Tax attitudes and the optimal general income taxation

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This paper:

- We characterize the optimal (redistributive) income tax when two skill-types of agents have preferences with respect to tax payments.
- Households derive utility from their own tax payments and payment of others in the economy - Relative Tax affinity concern.
- We present optimal labor and savings income tax in a dynamic OLG model with income tax evasion.

Overview

Motivation: Why do people pay taxes?

- Why do people pay taxes? Other than Allingham and Sandmo (1972) model, followed by Alm et al (1992), Alm and Torgler (2006), Slemrod (2007 and 2018) and many others.
- Recent evidence on non-pecuniary motivations for tax compliance (Slemrod, Rehman and Waseem, 2019)
- Pro-social behavior, inequality aversion, reciprocity, warm-glow (Andreoni, 1990; Andreoni et al 1998).
- Tax affinity (hostility): Individuals may derive (dis)utility from the amount of tax paid due to their pro-social tendencies, but also from the relative amount of their contributions, an impure altruistic behavior.

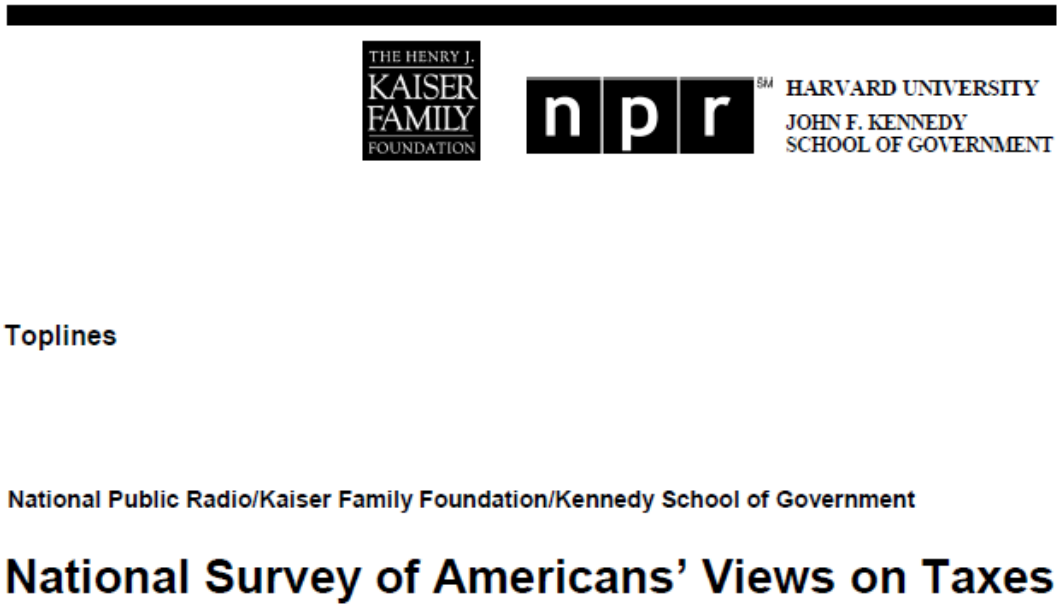
Motivation: Psychological Reasons

- Personality traits can module individuals‘ behavior (Almlund, Duckworth, Heckman, and Kautz, 2011).

- Self-construal refers to the way in which a person thinks about and defines the self. Also it is a way of understanding one's relationship to the larger social world (Markus and Kitayama, 1991).
  - ‘An interdependent self-construal, because of its emphasis on relationships and groups, is one in which the self is seen as fundamentally embedded in the larger social world and this might affect behavioral decisions.‘
- A relative tax affinity concerned individual enjoys utility when paying taxes ‘similar‘ to her reference group.

Is there such an individual with relative tax preferences?

Figure: American's View on Taxes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National Survey of Americans' Views on Taxes

Is there such an individual with relative tax preferences?

- Questions such as:
  - "Do you and your family pay more (less, about) than your fair share?"
  - "The feeling that some wealthy people get away no paying their fair share bothers you the most about taxes?"

  - "Did you: (i) buy something online or from a local store; (ii) donate more to charity or (iii) work less, to pay less in taxes last year?"
  - "To pay less taxes, have you (i) chosen to buy a house instead of renting; (ii) bought or sold a stock/bond you otherwise would not have bought/sold; (iii) chosen to live somewhere other than where you work; (iv) put money in a retirement account?"

Relative Tax Affinity

VII. Philosophy

18. I'm going to read you a list of groups. Please tell me if you think they pay more than their fair share, less than their fair share, or about their fair share in **federal** taxes.

	Pay more than their fair share	Less than their fair share	About their fair share	Don't know	Refused
a. High-income families	15	57	25	3	*
b. Middle-income families	59	3	34	3	*
c. Low-income families	36	20	40	4	*
d. You and your family	45	3	48	3	1

(SCRAMBLE WORDS IN PARENS)

22. Which of the following bothers you most about taxes: (the large amount you pay in taxes,) (the complexity of the tax system,) or (the feeling that some wealthy people get away not paying their fair share)?

	The large amount you pay in taxes	The complexity of the tax system	The feeling that some wealthy people get away not paying their fair share	Don't know	Refused
Total	14	32	51	2	*

Avoidance Decision

X. Taxes and Decision Making

61. Here are some decisions that some people make in part because of taxes. In the LAST YEAR did you (ITEM) IN PART because it meant that you would pay less in taxes?

	Yes	No	Retired/did not work	Don't know	Refused
b. Buy something on the Internet instead of from a local store	14	85	NA	*	*
c. Donate more to charity	16	83	NA	1	--
d. Work less	9	84	7	1	*

69. Have you EVER (ITEM) IN PART because it meant you would pay less in taxes

	Yes	No	Don't know	Refused
a. Chosen to buy a house instead of renting	26	73	*	*
b. Bought or sold a stock or a bond you otherwise wouldn't have bought or sold	9	90	1	*
c. Chosen to live somewhere other than where you work	11	88	1	--
d. Put money in a retirement account	40	60	1	*

Must control for I

73. Do you have children under the age of 18?

	Yes	No	Don't know	Refused
Total	38	62	*	*

(Asked of total who have children under 18; n= 519)

74. How many?

	1	2	3	4	5	6	7+	Refused
Total	40	34	16	6	2	1	*	*

Leaned Party table

	Republican	Democrat	Independent	Something else	Don't Know	Refused
Total	35	44	8	10	2	1

D06. Are you currently married, living with a partner, widowed, divorced, separated, or have you never married?

