A Robust Theory of Optimal Capital Taxation

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Introduction

- High degree of economic inequality
- Extensive policy debate on the "right" amount of redistribution
- Particular attention on capital taxes due to high wealth concentration
- Large variation in policy prescriptions in economics literature $\Rightarrow$ depend on underlying modeling framework

$\Rightarrow$ **Goal:** Derive robust policy prescriptions that are invariant across a large set of models

This Paper

- Combine two literatures

1. **Parametric dynamic general equilibrium:**
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2. **Sufficient statistics:**
    - Piketty and Saez 2012, 2013; Golosov et al. 2014, Saez and Stantcheva 2018

$\Rightarrow$ exogenous factor prices $\Rightarrow$ assume away 'trickle down' effects
- capital taxes $\downarrow$ $\Rightarrow$ investment $\uparrow$ $\Rightarrow$ labor demand $\uparrow$ $\Rightarrow$ wages $\uparrow$ $\Rightarrow$ welfare of working poor $\uparrow$
- extensive political discussion on the relevance of these effects

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$\Rightarrow$ Derive optimality condition in terms of **sufficient statistics** in **general equilibrium**, i.e. with endogenous factor prices

This Paper

- Rich **dynamic general equilibrium** framework
  - nests many models as special cases: Judd, 1984; Chamley, 1985, Aiyagari, 1994; Piketty and Saez, 2013; Saez and Stantcheva 2018; etc.

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- Derive optimality condition for time-invariant capital tax rate that is **robust** across all these frameworks

- Apply condition to US income and wealth data
  - discipline tax-elasticity of equilibrium capital stock using recent **quasi-experimental evidence** on tax-elasticity of wealth

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- Only second effect is important for the very poorest who live solely from government transfers $\Rightarrow$ optimal Rawlsian tax rate $\approx 90\%$
- 'Optimal' capital tax rate strongly declining in labor income $\Rightarrow$ status quo about optimal for the 70th income percentile

Simplified Model - Households

- Infinitely lived agents with time-constant idiosyncratic working ability η and initial wealth k_0; joint distribution $\Gamma(k_0, \eta)$

- Households optimize

$$\max_{c_t, k_{t+1}, l_t} \sum_{t=0}^{\infty} \beta^t u(c_t, l_t)$$

$$\text{s.t.} \quad k_{t+1} + c_t = (1 + (1 - \tau_k) r_t) k_t + w_t \eta l_t - \tau_l(w_t \eta l_t) + T_t \quad \forall t$$

Simplified Model - Firms

- Firms optimize

$$\max_{K_t \geq 0, L_t \geq 0} \{F(K_t, L_t) - (r_t + \delta)K_t - w_t L_t\}$$

- Factor prices

$$r_t = F_k(K_t, L_t) - \delta \quad \text{and} \quad w_t = F_l(K_t, L_t)$$

- Standard assumptions on F
  - nested case with constant factor prices: $F_{kl}(K, L) = 0$

The Policy Experiment

- Government announces one-off change in τ_k at $t = 0$
- Transfer T adjusts to ensure period-by-period budget clearing
- Agents have perfect foresight

Optimal Capital Taxation

- Planner's problem

$$(P) \qquad \max_{\tau_k \le 1} W = \int \omega(k_0, \eta) \sum_{t=0}^{\infty} \beta^t u\big(c_t(k_0, \eta), l_t(k_0, \eta)\big) d\Gamma$$

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- Marginal social welfare weights

$$g(k_0,\eta) = \omega(k_0,\eta) u_c(k_0,\eta)$$

- Normalization

$$\bar{g} = \int g(k_0,\eta) d\Gamma = 1$$

Welfare Effects of Capital Tax Increases

Local welfare change

$$dW = \big[EQ - MEB\big] Y_k d\tau_k$$

- Equity effect (EQ): redistributional gain
- Marginal excess burden (MEB): loss in revenue through behavioral responses

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Current tax is optimal only if

$$\frac{dW}{d\tau_k} = 0 \iff EQ = MEB$$

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- Marginal excess burden

$$MEB = \underbrace{\tau_k \bar{\varepsilon}_{K,1-\tau_k}}_{MEB_K} + \underbrace{\frac{\alpha^l}{\alpha^k} \bar{\varepsilon}_{L,1-\tau_k} \left[\mathrm{E}_\Gamma [\tau_l'] + \mathrm{Cov}_\Gamma \left(\tau_l', \frac{y^l}{Y^l} \frac{\bar{\varepsilon}_{l,1-\tau_k}}{\bar{\varepsilon}_{L,1-\tau_k}} \right) \right]}_{MEB_L}$$

