Do details matter? An analysis of the Italian PIT

Preliminary, please do not circulate

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XXI Bank of Italy's Public finance workshop
March 20, 2019

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- do the details through which progressive PIT codes are implemented in practice matter? How do they affect the long-run distribution of income and consumption?
- this paper aims at answering these questions with the help of an heterogeneous-agents OLG model, calibrated to mimic Italy

Related literature

- seminal contributions on OLG models: Auerbach, Kotlikoff (1987), Altig et al. (2001)
- infinite-horizon heterogeneous agents models: Aiyagary (1994), Heathcote (2005), Heathcote, Storesletten, Violante (2017)
- fiscal policy in heterogeneous agents OLG model: Conesa, Krueger (2006), Conesa, Kitao, Krueger (2009), Nishiyama, Smetters (2005, 2014), Fehr, Kallweit, Kinderman (2013)

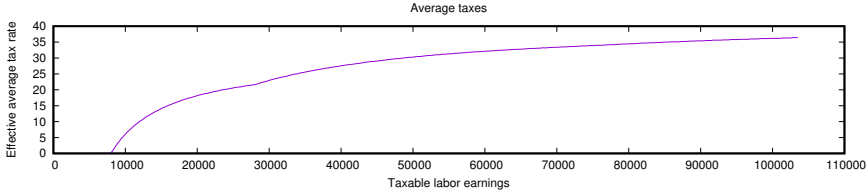
The aim of my project

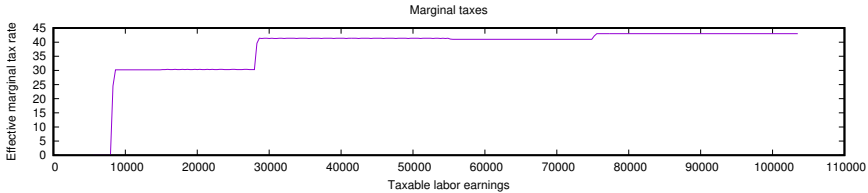
- I build a calibrated general-equilibrium OLG model of the Italian economy ...
- where borrowing-constrained agents face uncertain lifespan and heterogeneous uninsurable income shocks
- and are subject to a realistic PIT schedule.
- by "switching off" one characteristic of the PIT at a time, I gauge its long-term effects on macroeconomic variables and welfare.

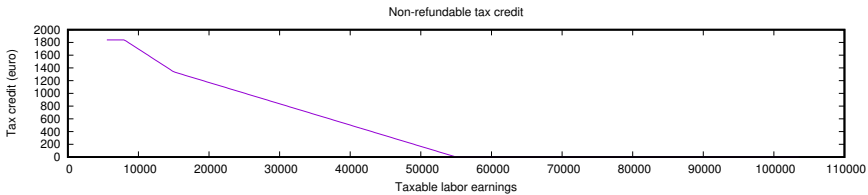
Basic facts about the Italian PIT

- The *Irpef* is a progressive tax on **individual** incomes
- Its tax base is mostly made of employment and pension incomes
- Statutory MTRs (increasing with income) + non-refundable tax credits (decreasing with income)
- Its receipts are worth about 10 percent of GDP (i.e. about one-fifth of overall revenues)

Effective rates and tax credit







The model: demographics and preferences

- J overlapping generations at each point in time t
- life-cycle setup, uncertain lifespan
- preferences are defined over consumption and leisure:

$$U(c, l) = \frac{\left(c^{\gamma} l^{(1-\gamma)}\right)^{(1-\sigma)}}{1-\sigma}$$

Earnings process

- Individuals differ in terms of productivity (z_j), which depend on:

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  1. a deterministic age profile (e_j);
  2. a fixed effect drawn at the beginning of life-cycle (χ);
  3. a transitory auto-regressive component (η_j)
- the individual productivity follows:

$$log(z_j) = log(e_j) + log(\chi) + log(\eta_j)$$
$$\eta_j = \rho\eta_{j-1} + \epsilon_j, \qquad \epsilon_j \sim N(0, \sigma_\epsilon^2)$$

The model: the households' problem

- The households solve:

$$V_t(\zeta) = max_{c,l,a^+} u(c,l) + \beta * E[V_{t+1}(\zeta^+)] \tag{1}$$

$$s.t. \qquad a^+ + p_t c = (1 + r_t^n)a + w_t^n h_t + pen, \qquad a^+ \geq 0$$

- Each individual household supply of labor and capital is summed to determine the aggregate supply of production factors (first by each cohort, then at the economy-wide level).