	Currently married	Living w/ a partner	Widowed	Divorced	Separated	Never married	Don't Know	Refused
Total	55	5	7	11	2	19	*	*

D09. What is the last grade or class that you completed in school?

	Total
High school graduate or less (NET)	49
Less than high school graduate (SUBNET)	17
None, or grade 1-8	4
High school incomplete	13
High school graduate + (SUBNET)	32
High school graduate	29
Business, technical/vocational school	2
Some college or more (NET)	51
Some college, no 4 year degree	27
College graduate + (SUBNET)	24
College graduate	16
Post-graduate training	8
Don't Know	*
Refused	*

Must control for II

D10. What is your age?

	18-29	30-49	50-64	65+	Refused
Total	21	40	21	16	1

D11. Are you, yourself, of Hispanic or Latino background, such as Mexican, Puerto Rican, Cuban, or other Latin American background?

	Yes	No	Don't know	Refused
Total	12	88	*	*

(Asked of total Hispanics; n = 114)
D11a. Are you White Hispanic or Black Hispanic

	White	Black	Don't know	Refused
Total	81	9	7	3

(Asked of total non-Hispanics; n = 1225)
D12. Do you consider yourself to be white, black or African-American, Asian-American, or some other race?

	White	Black/African-American	Asian-American	Some other race	Don't Know	Refused
Total	80	13	3	3	*	1

D18. GENDER

	Male	Female
Total	48	52

D19. REGION

	Northeast	North Central	South	West
Total	18	23	36	22

D20. METRO STATUS

	Urban	Suburban	Rural
Total	32	46	22

D14. IS YOUR TOTAL ANNUAL HOUSEHOLD INCOME FROM ALL SOURCES, AND BEFORE TAXES: (READ LIST)

	Total
Less than $50K (NET)	51
Less than $20K	14
$20K but less than $30K	15
$30K but less than $40K	11
$40K but less than $50K	8
Less than $50K (unspecified)	3
$50K - $149.9K (NET)	38
$50K but less than $60K	9
$60K but less than $75K	9
$75K but less than $100K	11
$100K but less than $150K	6
$50K but less than $150K (unspec)	3
$150K+ (NET)	4
$150K but less than $300K	3
$300K but less than $500K	1
$500K+	*
$150K+ (unspecified)	*
Don't Know	2

AVT - Table 1: Data descritption

	More	About	Less
Avoidance	0.68	0.67	0.82
Education	4.68	4.88	5.27
Low income	0.40	0.39	0.40
Middle Income	0.37	0.43	0.24
High Income	0.17	0.14	0.33
Has stocks	0.60	0.59	0.76
Own a House	0.76	0.75	0.76
Young	0.12	0.18	0.13
Adult	0.48	0.46	0.36
Old	0.26	0.21	0.42
Senior	0.12	0.14	0.09
Republican	0.39	0.39	0.29
Democrat	0.41	0.44	0.56
Independent	0.08	0.06	0.07
Male	0.48	0.52	0.53
n	605	651	45

AVT - Table 2: Correlations for Relative Tax affinity

Panel A	Avoidance	Avoidance I	Online	donation	labor supply
More	0.00546	0.0577**	0.0460**	0.00625	0.0382**
	(0.0278)	(0.0280)	(0.0206)	(0.0218)	(0.0152)
Fair	-0.00629	-0.0706**	-0.0371*	-0.0176	-0.0359**
	(0.0276)	(0.0276)	(0.0203)	(0.0216)	(0.0147)
Less	0.106	0.142*	0.0346	0.166**	0.00929
	(0.0679)	(0.0805)	(0.0605)	(0.0722)	(0.0431)
Panel B	Avoidance II	Own house	Stocks	Live	Retirement
More	-0.0218	0.0591**	0.00359	0.0300*	0.0155
	(0.0301)	(0.0255)	(0.0183)	(0.0172)	(0.0274)
Fair	0.0199	-0.0620**	-0.0139	-0.0269	0.00472
	(0.0299)	(0.0252)	(0.0182)	(0.0169)	(0.0273)
Less	0.156**	0.115	0.145**	-0.0193	0.113
	(0.0725)	(0.0747)	(0.0665)	(0.0433)	(0.0743)

Std errors in parentheses. $***p < 0.01, **p < 0.05, *p < 0.1$.

Avoidance I: Internet, donation,labor supply adjustments. Avoidance II: Own X rent a house, buy and sell stocks, live in a local different from the work, retirement account.

AVT - Table 3: Correlations for No Tax 'Hostility'

No Tax Hostility	Avoidance	Avoidance I	Avoidance II
More	-0.0846**	- 0.0782*	-0.0849**
	(0.0363)	(0.041)	(0.047)
Fair	-0.0843**	-0.0748*	-0.0848**
	(0.0364)	(0.0409)	(0.0408)
Less	- 0.0872**	-0.0929**	-0.0793*
	(0.0357)	(0.261)	(0.0406)

Std errors in parentheses. $***p < 0.01, **p < 0.05, *p < 0.1$.
Avoidance I: Internet, donation,labor supply adjustments. Avoidance II: Own X rent a house, buy and sell stocks, live in a local different from the work, retirement account.

Our results

- We find that less progressive income taxes (lower marginal taxes) can be imposed in both skill-types to stimulate labor effort at the margin.
- The optimal marginal savings tax exacerbates the difference between marginal rate of substitution between today versus tomorrow's consumption and interest rate.
- When tax evasion is allowed, we must add a policy instrument to close the wedge of the evasion and consumption margin, but still less (optimal) progressiveness can be reached.
- Even high skilled individuals could face a negative marginal income tax to avoid evasion and mimicking.

Literature I

- Neurophysiological evidence for the importance of social comparison on reward processing in the human brain (Fliessbach et al., 2007).
- Relative Consumption as individual's concern Aronsson and Johansson (2008, 2010, 2018).
- Donations versus tax payment decisions may be influenced by pure altruism and/or warm-glow. Do they crowd out? (Andreoni, 1990; Hungerman, 2014; Ottoni-Wilhelm et al., 2017).
- Comparison of tax payments to a reference level of taxes (Kahneman and Tversky, 1979).
- Self-Construal (Markus and Kitayama; 1991).

Literature II

- Tax affinity: Djanali and Sheehan-Connor (2012) "the high tax rates during World War II were accepted by virtually all citizens regardless of income level..."

