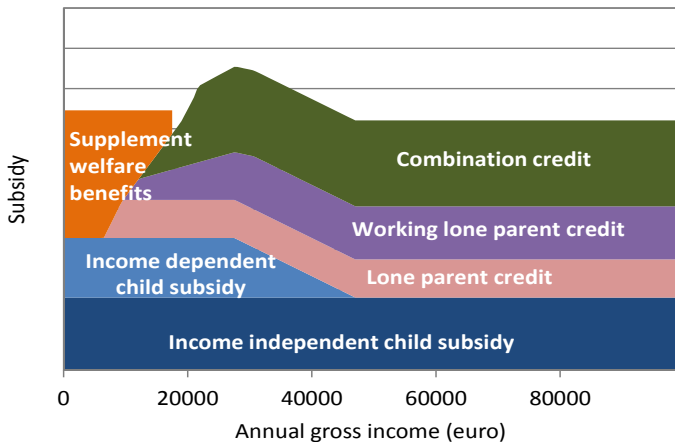
Application 2: Income support for lone parents

(De Boer and Jongen, 2023)

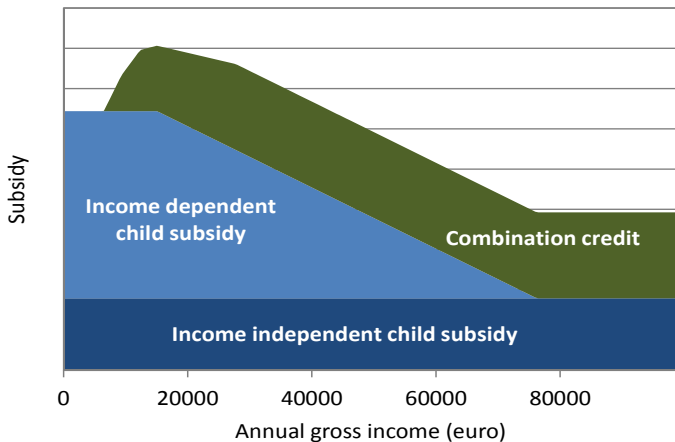
- Lone parents are of particular interest to policymakers
- Trade-off sufficient income and sufficient incentives to work
- Major reforms in income support for lone parents in the NL
- Goals: simplify the system and improve incentive to work
- Is the new system (closer to) optimal?

- Following Blundell et al. (2009), we invert the discrete optimal-tax model of Saez (2002)

Pre-reform income support lone parents (2014)



Post-reform income support lone parents (2015)