The model: the firm's problem

- A pretty standard profit maximization one
- Cobb-Douglas production function $Y_t = \Omega K_t^{\alpha} L_t^{1-\alpha}$
- capital stocks depreciates at rate δ
- closed-economy setup, thus firm's decisions determine factors' prices

$$r_t = \alpha\Omega(\frac{L_t}{K_t})^{1-\alpha} - \delta, \qquad w_t = (1-\alpha)\Omega(\frac{K_t}{L_t})^{\alpha}$$

The model: the government

- The government runs two separate (balanced) budgets:
  1. a PAYG social security system (with contributions financing pensions)
  2. a budget to finance public consumption G and interests on public debt, through proportional consumption and capital income taxes and a progressive PIT

$$\tau_t^c C_t + PIT_t + \tau_t^k r_t A_t + (1 + n_p) B_{t+1} = G_t + (1 + r_t) B_t$$

Equilibrium of the model

In the equilibrium:

1. all households solve their optimization problem, taking prices as given;
2. the firm solves its profit maximization problem;
3. the government's budget is balanced;
4. the factor markets clear

Calibration

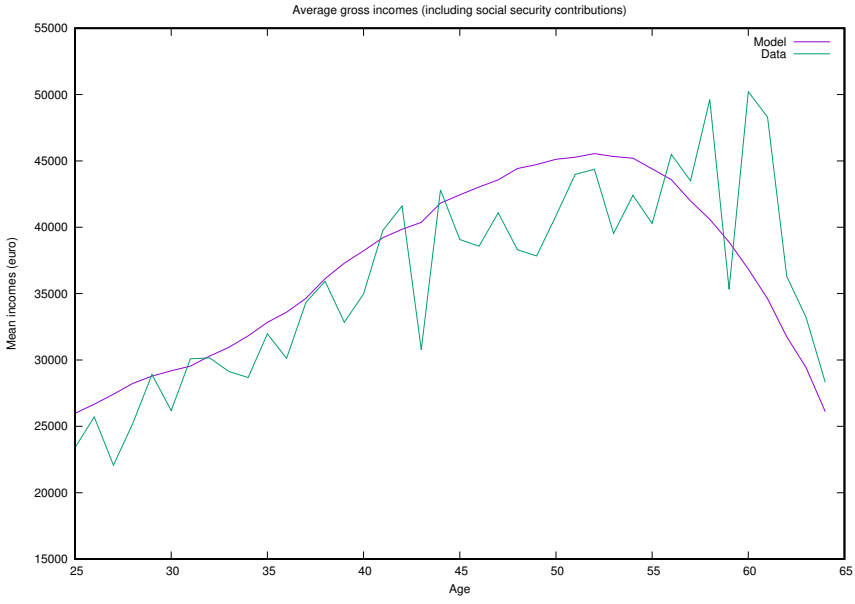
Parameter		Value	Source
Consumption tax rate (%)	τ_c	17.5	Taxation trends in EU 1999-2017
Capital income tax rate (%)	τ_k	26.0	Data
Government debt / GDP		113.2	Average 1999-2017
Growth rate of population (% per year)	n_p	0.3	Average 2002-2017
Variance of permanent shock	σ^2_θ	0.50	$Var(logincome_{25})$
Risk aversion	σ	4.0	Conesa and Krueger (2006)
Capital share	α	0.36	Torrini (2015)

Table 1: Parameters

Parameter		Value	Target	Value
Discount factor	β	0.97	K/GDP	3.10
Depreciation rate	δ	0.09	I/GDP	0.19
Consumption weight	γ	0.45	Average worked hours	0.33
Scale factor	Ω	1.04	Wage rate	1.00
Persistence of transitory shocks	ρ	0.98	Increasing variance of log income over ages	
Variance of transitory shocks	σ	0.01	$Var(logincomes_{64})$	1.15

Table 2: Calibrated parameters

Average gross incomes by age



Dispersion of income and consumption

	Gross incomes	Net incomes	Consumption
Model	86.4	77.4	58.7
Data (ISTAT)	87.4	77.7	63.6

Table 3: Coefficient of variation (SD/MEAN)

Removing the earnings-related tax credit

- I will show here the case of an alternative tax code without the earnings-related tax credit
- public consumption and debt are kept constant at the nominal level of the baseline steady state
- (ex-post) revenue-neutrality of the reforms is guaranteed by a lump-sum transfer to each working-age household

HEV

Long run effects

Variable	Benchmark	w/o tax credit
GDP	–	0.5%
Consumption C	–	0.5%
Capital stock K	–	1.3%
Average hours worked H	0.3	-1.9%
Personal income taxes /GDP	11.6	1.8
Lump sum transfer/GDP	0.0	2.1
Lump sum transfer/Average income	0.0	3.2
CV of net incomes	77.4	1.3
CV of consumption	58.7	2.0
Welfare of a newborn – *HEV*	na	-0.3

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Robustness and other results

- The main qualitative results are robust to reasonable changes of the risk aversion parameter
- They are also confirmed by a more advanced version of the model in which pensions are a function of individual life-time earnings

Next steps

- additional details on the Italian tax system (e.g. tax expenditures)
- additional robustness
- small open economy

Conclusions

- Do the details of the tax code matter?
- This paper studies some of the characteristics of the Italian PIT using an heterogeneous-agents OLG model with borrowing constraints and uninsurable wage shocks
- It finds that, within the current Italian tax code, the earnings-related tax credit plays an important role, by reducing the volatility of net incomes.
- Caveat: this paper does not study transitions! Results should not be interpreted as reform recipes.

Measuring welfare

- I focus only on steady states comparisons (i.e. no transition)
- I evaluate the welfare of future generations from an *ex-ante perspectives*, that is under the *veil of ignorance*
- the Hicksian equivalent variation measures the change in consumption and leisure we should guarantee to each household to make them indifferent between living in the initial steady state vs the world affected by our policy

$$HEV = \Delta(\zeta) = [\frac{V_1\hat{(\zeta)}}{V_1(\zeta)}]^{\frac{1}{1-\sigma}} - 1$$

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