- Paternalistic view for the social planner to correct the externality caused by under or over tax payment (Wane, 2001; Kanbur, Kenn and Tuomala, 1994).

- We also address the literature on salience and inattention (Bordalo et al., 2013; Caplin and Dean, 2015; Chetty et al., 2009; Hoopes et al., 2015 and Koszegi and Szeidl, 2013).

The Economy

Households and Positional Preferences:

- OLG model where at each time period t, a new generation is born and denoted by its date of birth.
- Individuals live for two periods. The members of generation t work during the first period of their life (when young, t) and do not work during the second period (when old, $t+1$).
- Agents born in period t are heterogeneous with respect to their work ability.
- Low-ability type (type $i=1$) is less productive than the high-ability type (type $i=2$).
- There are n_t^i type-i members of generation t (individuals of ability-type i who were born at the beginning of period t).

The Economy

- They care about leisure ($z_t^i = 1 - l_t^i$), and consumption in both periods: c_t^i and x_{t+1}^i.

- As a pro-social individual, she also is concerned about her (relative) tax payment $T_t\left(w_t^i l_t^i\right)$ on their labor income $w_t^i l_t^i$, where w_t^i is wage rate.

- She also cares about her savings tax payments $Q_{t+1}\left(s_t^i r_{t+1}\right)$, where s_t^i and r_{t+1} are the agent's savings in period t and the market interest rate in period $t+1$.

The Economy: Why OLG model?

- Individuals compare the amount of taxes they pay:

$$\overline{T}_t(.) = \overline{T}_t(T_t(w_t^i l_t^i), T_t(w_t^j l_t^j), T_{t-1}(w_{t-1}^i l_{t-1}^i), T_{t-1}(w_{t-1}^j l_{t-1}^j))$$
$$\overline{Q}_{t+1}(.) = \overline{Q}_{t+1}(Q_{t+1}(s_t^i r_{t+1}), Q_{t+1}(s_t^j r_{t+1}), Q_t(s_{t-1}^i r_t), Q_t(s_{t-1}^j r_t))$$

The Economy

Full attention/rationality corresponds to $m^i = 1$, versus $m^i = 0$ (Gabaix and Farhi, 2019). The utility function of ability-type i born in the period t:

$$U_t^i = u_t^i(c_t^i, z_t^i, x_{t+1}^i, m_T^i T_t(w_t^i l_t^i), m_Q^i Q_{t+1}(s_t^i r_{t+1}), m_T^i \overline{T}_t(.), m_Q^i \overline{Q}_{t+1}(.)) \quad (1)$$

s.t.

$$c_t^i = w_t^i l_t^i - T_t\left(w_t^i l_t^i\right) - s_t^i \quad (2)$$

$$x_{t+1}^i = s_t^i\left(1 + r_{t+1}\right) - Q_{t+1}\left(s_t^i r_{t+1}\right) \quad (3)$$

Consumer's FOC:

$$u_c^{it}[w_t^i - T_t'(w_t^i l_t^i)w_t^i] - u_z^{it} + u_{T(.)}^{it} m_T^i T_t'(w_t^i l_t^i)w_t^i = 0 \quad (4)$$

$$-u_c^{it} + u_x^{it}(1 + r_{t+1} - Q_{t+1}'(s_t^i r_{t+1})r_{t+1}) + u_{Q(.)}^{it} m_Q^i Q_{t+1}'(s_t^i r_{t+1})r_{t+1} = 0 \quad (5)$$

Slope of Indifference Curves:

$$\frac{dc_t^i}{dy_t^i} = \frac{u_y^{it}(1 - T_t') - u_{T(.)}^{it} m_T^i T_t'(w_t^i l_t^i)}{w_t^i u_c^{it}} \tag{6}$$

$$\frac{dc_t^i}{ds_t^i} = \frac{u_x^{it}(1 + r_{t+1} - Q_{t+1}'(s_t r_{t+1}) r_{t+1}) + u_{Q(.)}^{it} m_Q^i Q_{t+1}'(s_t^i r_{t+1}) r_{t+1}}{u_c^{it}} \tag{7}$$

Tax Affinity X Tax Hostility

Pareto Optimal Taxation

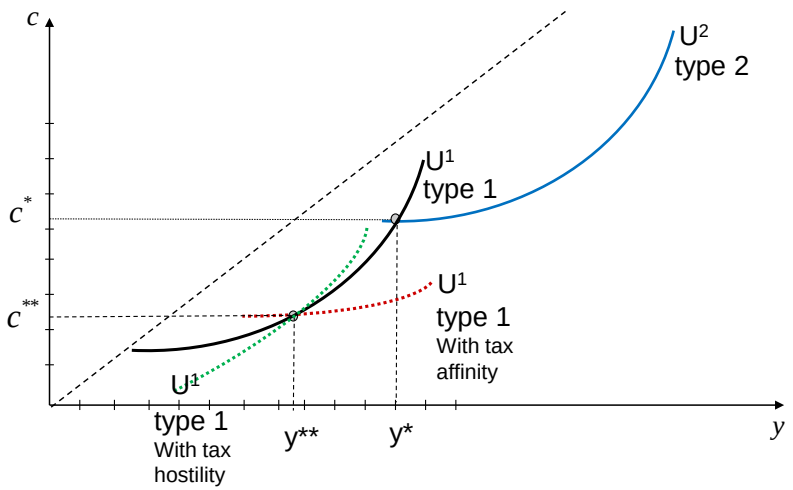

Table: Tax Independence vs. Interdependence: Affinity, Hostility

			Interdependent Preferences ($m^i_{\overline{T}} = 1$)	
			Tax Conformity $u^i_{\overline{T}(\cdot)} > 0$	Tax Opposition $u^i_{\overline{T}(\cdot)} < 0$
Independent Preferences ($m^i_T = 1$)	Tax Affinity	$u^i_{T^i} > 0$	Tax Sympathetic	Tax Funder
	Tax Hostility	$u^i_{T^i} < 0$	Tax Free-rider	Anti-tax

Note: $u^i_{T^i} = \partial u^i / \partial T \left(w^i l^i\right)$; $u^i_{\overline{T}(\cdot)} = \partial u^i / \partial \overline{T}$.