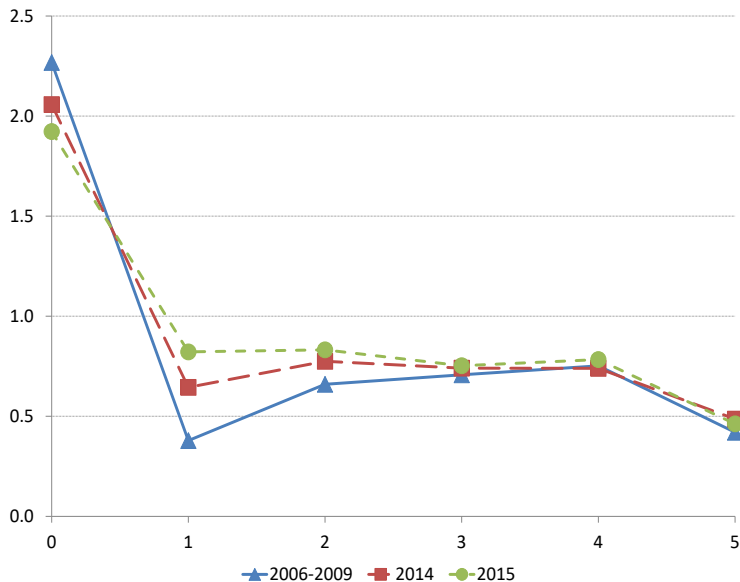
Inputs for the analysis

Table: Inputs optimal tax analysis lone parents: 2006-2009

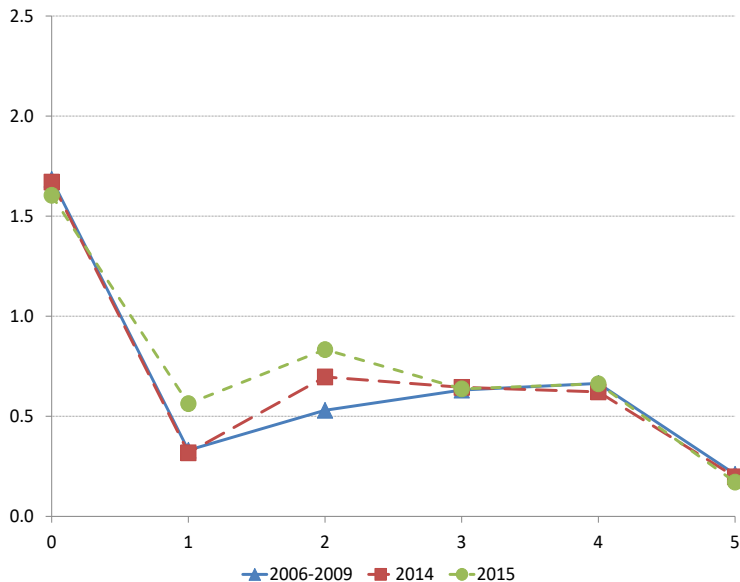
Gross earnings per week	Net income per week	Net tax per week	Intensive elasticity	Extensive elasticity	Share
<i>Panel A: Lone parents with a youngest child 0–17 years of age^a</i>					
0	293	-293	–	–	0.25
200	314	-114	0.04	0.04	0.15
326	384	-58	0.06	0.13	0.15
423	441	-18	0.06	0.16	0.15
544	503	41	0.05	0.20	0.15
851	659	192	0.12	0.35	0.15
<i>Panel B: Lone parents with a youngest child 0–3 years of age^b</i>					
0	296	-296	–	–	0.43
184	379	-195	0.29	0.29	0.11
289	445	-156	0.07	0.48	0.11
378	522	-143	0.12	0.59	0.11
478	579	-101	0.07	0.58	0.11
704	697	7	0.13	0.89	0.11

^a41,339 observations, ^b4,171 observations.

Social welfare weights: child 0-17 years of age



Social welfare weights: child 0-3 years of age



Conclusions income support lone parents

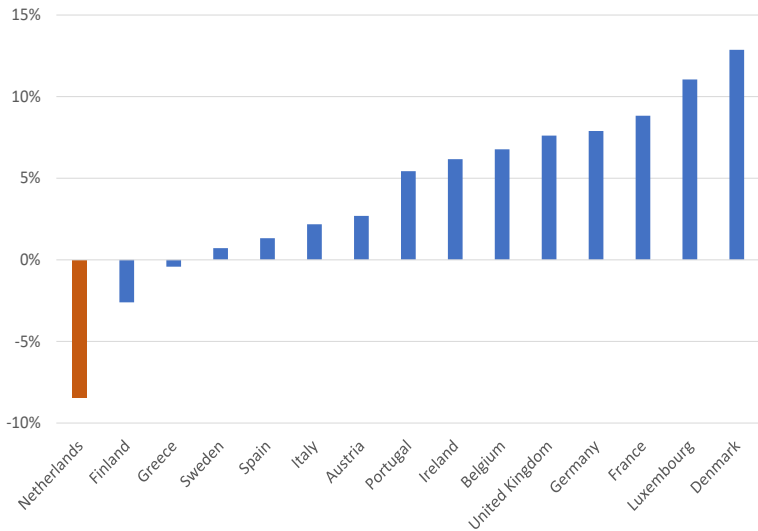
- Social welfare weights were monotonically declining in income
- Social welfare weights were sometimes negative
- The reforms mitigated these anomalies

Application 3: Taxation of secondary earners

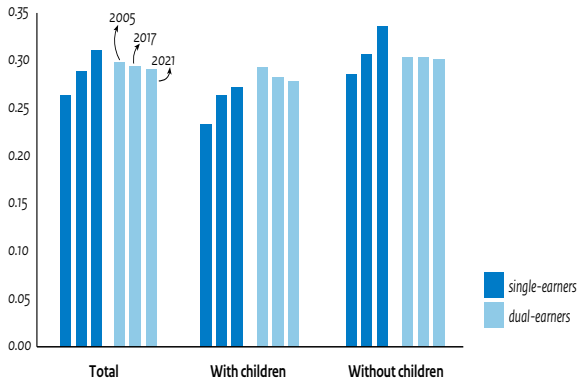
(De Boer, Jongen and Koot, 2018)

- Many OECD countries implemented tax-benefit reforms to promote labour participation, in particular of women
- Tax rates for secondary earners have decreased
- The Netherlands is a frontrunner
- Major reforms in the period 2005–2021
- Question: too much of a good thing?
- We again use the inverted discrete optimal-tax model of Saez (2002)

