

Wealth Taxes and Inequality

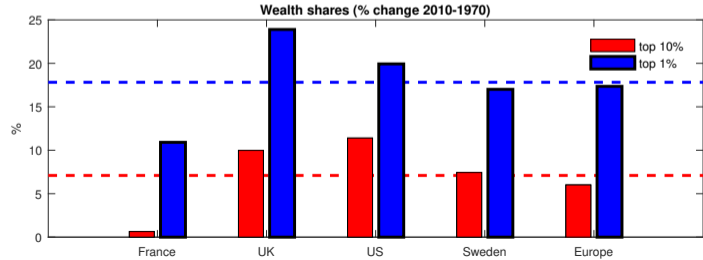
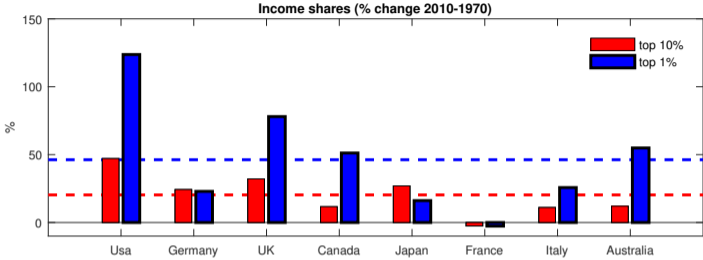
Nicola Borri, LUISS
Pietro Reichlin, LUISS & CEPR

Università Sapienza – March 20, 2019

Motivation (I/II)

- ▶ Since the 70s in many advanced economies
 1. increase in wealth-to-income ratios & wealth inequality (Piketty and Zucman, 2014; Benhabib and Bisin, 2018)

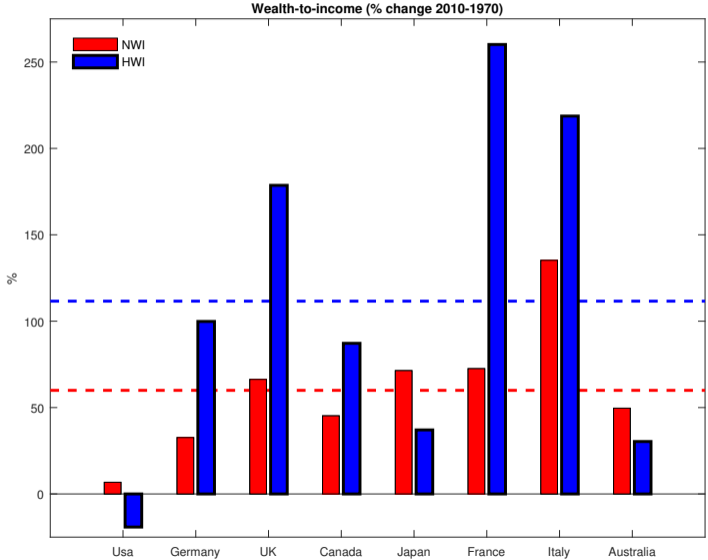
Motivation (I/II)



Motivation (I/II)

- ▶ Since the 70s in many advanced economies
 1. increase in wealth-to-income ratios & wealth inequality (Piketty and Zucman, 2014; Benhabib and Bisin, 2018)
 2. mostly due to capital gains on assets like housing and land (Rognlie, 2014; Bonnet et al., 2014)

Motivation (I/II)



Motivation (I/II)

- ▶ Since the 70s in many advanced economies
 1. increase in wealth-to-income ratios & wealth inequality (Piketty and Zucman, 2014; Benhabib and Bisin, 2018)
 2. mostly due to capital gains on assets like housing and land (Rognlie, 2014; Bonnet et al., 2014)
 3. and independent from earnings inequality (Benhabib et al., 2017)

Motivation (II/II)

- ▶ As a response, some have proposed shifting taxation from labor to wealth (Piketty (2014), Piketty et al. (2013) and Altman (2012))

This Paper (I/II)

- ▶ We investigate the long-run social welfare effect of such tax reform using a model
 - ▶ with heterogenous households (i.e., rich and poor) and households' wealth (i.e., business capital, housing and financial assets)
 - ▶ where business and housing capital are both reproducible
 - ▶ under full commitment
 - ▶ where wealth ratios & inequality increase endogenously because of a (housing) *cost disease* problem (Borri and Reichlin, 2018)

This Paper (II/II)

- ▶ We consider a limited set of tax rates
 - ▶ tax on labor income
 - ▶ wealth tax
 - ▶ no consumption taxes