Firms' Problem:

To Maximize Profits (CRS tech):

$$\Pi_t = F\left(L_t^1, L_t^2, K_t\right) - w_t^1 L_t^1 - w_t^2 L_t^2 - r_t K_t$$

,

$$F_{L_t^i}\left(L_t^1, L_t^2, K_t\right) = \frac{\partial f\left(\theta^1 L_t^1 + \theta^2 L_t^2, K_t\right)}{\partial\left(\theta^1 L_t^1 + \theta^2 L_t^2\right)}\theta^i = w_t^i, \text{ for } i = 1, 2, \tag{8}$$

$$F_{K_t}\left(L_t^1, L_t^2, K_t\right) = \frac{\partial f\left(\theta^1 L_t^1 + \theta^2 L_t^2, K_t\right)}{\partial K_t} = r_t. \tag{9}$$

Problem Constraints:

(i) Government wants to redistribute from high to low and observes income, not labor supply;

(ii) Self-Selection Constraint:

$$\begin{aligned} U_t^2 &= u_t^2\left(c_t^2, z_t^2, x_{t+1}^2, m_T^2 T_t\left(w_t^2 l_t^2\right), m_\Phi^2 Q_{t+1}\left(s_t^2 r_{t+1}\right), m_T^2 \overline{T}_t(\cdot), m_\Phi^2 \overline{Q}_{t+1}(\cdot)\right) \\ &\geq \widehat{u}_t^2\left(c_t^1, 1-\phi l_t^1, x_{t+1}^1, m_T^2 T_t\left(w_t^2 \phi l_t^1\right), m_Q^2 Q_{t+1}\left(s_t^1 r_{t+1}\right), m_T^2 \overline{T}_t(\cdot), m_Q^2 \overline{Q}_{t+1}(\cdot)\right) \quad (10) \\ &= \widehat{U}_t^2 \end{aligned}$$

(iii) Resource Constraints.

$$F\left(L_t^1, L_t^2, K_t\right) + K_t = \sum_{i=1}^{2}\left(n_t^i c_t^i + n_{t-1}^i x_t^i\right) + K_{t+1} \quad (11)$$

Planner's Problem:

$$
\begin{aligned}
L &= W\left(n_0^1 U_0^1, n_0^2 U_0^2, n_1^1 U_1^1, n_1^2 U_1^2, ...\right) \\
&+ \sum_t \lambda_t \left[U_t^2 - \widehat{U}_t^2\right] \\
&+ \sum_t \gamma_t \left[F\left(L_t^1, L_t^2, K_t\right) + K_t - \sum_{i=1}^{2}\left(n_t^i c_t^i + n_{t-1}^i x_t^i\right) - K_{t+1}\right]
\end{aligned} \tag{12}
$$

λ_t and γ_t are the Lagrange multipliers associated with constraints (10) and (11),

Definitions:

Definitions

$$MRS^{it}_{z,c} = \frac{u^{it}_z}{u^{it}_c} \qquad MRS^{it}_{c,x} = \frac{u^{it}_c}{u^{it}_x} \qquad MRS^{it}_{T(\cdot),c} = \frac{u^{it}_{T(\cdot)}}{u^{it}_c}$$

$$MRS^{it}_{Q(\cdot),c} = \frac{u^{it}_{Q(\cdot)}}{u^{it}_c} \qquad MRS^{it}_{Q(\cdot),x} = \frac{u^{it}_{Q(\cdot)}}{u^{it}_x}$$

Optimal Labor Income Taxes with Relative Tax Affinity

Optimal marginal income taxes

$$T_t'\left(w_t^1 l_t^1\right) = \frac{+\left(\frac{\lambda_t^*}{n_t^1 w_t^1}\right)\left(MRS_{z,c}^{1t} - \phi\widehat{MRS}_{z,c}^{2t}\right) - \left(\frac{1}{\gamma_t n_t^1 w_t^1}\right)\Omega_T^{1t}\left(\frac{\partial L}{\partial \overline{T}_t}\right)}{1 + \left(\frac{\lambda_t^*}{n_t^1}\right)\left(m_T^1 MRS_{T(\cdot),c}^{1t} - m_T^2 \widehat{MRS}_{T(\cdot),c}^{2t}\right)} \tag{13}$$

$$T_t'\left(w_t^2 l_t^2\right) = -\frac{1}{\gamma_t n_t^2 w_t^2}\Omega_T^{2t}\left(\frac{\partial L}{\partial \overline{T}_t}\right) \tag{14}$$

Making sense of equations
Part 1: Mirrlees (1971)/ Stiglitz (1982)

$$T_t'\left(w_t^1 l_t^1\right) = \frac{\left(\frac{\lambda_t^*}{n_t^1 w_t^1}\right)\left(MRS_{z,c}^{1t} - \phi\widehat{MRS}_{z,c}^{2t}\right)}{1} \tag{15}$$

$$T_t'\left(w_t^2 l_t^2\right) = 0 \tag{16}$$

Making sense of equations - Reference level
Part 2: Wane (2001)/Kanbur, Keen and Tuomala (1994) Aronsson and Johansson (2010)

$$T_t'\left(w_t^1 l_t^1\right) = -\frac{\left(\frac{1}{\gamma_t n_t^1 w_t^1}\right)\Omega_T^{1t}\left(\frac{\partial L}{\partial \overline{T}_t}\right)}{1} \tag{17}$$

$$T_t'\left(w_t^2 l_t^2\right) = -\frac{1}{\gamma_t n_t^2 w_t^2}\Omega_T^{2t}\left(\frac{\partial L}{\partial \overline{T}_t}\right) \tag{18}$$

Making sense of equations
Part 3: Own Self Tax Concern

$$T_t'\left(w_t^1 l_t^1\right) = \frac{1}{1+\left(\frac{\lambda_t^*}{n_t^1}\right)\left(m_T^1 MRS_{T(\cdot),c}^{1t} - m_T^2 \widehat{MRS}_{T(\cdot),c}^{2t}\right)} \tag{19}$$

$$T_t'\left(w_t^2 l_t^2\right) = 0 \tag{20}$$

Optimal Income Taxes

Proposition 1: Optimal Income Distortion

In an economy where individuals have independent tax affinity (hostility) attitudes, the less skilled is expected to face lower (larger) optimal marginal income taxes than otherwise for redistributive reason. Interdependent conformity (opposition) preferences act generating a positive (negative) impact on aggregated welfare leading to lower (larger) marginal income taxes.