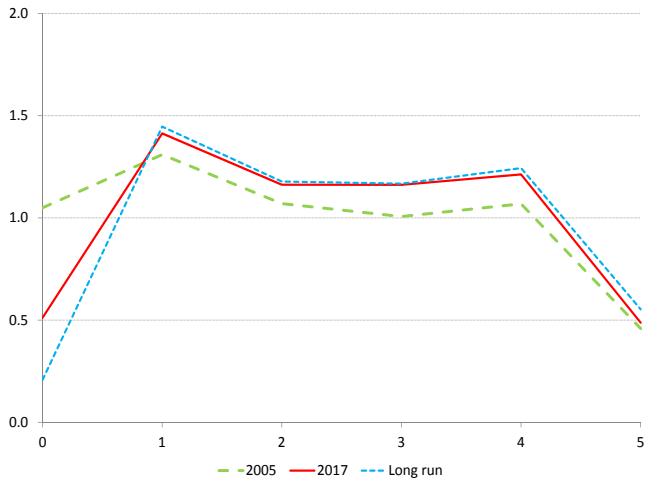
Average tax rate dual- minus single-earner couple: 2020



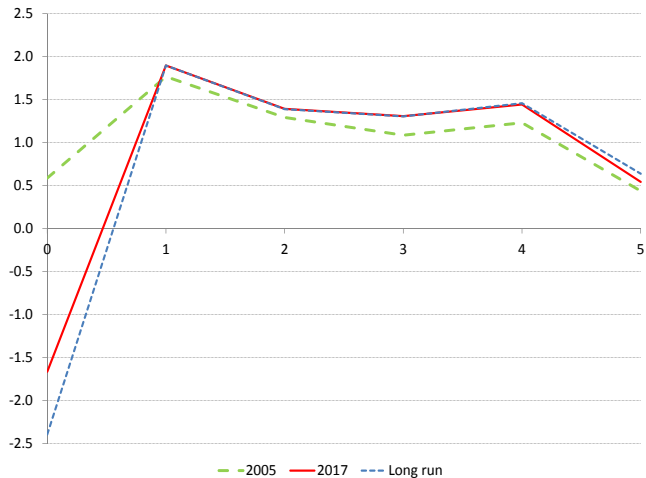
Average tax rates couples: 2005, 2017 and 2021



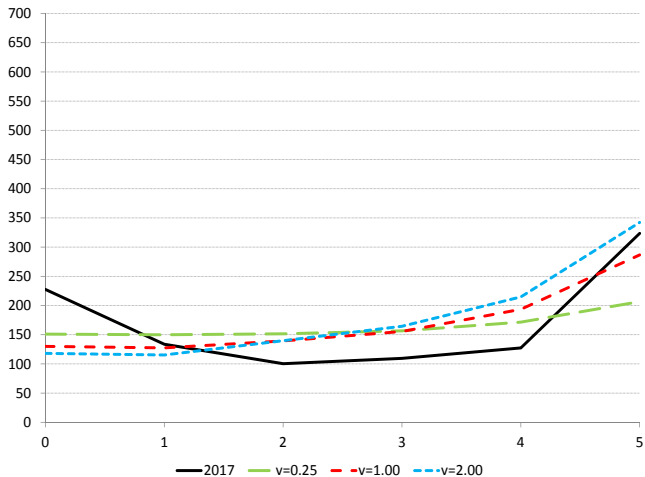
Social welfare weights: child 0-17 years



Social welfare weights: child 0-3 years



Optimal taxation child 0-3 years for different SWFs



Conclusions taxation of secondary earners

- We find anomalies in the social welfare weights:
 - Social welfare weights grosso modo well-behaved before reforms
 - After reforms no longer monotonically declining and sometimes negative
 - This suggests an imbalance between equity and efficiency
- But the optimal tax model has its limitations
 - Unitary household model
 - No lifecycle considerations

Challenges and concluding remarks

Challenges for optimal tax analyses

- What is between the elasticity of hours worked and the elasticity of taxable income?
- Dealing with households/couples
- Dealing with lifecycle considerations
- Dealing with preference heterogeneity (empirically)
- Dealing with information frictions and other frictions

Concluding remarks

- We should take up these challenges
- Make our optimal-tax models more realistic and thereby even more policy relevant
- Remain wary of the remaining limitations and how they impact your conclusions
- But a promising way to get a grip on real-life policy questions!

Or as Darth Vader would put it



Join me and together we can rule the policy galaxy!

Thank you!

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