Main Findings

- ▶ Optimal tax structure includes
 - ▶ some taxation of labor
 - ▶ zero taxation of business capital & financial wealth
 - ▶ a **positive tax** on the housing wealth of **rich** households
 - ▶ a **subsidy** on the housing wealth of **poor** households
- ▶ When wealth inequality increases, and the share of rich households is small enough, **housing tax rates on rich households are high and increase with inequality**

Literature

- ▶ **Housing & land taxation:** Poterba (1984), Gahvari (1984), Berkovec and Fullerton (1992), Auerbach and Hines (2002), Gervais (2002), Mirrlees et al. (2011), Gervais (2002), **Bonnet et al. (2016)**
- ▶ **Wealth elasticity with respect to wealth taxes:** Jacobsen et al. (2017); Seim (2017) and **Brühlhart et al. (2016)**

Model

Environment

- ▶ Time is discrete $t = 0, 1, \dots$
- ▶ There are
 - ▶ two sectors: *manufacturing* and *(housing) construction*
 - ▶ and finite set of households types, indexed by i

Preferences (I/II)

- ▶ Household types
 - ▶ have mass $m_i \in (0, 1)$ (with $\sum_i m_i = 1$)
 - ▶ supply one unit of labor inelastically
 - ▶ belong to infinitely lived dynasties
- ▶ Life time utilities are

$$U^i = \sum_{t=0}^{\infty} \beta_i^t U(C_t^i, H_t^i),$$

Preferences (II/II)

- ▶ To simplify the exposition we assume that

$$U(C, H) = \log u(C, H),$$

where $u(C, H)$ is homogeneous of degree one

- ▶ Under this assumption
 - ▶ we obtain a balanced growth path
 - ▶ the welfare impact of productivity growth can be separated into a "level" effect and a relative price effect

Technology (I/III)

- ▶ Production takes place in the manufacturing (m) and housing (h) sectors

$$Y_t^m = F^m(K_t^m, z_t^m l_t^m), \quad Y_t^h = F^h(K_t^h, z_t^h l_t^h, X_t),$$

where X_t is the flow of new land available for housing construction (Favilukis et al., 2017; Borri and Reichlin, 2018) and $F^m(\cdot)$ and $F^h(\cdot)$ are assumed to be increasing, strictly concave, and to exhibit constant returns to scale

Technology (II/III)

- ▶ It is convenient to switch to the intensive-form production functions

$$\begin{aligned}y^m &\equiv Y^m / z^m l^m = F^m(k^m, 1) \equiv f^m(k^m), \\y^y &\equiv Y^h / z^h l^h = F^h(k^h, 1, x) \equiv f^h(k^h, x).\end{aligned}$$

where $k^j = K^j / z^j l^j$ for $j = h, m$, $x = X / z^h l^h$, $y^j = Y^j / z^j l^j$ are measured per-units of labor efficiency

Technology (III/III)

- ▶ For simplicity, we assume that labor productivity (ρ) grows at the same constant rate across the two sectors

$$1 + \rho = z_t^j / z_{t-1}^j.$$

- ▶ Then, the *relative labor productivity in manufacturing*, $\zeta = z^m / z^h$, is constant

Additional Notation

- ▶ variables normalized in units of labor efficiency in manufacturing are denoted with lower case letters

$$c^i = C^i / z^m \quad h^i = H^i / z^m$$

and

$$c = \sum_i m_i c^i \quad h = \sum_i m_i h^i \quad k = K / z^m \quad g = G / z^m$$

where K is the total capital stock and G public spending

Feasible Allocation

Then, for some given initial allocation of capital, k_0 , and housing stock, h_{-1} , a *feasible allocation* of individuals' consumption and sector specific capital and employment is a sequence $\{c_t^i, h_t^i, k_t^j, l_t^j; i \in \mathcal{I}, j = h, m\}_{t=0}^\infty$, satisfying

$$\begin{aligned}c_t + g_t + (1 + \rho)k_{t+1} &\leq f^m(k_t^m)l_t^m, \\h_t &\leq f^h(k_t^h, x_t)l_t^h / \zeta_t + \left(\frac{1 - \delta}{1 + \rho}\right) h_{t-1}, \\l_t^m + l_t^h &\leq 1, \\k_t^h l_t^h / \zeta_t + k_t^m l_t^m &\leq k_t, \\x_t &\leq \bar{X}_t / z_t^h l_t^h,\end{aligned}$$

for all $t \geq 0$, where $\delta \in (0, 1]$ is the housing depreciation rate and $\{\bar{X}_t\}_{t=0}^\infty$ is the sequence of government provided flow of new land permits.