Optimal Savings Tax

Optimal savings tax

$$Q'\left(s^1_{t+1} r_{t+1}\right) = \frac{1}{r_{t+1}} \left\{ \frac{\left[(1+r_{t+1}) - MRS^{1t}_{c,x}\right] - \frac{1}{\gamma_t n^1_t m^1_\Phi} \Omega^{1t+1}_Q \left(\frac{\partial L}{\partial \overline{Q}_{t+1}}\right)}{1 + \frac{\lambda^{**}_t}{\gamma_t n^1_t m^1_Q} \left[m^1_Q MRS^{1t}_{Q,x} - m^2_Q \hat{MRS}^{2t}_{Q,x} \right]} \right\} \quad (21)$$

$$Q'\left(s^2_{t+1} r_{t+1}\right) = \frac{1}{r_{t+1}} \left\{ \left[(1+r_{t+1}) - MRS^{2}_{c,x}\right] - \frac{1}{\gamma_t n^2_t m^2_Q} \Omega^{2t+1}_Q \left(\frac{\partial L}{\partial \overline{Q}_{t+1}}\right) \right\} \quad (22)$$

Optimal Savings Taxes

Proposition 2: Optimal Savings Distortion

An individual with relative tax concern can face smaller (larger) optimal marginal savings tax than otherwise. This lower marginal savings taxes can be decomposed in two terms

- a positive (negative) impact of the reference tax payment on economy's welfare that affects both types and
- the own tax affinity (hostility) term that influences the lower (larger) optimal marginal savings taxes on the less skilled.

Moreover, the optimal marginal savings tax exacerbates the difference between marginal rate of substitution between today versus tomorrow's consumption and interest rate to address savings tax positionality.

Reference effect:

The following derivatives capture the positionality effect in period t and $t+1$ as they reflect the atmospheric welfare effects of a change in the level of reference taxation in period t and $t+1$:

$$\begin{aligned}
\frac{\partial L}{\partial \overline{T}_t(\cdot)} &= \sum_{i=1}^{2}\left(\frac{\partial W}{\partial\left(n_t^i U_t^i\right)}\right) n_t^i m_T^i u_{\overline{T}(\cdot)}^{it} + \sum_{i=1}^{2}\left(\frac{\partial W}{\partial\left(n_{t+1}^i U_{t+1}^i\right)}\right) n_{t+1}^i m_T^i u_{\overline{T}(\cdot)}^{it+1} \\
&+ \lambda_t m_T^2\left[u_{\overline{T}(\cdot)}^{2t} - \widehat{u}_{\overline{T}(\cdot)}^{2t}\right] + \lambda_{t+1} m_T^2\left[u_{\overline{T}(\cdot)}^{2t+1} - \widehat{u}_{\overline{T}(\cdot)}^{2t+1}\right] \\
\frac{\partial L}{\partial \overline{Q}_{t+1}(\cdot)} &= \sum_{i=1}^{2}\frac{\partial W}{\partial\left(n_t^i U_t^i\right)} n_t^i m_Q^i u_{\overline{\Phi}(\cdot)}^{it} + \sum_{i=1}^{2}\frac{\partial W}{\partial\left(n_{t+1}^i U_{t+1}^i\right)} n_{t+1}^i m_Q^i u_{\overline{\Phi}(\cdot)}^{it+1} \\
&+ \lambda_t m_Q^2\left[u_{\overline{Q}(\cdot)}^{2t} - \widehat{u}_{\overline{Q}(\cdot)}^{2t}\right] + \lambda_{t+1} m_\Phi^2\left[u_{\overline{Q}(\cdot)}^{2t+1} - \widehat{u}_{\overline{Q}(\cdot)}^{2t+1}\right]
\end{aligned}$$

Reference effect:

Externality and Self-selection effect of the Reference Level

- Atmospheric externality of the tax concern. Tax conformity versus tax opposition.
  Conditional on their own tax payments, we expect the net to be positive:
  $\sum_{i=1}^{2}\left(\partial W/\partial\left(n_t^i U_t^i\right)\right) n_t^i m_T^i u_{\overline{T}(\cdot)}^{it} + \sum_{i=1}^{2}\left(\partial W/\partial\left(n_{t+1}^i U_{t+1}^i\right)\right) n_{t+1}^i m_T^i u_{\overline{T}(\cdot)}^{it+1}$.

- With same utility function and different levels of c_t and l_t.
  Depend on complementarity/substitutability between $\overline{T}(\cdot)$ and those choices.
  Should be really small/zero:
  $\lambda_t m_T^2\left[u_{\overline{T}(\cdot)}^{2t} - \widehat{u}_{\overline{T}(\cdot)}^{2t}\right] + \lambda_{t+1} m_T^2\left[u_{\overline{T}(\cdot)}^{2t+1} - \widehat{u}_{\overline{T}(\cdot)}^{2t+1}\right]$

Illustrative Example

$$u_t^i = c_t^i + logz_t^i - m_T^i \left[T_t^i(w_t^i l_t^i) - \bar{T}_t \right]^2 + \beta \left\{ x_{t+1}^i - m_Q^i \left[Q_{t+1}^i(s_t r_{t+1}) - \bar{Q}_{t+1} \right]^2 \right\}. \tag{23}$$

$$\overline{T}_t = \frac{1}{N_t} \left[\alpha \sum_{i=1}^{2} n_t^i T_t \left(w_t^i l_t^i \right) + (1-\alpha) \sum_{i=1}^{2} n_{t-1}^i T_{t-1} \left(w_{t-1}^i l_{t-1}^i \right) \right] \tag{24}$$

$$\overline{Q}_{t+1} = \frac{1}{N_t} \left[\alpha \sum_{i=1}^{2} n_t^i Q_{t+1} \left(s_t^i r_{t+1} \right) + (1-\alpha) \sum_{i=1}^{2} n_{t-1}^i Q_t \left(s_{t-1}^i r_t \right) \right] \tag{25}$$