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- Discounted average semi-elasticity

$$\bar{\varepsilon}_{K,1-\tau_k} = (1-\beta) \sum_{t=0}^{\infty} \beta^t \varepsilon_{K_t,1-\tau_k}, \text{ where } \varepsilon_{K_t,1-\tau_k} = \frac{d \ln K_t}{d(1-\tau_k)}$$

Endogenous Prices

Additional welfare effect

$$\begin{aligned} P =& EQ_P - MEB_P \\ =& \underbrace{\frac{\alpha^l}{\alpha^k}\left[(1-\tau_k)\bar{g}^k - (1-\bar{\tau}_l')\tilde{g}^l\right]\bar{\varepsilon}_{w,1-\tau_k}}_{EQ_P} - \underbrace{\frac{\alpha^l}{\alpha^k}\left[\bar{\tau}_l' - \tau_k\right]\bar{\varepsilon}_{w,1-\tau_k}}_{MEB_P}, \end{aligned}$$

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- $\tau_k \uparrow \Rightarrow w \downarrow r \uparrow$
  - increases net capital income

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  - reduces net labor income

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- $\tau_k \uparrow \Rightarrow w \downarrow r \uparrow$
  - increases net capital income
  - reduces net labor income
  - has an ambiguous effect on revenue

Optimality Condition with Endogenous Prices

Proposition

The effect of a marginal tax increase $d\tau_k > 0$ on social welfare is given by

$$dW = \Big[\underbrace{EQ_M + EQ_P}_{EQ} - \underbrace{\big(MEB_K + MEB_L + MEB_P\big)}_{MEB}\Big] Y^k d\tau_k.$$

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$$dW = \Big[\underbrace{EQ_M + EQ_P}_{EQ} - \underbrace{\big(MEB_K + MEB_L + MEB_P\big)}_{MEB}\Big] Y^k d\tau_k.$$

Consequently, the pre-existing capital income tax rate $\tau_k < 1$ is optimal only if it satisfies

$$\tau_k = \frac{1 - \bar{g}^k - MEB_L + P}{\bar{\varepsilon}_{K,1-\tau_k}}.$$

The Marginal Excess Burden

	MEB_K	MEB_L	MEB_P	MEB
Exogenous prices ($\sigma = \infty$)	0.8775	0.0000	0.000	0.8775
Endogenous prices ($\sigma = 0.6$)	0.2589	0.0196	-0.1497	0.1287

Table: Decomposition of the Marginal Excess Burden: numbers in dollar per mechanical dollar in capital tax revenue raised; MEB_K: loss in capital income tax revenue due to lower savings; MEB_L: loss in labor income tax revenue due to lower labor supply; MEB_P: revenue impact of changing factor prices due to differential taxation of capital and labor; Frisch elasticity: $\gamma_l = 0.5$

The Capital Elasticity

- **Problem:** $\bar{\epsilon}_{K,1-\tau_k}$ is unmeasured policy elasticity (Hendren 2016)
- Summarizes overall reaction of K taking joint adjustments in T, w, r into account
- **Solution:** derive mapping of $\bar{\epsilon}_{K,1-\tau_k}$ to actually estimated wealth elasticities (Jakobsen et al. 2020) using envelope conditions of households' and firms' optimization problems

The Tax-Elasticity of Individual Wealth

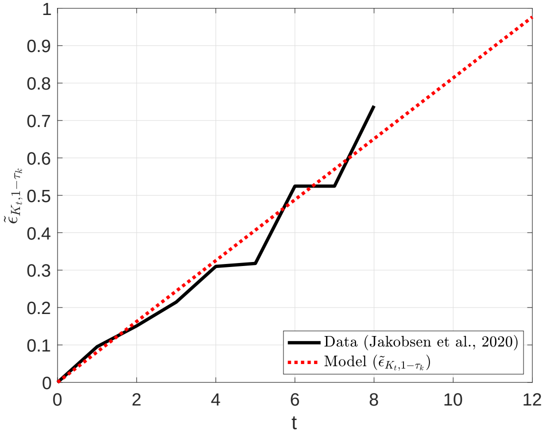

Figure: Capital Supply Elasticity: net-of-wealth-tax elasticities are translated to net-of-capital-tax elasticities using the return of $r = 6.58\%$; dotted line is model implied individual response if only τ_k changes (fixing T, w, r).