Main Assumptions

1. All housing is owner occupied (i.e. no rental market)
2. We rule out consumption taxes
3. Labor taxes cannot be individual-specific
4. Wealth taxes may be differentiated across types of wealth (i.e., financial or housing) and debt is untaxed ($\tau_t^{k,i} = 0$ if $b_t^i \leq 0$)
5. Households belong to only two types with $\beta_1 > \beta_2$

Timing

Any household i , at all time $t \geq 0$

- ▶ buys some units of a 1-period bond with gross pre-tax interest rate, R_{t+1}
- ▶ and acquires some residential property with unit price q_t
- ▶ enjoys the housing services generated by it, and then resells the property the next period and pays taxes on realized wealth

Household Net Wealth

- ▶ Denote household net wealth as

$$a_t^i = b_t^i(1 - \tau_t^{k,i}) + ((1 - \delta)/(1 + \rho))\hat{q}_t^i h_{t-1}^i.$$

- ▶ We assume that total net wealth must be non-negative at all periods,

$$a_{t+1}^i \geq 0,$$

i.e., households debt must be fully collateralized by the housing wealth.

- ▶ At a steady state, the impatient household has zero net total wealth ($a^2 = 0$)

t -period budget constraint

- ▶ The t -period budget constraint is

$$\left(\frac{1 + \rho}{\hat{R}_{t+1}^i} \right) a_{t+1}^i + c_t^i + \hat{\pi}_t^i h_t^i = \hat{w}_t + a_t^i,$$

where $\hat{R}^i = R(1 - \tau^{k,i})$ is the after tax interest rate, and

$$\hat{\pi}_t^i = q_t - (1 - \delta)\hat{q}_{t+1}^i / \hat{R}_{t+1}^i$$

is the after tax *user cost of housing*.

Optimal Taxation (I/II)

- ▶ By the linear homogeneity of $u(\cdot)$

$$U(C^i, H^i) = \log u(c^i, h^i) + \log z^m,$$

- ▶ and any household's lifetime utility can be decomposed as

$$\mathcal{U}^i = \Omega^i + \Gamma^i,$$

where

$$\Omega^i = \sum_{t=0}^{\infty} \beta_i^t \log u(c_t^i, h_t^i)$$

and

$$\Gamma^i = \frac{\log z_0^m}{1 - \beta_i} + \sum_{t=0}^{\infty} \beta_i^t \log(1 + \rho)^t$$

Optimal Taxation (II/II)

- ▶ The Planner maximizes the average per period utilities (w/equal weights) by choosing appropriate values of the available tax rates.
- ▶ In order to obtain the steady state allocation as a possible solution to the optimal policy we assume that per period utilities are discounted at the same rate, β_1 , *i.e.*, the discount rate of patient households.
- ▶ Since z^m is unaffected by the Planner's choices, there is no loss of generality in assuming that the social welfare function is a weighted average of only Ω^i .

Analytical Results (I/III)

► Assume

1. Utility is log

$$U(c, h) = \phi \log c + (1 - \phi) \log h,$$

2. Cobb-Douglas production functions for both manufacturing and housing
3. Tax rates are uniform across types ($\tau^{h,i} = \tau^h$ and $\tau^{k,i} = 0$ for $i = 1, 2$)

Analytical Results (II/III)

- ▶ Define two endogenous variables
 1. the aggregate housing wealth $v = \sum_i m_i q h^i$
 2. the net wage $\hat{w} = (1 - \tau^w)w$

Analytical Results (III/III)

► Steady state is the intersection between two curves

1. *budget feasible net wage*: (v, \hat{w}) that verify the government budget constraint