Illustrative Example

$$
\begin{aligned}
T_t'\left(w_t^1 l_t^1\right) &= \frac{\left(\frac{\lambda_t^*}{n_t^1 w_t^1}\right)\left(\frac{1}{1-l_t^1}-\phi\frac{1}{1-\phi l_t^1}\right)}{1-\left(\frac{\lambda_t^*}{n_t^1}\right)\left(2m_T^1\Delta T_t^1-2m_T^2\Delta T_t^1\right)+\left(\frac{1}{\gamma_t n_t^1 w_t^1}\right)\left(\frac{\partial L}{\partial \overline{T}_t}\right)} \\
T_t'\left(w_t^2 l_t^2\right) &= 0 \\
Q'\left(s_{t+1}^1 r_{t+1}\right) &= \left[1-\left(\frac{\lambda_t^{**}}{\gamma_t n_t^1 m_Q^1}\right)\left(2m_Q^1\Delta Q_t^1-2m_Q^2\Delta Q_t^2\right)+\left(\frac{1}{\gamma_t n_t^1 m_Q^1}\right)\left(\frac{\partial L}{\partial \overline{Q}_{t+1}}\right)\right]^{-1} \\
Q'\left(s_{t+1}^2 r_{t+1}\right) &= \left[1+\frac{1}{\gamma_t n_t^2}\left(\frac{\partial L}{\partial \overline{Q}_{t+1}}\right)\right]^{-1}
\end{aligned}
$$

Tax Evasion as a Cost Resource

Consumer's Utility

$$U_t^i = u_t^i\left(c_t^i, z_t^i, x_{t+1}^i, m_T^i T_t\left((1-e_t^i)w_t^i l_t^i\right), m_Q^i Q_{t+1}\left(s_t^i r_{t+1}\right), m_T^i \overline{T}_t(\cdot), m_Q^i \overline{Q}_{t+1}(\cdot)\right) \quad (26)$$

$\overline{T}_t(\cdot)$ is defined as

$$\overline{T}_t(\cdot) = \overline{T}_t\Big[T_t\left((1-e_t^i)w_t^i l_t^i\right), T_t\left((1-e_t^j)w_t^j l_t^j\right), \quad (27)$$
$$T_{t-1}\left((1-e_{t-1}^i)w_{t-1}^i l_{t-1}^i\right), T_{t-1}\left((1-e_{t-1}^j)w_{t-1}^j l_{t-1}^j\right)$$

Evasion is a resource cost

$$c_t^i = w_t^i l_t^i - T_t\left((1-e_t^i)w_t^i l_t^i\right) - \sigma_t^i e_t^i w_t^i l_t^i - s_t^i \quad (28)$$

Tax evasion as a Cost Resource

- We allow for evasion of a fraction of the earned income (e_t^i) in that period, σ denotes that concealment cost.
- Individuals can only evade labor income taxes but not their savings earnings. (Third-part remittance assumption).

New Consumer's FOCs:

$$\begin{aligned} u_c^{it}\left[(1-\sigma e_t^i)w_t^i - T_t'\left((1-e_t^i)w_t^i l_t^i\right)(1-e_t^i)w_t^i\right] - u_z^{it} & \\ +u_{T(\cdot)}^{it} m_T^i T_t'\left((1-e_t^i)w_t^i l_t^i\right)(1-e_t^i)w_t^i &= 0 \quad (29) \\ u_c^{it}\left[-\sigma w_t^i l_t^i + T_t'\left((1-e_t^i)w_t^i l_t^i\right)w_t^i l_t^i\right] - u_{T(\cdot)}^{it} m_T^i T_t'\left((1-e_t^i)w_t^i l_t^i\right)w_t^i l_t^i &= 0 \quad (30) \\ -u_c^{it} + u_x^{it}\left(1 + r_{t+1} - Q_{t+1}'\left(s_t^i r_{t+1}\right)r_{t+1}\right) + u_{Q(\cdot)}^{it} m_Q^i Q_{t+1}'\left(s_t^i r_{t+1}\right)r_{t+1} &= 0 \quad (31) \end{aligned}$$

Tax evasion as a Cost Resource

Now three self-selection constraints

Traditional: (32).

Tax Evasion: Chooses (e_t^2) and adjust labor supply $(l_t^2 = [w_t^1(1-e_t^1)/w_t^2(1-e_t^2)]l_t^1)$: (33).

Tax Avoidance: Chooses (l_t^2) and adjust the evasion level $((1-e_t^2) = w_t^1 l_t^1)/w_t^2 l_t^8(1-e_t^1))$: (34).

$$U_t^2 \geq \widehat{U}_t^2 \tag{32}$$

$$U_t^2 \geq \widetilde{U}_t^2 \tag{33}$$

$$U_t^2 \geq \widehat{\widehat{U}}_t^2 \tag{34}$$

Tax evasion as a Cost Resource

Now three self-selection constrains

$$
\begin{aligned}
U_t^2 &= u_t^2\left(c_t^2, 1-l_t^2, x_{t+1}^2, m_T^2 T_t\left((1-e_t^2) w_t^2 l_t^2\right), m_\Phi^2 Q_{t+1}\left(s_t^2 r_{t+1}\right), m_T^2 \overline{T}_t(\cdot), m_\Phi^2 \overline{Q}_{t+1}(\cdot)\right) \\
\widehat{U}_t^2 &= \widehat{u}_t^2\left(c_t^1, 1-\phi l_t^1, x_{t+1}^1, m_T^2 T_t\left((1-e_t^1) w_t^2 \phi l_t^1\right), m_Q^2 Q_{t+1}\left(s_t^1 r_{t+1}\right), m_T^2 \overline{T}_t(\cdot), m_Q^2 \overline{Q}_{t+1}(\cdot)\right) \\
\widetilde{U}_t^2 &= \widetilde{u}_t^2\left(\begin{array}{l} c_t^1, 1-\phi\left(\frac{1-e_t^1}{1-e_t^2}\right) l_t^1, x_{t+1}^1, m_T^2 T_t\left((1-e_t^2) w_t^2\left[\phi\left(\frac{1-e_t^1}{1-e_t^2}\right) l_t^1\right]\right), \\ m_Q^2 Q_{t+1}\left(s_t^1 r_{t+1}\right), m_T^2 \overline{T}_t(\cdot), m_Q^2 \overline{Q}_{t+1}(\cdot) \end{array}\right) \\
\widehat{\widehat{U}}_t^2 &= \widehat{\widehat{u}}_t^2\left(\begin{array}{l} c_t^1, 1-l_t^2, x_{t+1}^1, m_T^2 T_t\left(\left[\phi\left(1-e_t^1\right)\frac{l_t^1}{l_t^2}\right] w_t^2 l_t^2\right), \\ m_Q^2 Q_{t+1}\left(s_t^1 r_{t+1}\right), m_T^2 \overline{T}_t(\cdot), m_Q^2 \overline{Q}_{t+1}(\cdot) \end{array}\right)
\end{aligned}
$$