The Elasticity of the Equilibrium Capital Stock

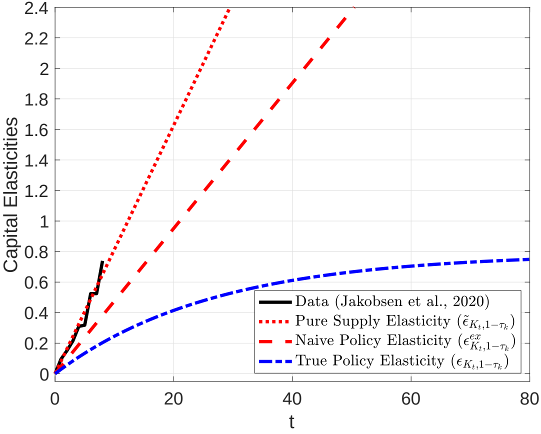

Figure: Capital Elasticities: black solid line and red dotted line as before; red dashed line ($\epsilon^{ex}_{K_t,1-\tau_k}$): policy elasticity in the exogenous price case ($\sigma = \infty$); blue dash-dotted line line ($\epsilon_{K_t,1-\tau_k}$): policy elasticity with endogenous prices ($\sigma = 0.6$); Frisch elasticity of labor supply $\gamma_l = 0.5$.

The Equity Effect

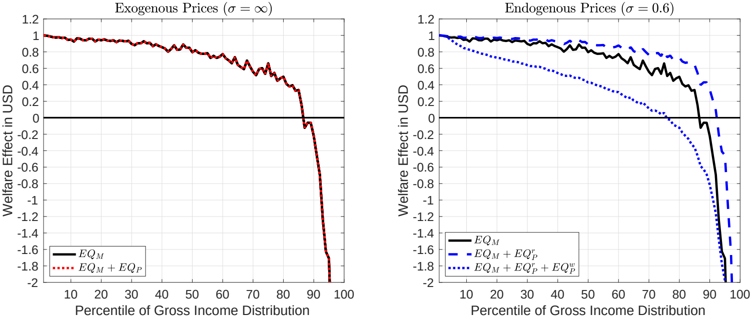

Figure: The Equity Effect: different substitution elasticities σ and Frisch elasticities γ_l; in USD per dollar of revenue mechanically raised; EQ_M: mechanical effect (red solid line, same for all σ), EQ_P : redistributional effect of factor price changes; value p on x-axis corresponds to the social welfare function that concentrates the whole welfare weight at percentile p of the total gross income distribution.

The Total Welfare Effect

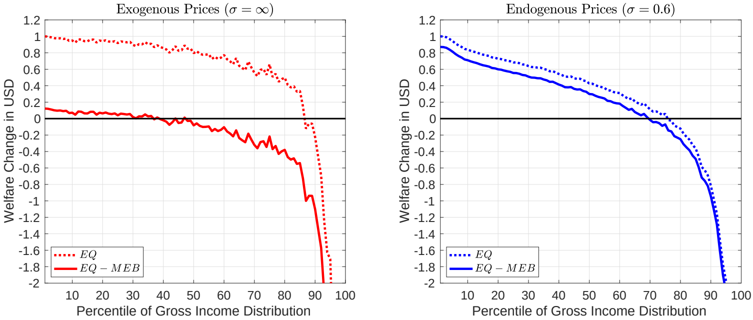

Figure: Welfare Change: in USD per dollar of revenue mechanically raised; EQ: equity effect, MEB: marginal excess burden; value p on x-axis corresponds to the social welfare function that concentrates the whole welfare weight at percentile p of the total gross income distribution; Frisch elasticity of labor supply: $\gamma_l = 0.5$.

The Optimal Capital Tax Rate

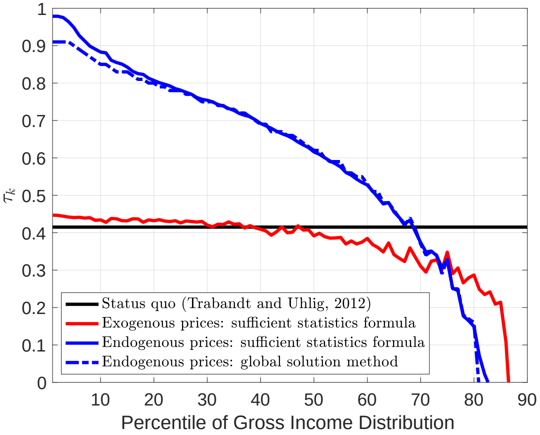

Figure: Optimal Capital Tax Rates: value p on the x-axis corresponds to the social welfare function that concentrates the whole welfare weight at percentile p of the total gross income distribution; capital-labor substitution elasticities $\sigma = 0.6$ (endogenous prices) and $\sigma = \infty$ (exogenous prices); benchmark Frisch elasticity of labor supply ($\gamma_l = 0.5$).

Conclusion

- Paper advances sufficient statistic approach to dynamic GE setting
- Strong discrepancies to policy prescriptions from existing formulas with exogenous prices
- Bottom 70% of US income distribution desire significantly higher capital tax rates
- Desired capital tax increases are strongly declining in labor income due to depressing effect on wages