$$\hat{w}^b = (w^* - g) + A(\tau^h)v,$$

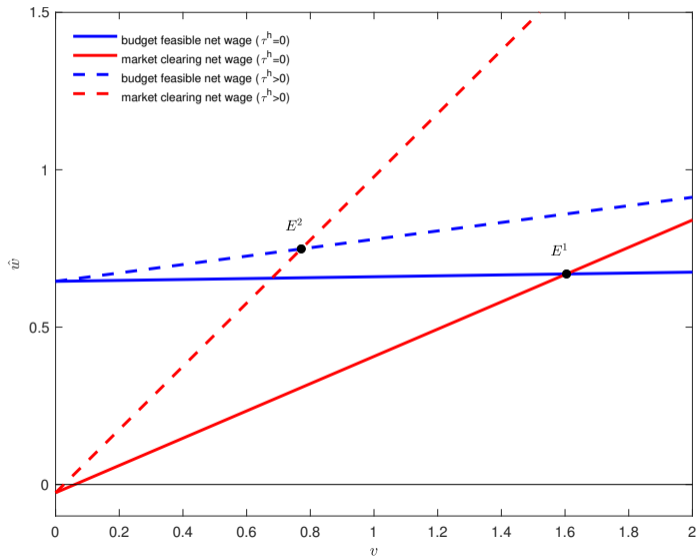
2. *market clearing net wage*: (v, \hat{w}) that verify the equilibrium in assets and housing markets

$$\hat{w}^a = B(\tau^h)v - (1 - \beta_1)R^*k^{m,*}$$

Equilibrium

A necessary and sufficient condition for a unique positive solution is that capital intensity in the manufacturing sector is larger than the capital intensity in the construction sector

Geometric Representation of Equilibrium



Quantitative Analysis

Road map

1. Exogenous tax structure

- ▶ analyze impact of different taxes on key variables of model

2. Optimal tax structure

- ▶ Use an exogenous increase in the relative productivity in manufacturing to generate an increase in the wealth-to-income ratio and wealth inequality as observed for advanced economies (Borri and Reichlin, 2018)
- ▶ Provide quantitative analysis of steady state equilibria and investigate optimal combination of taxes

Two key assumptions

- ▶ *technology*: Cobb-Douglas production function in manufacturing sector and CES production function with elasticity of substitution σ^h in housing sector
- ▶ *preferences*: utility function is CES

$$u(c, h) = \begin{cases} \left[(\theta)^{\frac{1}{\gamma}} c^{\frac{\gamma-1}{\gamma}} + (1-\theta)^{\frac{1}{\gamma}} h^{\frac{\gamma-1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1}} & \text{if } \gamma \neq 1 \\ c^\theta h^{1-\theta} & \text{otherwise} \end{cases}$$

Calibration

- ▶ To calibrate the model
 - ▶ borrow some parameter values from existing literature
 - ▶ set others to match some moments of the data

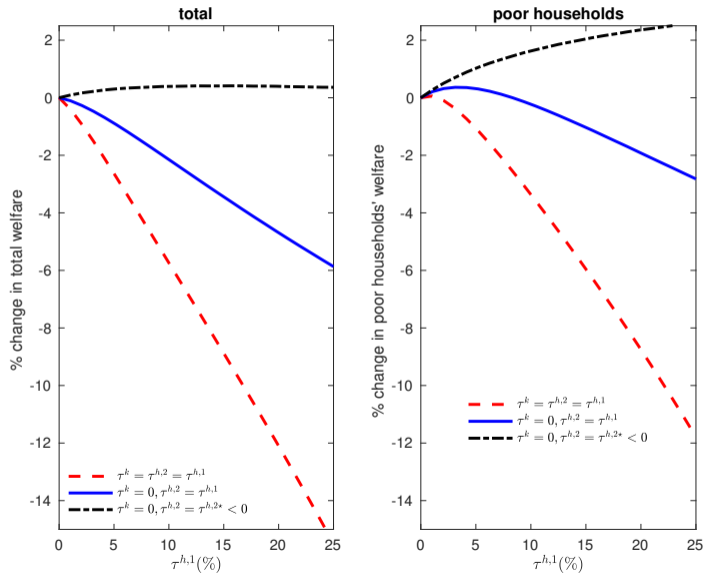
Model Parameters

<u>Preferences</u>		
Weight consumption:	θ	0.80
EIS:	γ	0.75
discount rate patient household:	β_1	0.95
discount rate impatient household:	β_2	0.80
<u>Technology</u>		
Housing depreciation:	δ	0.02
Growth rate productivity:	ρ	0.03
capital share manufacturing:	α^m	0.33
total factor productivity manufacturing:	A^m	2.00
capital weight housing:	α_k^h	0.20
labor weight housing:	α_l^h	0.50
elasticity of substitution housing:	σ^h	0.75
<u>Economy structure</u>		
Government expenditure:	g	0.40
Government debt:	b	0.00
Share patient households:	m_1	0.10
Share impatient households:	m_2	0.90
Flow new land:	ξ	0.75