Tax evasion as a Cost Resource

Planner's Problem

$$
\begin{aligned}
L &= W\left(n_0^1 U_0^1, n_0^2 U_0^2, n_1^1 U_1^1, n_1^2 U_1^2, ...\right) \qquad (35)\\
&+ \sum_t \lambda_t \left[U_t^2 - \widehat{U}_t^2\right] + \sum_t \eta_t \left[U_t^2 - \widetilde{U}_t^2\right] + \sum_t \mu_t \left[U_t^2 - \widehat{\widehat{U}}_t^2\right]\\
&+ \sum_t \gamma_t \left[F\left(L_t^1, L_t^2, K_t\right) + K_t - \sum_{i=1}^{2}\left(n_t^i c_t^i + n_{t-1}^i x_t^i\right) - \sum_{i=1}^{2}\left(\sigma_t^i n_t^i e_t^i w_t^i l_t^i\right) - K_{t+1}\right]
\end{aligned}
$$

Tax evasion as a Cost Resource

Optimal Income Taxes

$$T_t'\left(\left(1-e_t^1\right)w_t^1 l_t^1\right)=\frac{\left[\begin{array}{l}\left(\frac{\lambda_t^*}{n_t^1\left(1-e_t^1\right)w_t^1}\right)\left(MRS_{z,c}^{1t}-\phi\widehat{MRS}_{z,c}^{2t}\right)\\+\left(\frac{\eta_t^*}{n_t^1\left(1-e_t^1\right)w_t^1}\right)\left(MRS_{z,c}^{1t}-\phi\frac{\left(1-e_t^1\right)}{\left(1-e_t^2\right)}\widetilde{MRS}_{z,c}^{2t}\right)\\+\left(\frac{\mu_t^*}{n_t^1\left(1-e_t^1\right)w_t^1}\right)\left(MRS_{z,c}^{1t}\right)-\left(\frac{1}{\gamma_t n_t^1\left(1-e_t^1\right)w_t^1}\right)\Omega_T^{1t}\left(\frac{\partial L}{\partial\overline{T}_t}\right)\end{array}\right]}{\left[\begin{array}{l}1+\left(\frac{\lambda_t^*}{n_t^1}\right)\left(m_T^1 MRS_{T(\cdot),c}^{1t}-m_T^2\widehat{MRS}_{T(\cdot),c}^{2t}\right)\\+\left(\frac{\eta_t^*}{n_t^1}\right)\left(m_T^1 MRS_{T(\cdot),c}^{1t}-m_T^2\widetilde{MRS}_{T(\cdot),c}^{2t}\right)\\+\left(\frac{\mu_t^*}{n_t^1}\right)\left(m_T^1 MRS_{T(\cdot),c}^{1t}-m_T^2\widehat{\widehat{MRS}}_{T(\cdot),c}^{2t}\right)\end{array}\right]} \tag{36}$$

$$T_t'\left(\left(1-e_t^2\right)w_t^2 l_t^2\right)=-\left(\frac{\mu_t^*\widehat{\widehat{MRS}}_{z,c}^{2t}}{\left(1-e_t^2\right)w_t^2 n_t^2}+\left(\frac{1}{\gamma_t n_t^2\left(1-e_t^2\right)w_t^2}\right)\Omega_T^{2t}\left(\frac{\partial L}{\partial\overline{T}_t}\right)\right) \tag{37}$$

Tax evasion as a Cost Resource

Proposition 3: Optimal Income Taxes with evasion

The possibility of evading income adds mimicking alternatives for the skilled individual. The optimal marginal income taxes for the less skilled now can be even lower (larger) than without evasion when individuals present independent tax affinity (hostility). Interdependent tax affinity (hostility) still acts reducing (increasing) tax progressivity on both types. The optimal marginal income tax for the skilled one calls for a subsidy to discourage her for mimicking.

Tax evasion as a Cost Resource

Optimal Savings Taxes

$$Q'\left(s_{t+1}^{1} r_{t+1}\right) = \left(\frac{1}{r_{t+1}}\right) \frac{\left[(1+r_{t+1}) - MRS_{c,x}^{1t}\right] - \left(\frac{1}{\gamma_t}\right) \Omega_{Q}^{1t+1} \left(\frac{\partial L}{\partial \overline{Q}_{t+1}}\right)}{\left[\begin{array}{l} 1 + \left(\frac{\lambda_t^{**}}{n_t^1}\right)\left(m_Q^1 MRS_{Q(.),x}^{1t} - m_Q^2 \hat{MRS}_{Q(.),x}^{2t}\right) \\ + \left(\frac{\eta_t^{**}}{n_t^1}\right)\left(m_Q^1 MRS_{Q(.),x}^{1t} - m_Q^2 \widetilde{MRS}_{Q(.),x}^{2t}\right) \\ + \left(\frac{\mu_t^{**}}{n_t^1}\right)\left(m_Q^1 MRS_{Q(.),x}^{1t} - m_Q^2 \widehat{\widehat{MRS}}_{Q(.),x}^{2t}\right) \end{array}\right]} \tag{38}$$

$$Q'\left(s_{t+1}^{2} r_{t+1}\right) = \left(\frac{1}{r_{t+1}}\right) \left[\left[(1+r_{t+1}) - MRS_{c,x}^{2}\right] - \frac{1}{\gamma_t n_t^2} \Omega_{Q}^{2t+1} \left(\frac{\partial L}{\partial \overline{Q}_{t+1}}\right)\right] \tag{39}$$

Tax evasion as a Cost Resource

Proposition 4: Optimal Savings Taxes with evasion

We should not impose distortion on savings decision if marginal rate of substitution between consumption today versus tomorrow equals to interest rate. The larger that MRS the lower the tax/subsidy to accomplish future consumption. Again, interdependent tax affinity (hostility) calls for a reduction (increase) on the optimal marginal savings tax for both types. Self-selection constraints leads to an increase (reduction) optimal marginal savings tax on the less skilled if both individuals have independent tax affinity (hostility).