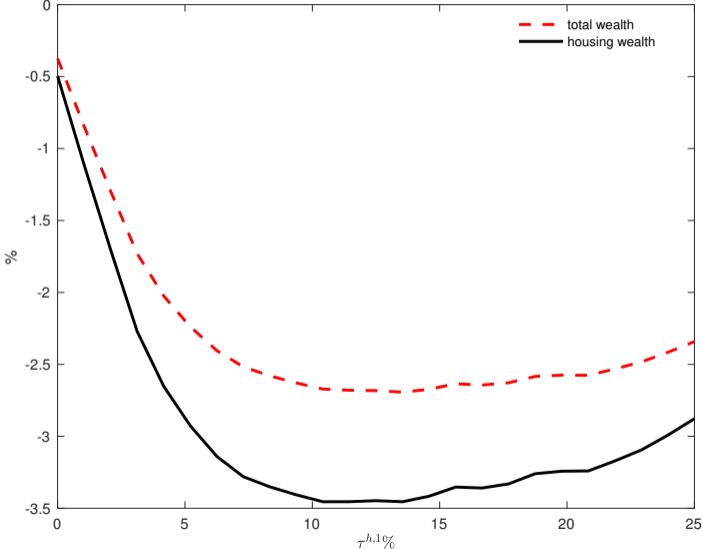
Exogenous Tax Structure

- ▶ Fix the relative productivity parameter to $\zeta = 1$
- ▶ Simulate the model under three different scenarios
 1. $\tau^k = \tau^{h,1} = \tau^{h,2} \geq 0$
 2. $\tau^k = 0, \tau^{h,1} = \tau^{h,2} \geq 0$
 3. $\tau^k = 0, \tau^{h,1} \geq 0, \tau^{h,2} = \tau^{h,2,*}$

Taxes and Welfare with Exogenous Tax Structure



Wealth Elasticity



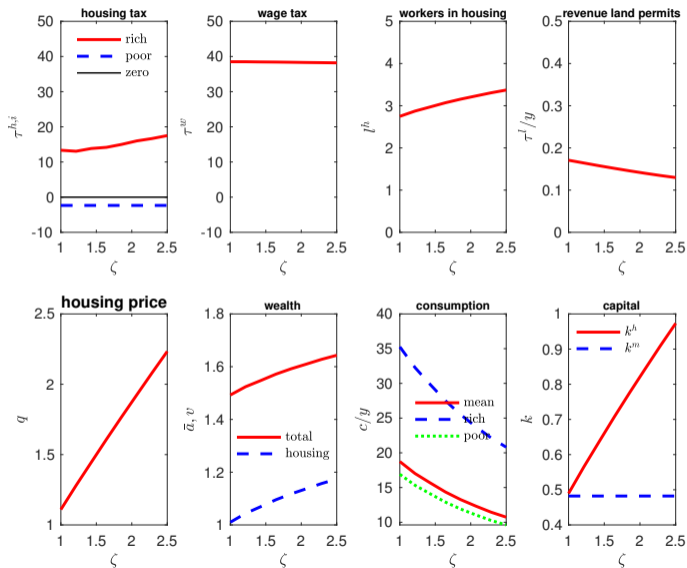
To Sum Up

1. Taxing financial wealth is never optimal
2. Taxing housing wealth uniformly is also never optimal
3. When poor households receive a housing wealth subsidy (i.e., $\tau^{h,2} < 0$), then it is optimal for the government to set a positive housing wealth tax rate on rich households
4. The elasticity of wealth, starting from a 0% rate on housing wealth, is approximately equal to -1%, in line with estimates in Jacobsen et al. (2017); Seim (2017)

Optimal Tax Structure

- ▶ We generate a path of increasing wealth inequality and housing prices by simulating the model for different values of the relative productivity in manufacturing, i.e., $\zeta = 1, \dots, 2.5$
- ▶ We focus only on the household specific component of the lifetime utility function, and not on the common component which is increasing in ζ

Welfare, Inequality, and Taxes



To Sum Up (I/II)

1. poor households should receive a (constant) subsidy of approximately 3%
2. rich households pay a positive housing tax rates, increasing in relative productivity, that ranges from 15 to 20%
3. the tax rate on wages is constant and equal to 40%
4. the share of workers in the housing construction sector increases from 2.5 to 3.5%

To Sum Up (II/II)

1. the government revenue from the sale of land permits are small, and equal to approximately 0.1% of total output
2. housing prices increase by almost 100%
3. rich households wealth, and total housing wealth, increase by approximately 20%
4. consumption, as a fraction of total output, decreases
5. capital used in the housing construction sector increases

Conclusions (I/II)

- ▶ We consider a simple model with
 - ▶ rich and poor households,
 - ▶ financial and housing wealth,
- ▶ and find that the optimal steady state tax structure includes
 - ▶ some taxation of labor,
 - ▶ zero taxation of financial wealth,
 - ▶ a housing tax on rich households
 - ▶ and a housing subsidy on poor households.