Tax evasion as a Cost Resource: Back to our example

$$
\begin{aligned}
T_t'\left(w_t^1 l_t^1\right) &= \frac{\left[\begin{array}{c}\left(\frac{\lambda_t^*}{n_t^1 w_t^1}\right)\left(\frac{1}{1-l_t^1}-\phi\frac{1}{1-\phi l_t^1}\right)+\mu_t^*\left[\frac{1}{1-l_t^1}\right]\frac{1}{\left(1-e_t^1\right)w_t^1 n_t^1} \\ +\frac{\eta_t^*}{\left(1-e_t^1\right)w_t^1 n_t^1}\left(\frac{1}{1-l_t^1}-\phi\left(\frac{1-e_t^1}{1-e_t^2}\right)\right)\left(\frac{1}{1-\phi\left[(1-e_t^1)/(1-e_t^2)\right]l_t^1}\right)\end{array}\right]}{\begin{array}{c}1-\left(\frac{\lambda_t^*}{n_t^1}\right)\left[2m_T^1\Delta T_t^1-2m_T^2\Delta T_t^1\right]+\left(\frac{1}{\gamma_t n_t^1}\right)\left(\frac{\partial L}{\partial \overline{T}_t}\right) \\ -\frac{\mu_t^*}{n_t^1}\left[2m_T^1\Delta T_t^1\right]-\frac{\eta_t^*}{n_t^1}\left[2m_T^1\Delta T_t^1-2m_T^2\Delta T_t^1\right]\end{array}} \\
T_t'\left(w_t^2 l_t^2\right) &= \frac{-\frac{\mu_t^*}{\left(1-e_t^2\right)w_t^2 n_t^2}\left[\frac{1}{1-l_t^2}\right]}{1-\frac{\mu_t^*}{n_t^2}\left[2m_T^2\Delta T_t^2\right]+\left(\frac{1}{\gamma_t n_t^2}\right)\left(\frac{\partial L}{\partial \overline{T}_t}\right)}
\end{aligned}
$$

Tax evasion as a Cost Resource: Back to our example II

$$
\begin{aligned}
Q'\left(s_{t+1}^{1} r_{t+1}\right) &= \left[\begin{array}{l} 1+\left(\frac{\lambda_t^{**}}{\gamma_t n_t^1 m_Q^1}\right)\left(m_Q^1 MRS_{Q(.),x}^{1t} - m_Q^2 \hat{MRS}_{Q(.),x}^{2t}\right) \\ +\left(\frac{\eta_t^{**}}{n_t^1 m_Q^1}\right)\left(m_Q^1 MRS_{Q(\cdot),x}^{1t} - m_Q^2 \widetilde{MRS}_{Q(\cdot),x}^{2t}\right) \\ +\left(\frac{\mu_t^{**}}{n_t^1 m_Q^1}\right)\left(m_Q^1 MRS_{Q(\cdot),x}^{1t} - m_Q^2 \widehat{\widehat{MRS}}_{Q(.),x}^{2t}\right) + \left(\frac{1}{\gamma_t n_t^1 m_Q^1}\right)\left(\frac{\partial L}{\partial \overline{Q}_{t+1}}\right) \end{array}\right]^{-1} \\
Q'\left(s_{t+1}^{1} r_{t+1}\right) &= \left[1+\frac{1}{\gamma_t n_t^2}\left(\frac{\partial L}{\partial \overline{Q}_{t+1}}\right)\right]^{-1}
\end{aligned}
$$

Optimal Concealment Gap

- An additional instrument is necessary to optimally characterize the marginal rate of substitution between evasion and tax preferences (Slemrod and Yitzhaki, 1989 and Keen and Slemrod (2017).
- Assume government can choose (σ_t^i) as policy variable having only welfare cost.
- Adjustment decision will come in welfare terms to decrease the wedge between evasion and consumption decision on the consumer versus government optimal allocation.
- Benefits of a larger concealment cost: restricts incentive of mimickers $(\widehat{U}_t^2; \widehat{\widehat{U}}_t^2; \widetilde{U}_t^2)$ with respect to $MRS_{T(.),c}^{it}$.
- Costs: It reduces the margin for evasion of the mimickers $\widetilde{U}_t^2$ that would otherwise act reducing the distortion on labor supply. That would close the gap between own $MRS_{T(.),x}^{it} m_T^i$ and mimicker's.

Optimal Concealment Gap

Optimal Concealment Gap

$$\sigma_t^1 = \frac{\left[1 - MRS^{1t}_{T(.),x} m_T^1\right]\left[\left(\frac{\eta_t^*}{n_t^1 w_t^1 l_t^1}\right)\widetilde{MRS}^{2t}_{z,c}\phi\left(\frac{l_t^1}{1-e_t^2}\right) - \left(\frac{1}{\gamma_t n_t^1 w_t^1 l_t^1}\right)\Omega_\sigma^{1t}\left(\frac{\partial L}{\partial \overline{T}}\right)\right]}{\left[\begin{array}{c} 1 + \left(\frac{\lambda_t^*}{n_t^1}\right)\left(m_T^1 MRS^{1t}_{T(.),c} - m_T^2 \hat{MRS}^{2t}_{T(.),c}\right) \\ + \frac{\eta_t^*}{n_t^1}\left(m_T^1 MRS^{1t}_{T(\cdot)c} - m_T^2 \widetilde{MRS}^{2t}_{T(\cdot),c}\right) + \frac{\mu_t^*}{n_t^1}\left(m_T^1 MRS^{1t}_{T(\cdot),c} - m_T^2 \widehat{\widehat{MRS}}^{2t}_{T(.),x}\right) \end{array}\right]} \tag{40}$$

$$\sigma_t^2 = \frac{\left[1 - MRS^{2t}_{T(.),x} m_T^2\right]\left[\frac{\eta_t^* \phi(1-e_t^1 l_t^1)}{(1-e_t^2) w_t^2 l_t^2 n_t^2}\widetilde{MRS}^{2t}_{z,c} - \left(\frac{1}{\gamma_t w_t^2 l_t^2}\right)\Omega_\sigma^{2t}\left(\frac{\partial L}{\partial \overline{T}}\right)\right]}{\left[1 + MRS^{2t}_{T(\cdot),c} m_T^2\right]} \tag{41}$$

Final Remarks

- We add to recent literature on optimal taxation with positional preferences.
- We also dialogue with warm-glow donation literature having agents with pro-social behavior with respect to their relative tax payments.
- We expect to have positive atmospheric externality related to the taxes collected (tax conformity), but....
- Such tax preference act reducing the optimal marginal income tax on both skilled and unskilled individuals.
- A careful introduction of evasion imposes additional self-selection constraints to be respected. A relative tax concerned individual still should (under some assumptions) face lower marginal labor and capital income taxes.

To do list

- Numerical Exercise to quantify the tax attitudes effect.
- Endogenous m^i so that the government could influence such parameter $m^i()$.
- Work in progress: comments and suggestions are welcome.