Conclusions (II/II)

- ▶ We consider an exogenous increase in the relative productivity in manufacturing with respect to construction, which generates an increase in housing prices, wealth-to-income ratios, and wealth inequality as we observe since 1970 in a sample of developed countries
- ▶ We find that
 - ▶ housing prices increase by approximately 100%
 - ▶ housing tax rate on rich households increases by the approximately 30% (i.e., from 13 to 17.5%) when the share of rich households is small enough
- ▶ These findings are robust with respect to variations in the housing demand elasticity.

Thank you!

References I

- ALTMAN, D. (2012): "To Reduce Inequality, Tax Wealth, Not Income," *The New York Times*, Nov. 18.
- AUERBACH, A. J. AND J. R. HINES (2002): *Handbook of Public Economics*, Elsevier, vol. 3, chap. Taxation and Economic Efficiency.
- BENHABIB, J. AND A. BISIN (2018): "Skewed Wealth Distributions: Theory and Empirics," *Journal of Economic Literature*, 56, 1261–91.
- BENHABIB, J., A. BISIN, AND M. LUO (2017): "Earnings inequality and other determinants of wealth inequality," *American Economic Review*, 107, 593–97.
- BERKOVEC, J. AND D. FULLERTON (1992): "A general equilibrium model of housing, taxes, and portfolio choice," *Journal of Political Economy*, 100, 390–429.
- BONNET, O., P.-H. BONO, G. CHAPPELLE, A. TRANNOY, AND E. WASMER (2016): "Capital is Heterogeneous: Tax land rather than Wealth and Investment," mimeo, Sciences Po, Economics Department.
- BONNET, O., P.-H. BONO, G. CHAPPELLE, AND E. WASMER (2014): "Le capital lodgement contribue-t-il aux inégalités?" LIEPP Working Paper.
- BORRI, N. AND P. REICHLIN (2018): "The Housing Cost Disease," *Journal of Economic Dynamics and Control*, 87, 106–123.

References II

- BRÜLHART, M., J. GRUBER, M. KRAPF, AND K. SCHMIDHEINY (2016): "Taxing Wealth: Evidence from Switzerland," Working Paper 22376, NBER.
- FAVILUKIS, J., S. C. LUDVIGSON, AND S. V. NIEUWERBURGH (2017): "The Macroeconomic Effects of Housing Wealth, Housing Finance, and Limited Risk Sharing in General Equilibrium," *Journal of Political Economy*, 125, 140–223.
- GAHVARI, F. (1984): "Incidence and efficiency aspects of differential taxation of residential and industrial capital in a growing economy," *Journal of Public Economics*, 25, 211–233.
- GERVAIS, M. (2002): "Housing Taxation and Capital Accumulation," *Journal of Monetary Economics*, 49, 1461–1489.
- JACOBSEN, K., K. JAKOBSEN, H. KLEVEN, AND G. ZUCMAN (2017): "Wealth Taxation and Wealth Inequality: Evidence from Denmark, 1980-2014," Tech. rep., mimeo.
- MIRRELES, J., A. STUART, T. BESLEY, R. BLUNDELL, S. BOND, R. CHOTE, M. GAMMIE, P. JOHNSON, G. MYLES, AND J. M. POTERBA (2011): *Tax by Design*, Oxford University Press.
- PIKETTY, T. (2014): *Capital in the Twenty-First Century*, Cambridge, Massachusetts: Belknap Press - Harvard.
- PIKETTY, T., E. SAEZ, AND G. ZUCMAN (2013): "Rethinking Capital and Wealth Taxation," Tech. rep., mimeo.

References III

- PIKETTY, T. AND G. ZUCMAN (2014): "Capital is Back: Wealth Income Ratios in Rich Countries 1700-2010," *Quarterly Journal of Economics*, 129, 1255–1311.
- POTERBA, J. M. (1984): "Tax subsidies to owner-occupied housing: an asset market approach," *Quarterly Journal of Economics*, 99, 729–752.
- ROGNLIE, M. (2014): "A Note on Piketty and diminishing returns to capital," Mimeo.
- SEIM, D. (2017): "Behavioral Responses to Wealth Taxes: Evidence from Sweden," *American Economic Journal: Economic Policy*, 9, 395–421.