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Taxation of capital income and corporate profits in NORA

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Background

- Standard (DSGE) models treat taxation of capital income of households and corporate profits in a highly stylized way
  - Modeling assumptions at odds with reality
  - Tax bases not modeled properly
  - Difficult to "translate" model mechanisms to reality

- Standard model not able to accommodate Norway's shareholder income tax model "aksjonærmodellen", i.e. the system of taxation of shareholder income at the household level

Presentation outline

1. Shareholder income tax

2. Shortcomings of the standard (DSGE) model

3. Capital income and corporate profit taxation in NORA
   i. Theory
   ii. Simulations

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The shareholder income tax

Challenges in designing tax system (see Sørensen, 2005)

- Coexistence of the corporate and the personal income tax can drive the total effective tax rate on corporate equity above the tax rate imposed on other forms of fin. income
  - Return to equity accrue in corporations and are taxed as corporate profits
  - Distributed after-tax profits are again taxed as personal income
  - Distorts investments, particularly for small and medium-sized companies (Sørensen, 2004)
  - Favors firm bonds as opposed to equity financing

- Typically, governments therefore alleviate double taxation
  - By taxing dividends at a reduced rate at shareholder level or
  - By granting dividend tax credits

- Dilemma: possible tax avoidance by income shifting: transforming shareholder wages to dividends

- Problem particularly acute in Norway with a dual income tax where progressive surtaxes are levied to labor income

Norway's shareholder income tax

- Proposed by Norwegian tax reform committee
  ("Skauge committee", see NOU 2003:9 Skatteutvalget)
  - A personal tax on the equity premium: tax on returns to shares in excess of the after-tax interest rate on government bonds ("Rate-of-Return Allowance")
  - Combination of corporate profit tax and personal tax on equity premium yields a marginal tax rate on equity income in line with top marginal tax rate on labor

- The tax model prevents
  - Tax avoidance by income shifting
  - Distortion of investments in the corporate sector caused by personal tax

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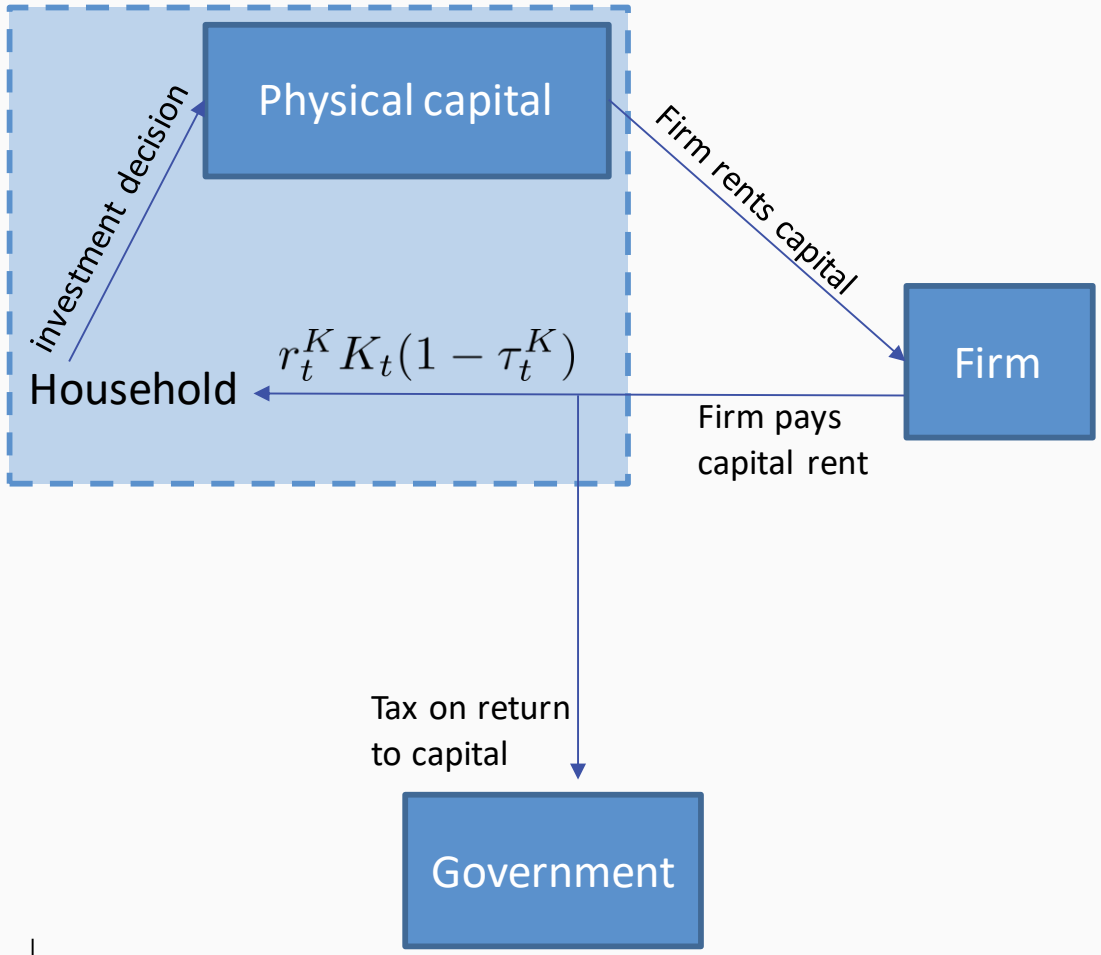
Shortcomings of the standard (DSGE) model

Capital income taxation in standard DSGE models

(see for example Frankovic et. al 2018)



Household

- Maintains capital stock and invests
- Receives rental income and pays taxes on it

Firm

- Decides how much capital to rent, how much labor to hire
- Profits (if at all) arise from monopolistic competition
- Taxation of profits does not affect firm's capital and labor decision

Challenges with standard model of capital income taxation

Standard model		Reality
Investment decisions made by household	⟺	Investment decisions made by firm
Only one meaningful tax base: capital income of households	⟺	Corporate profit tax applied to firm profits, tax on shareholder income applied to household income
Taxation of household capital income directly affects the level of investment	⟺	Taxation of household's return to savings has limited effect on investment. The marginal investor is abroad.
No financing decision by firms	⟺	Firms finance investments either through borrowing or retained profits (or equity issuance)

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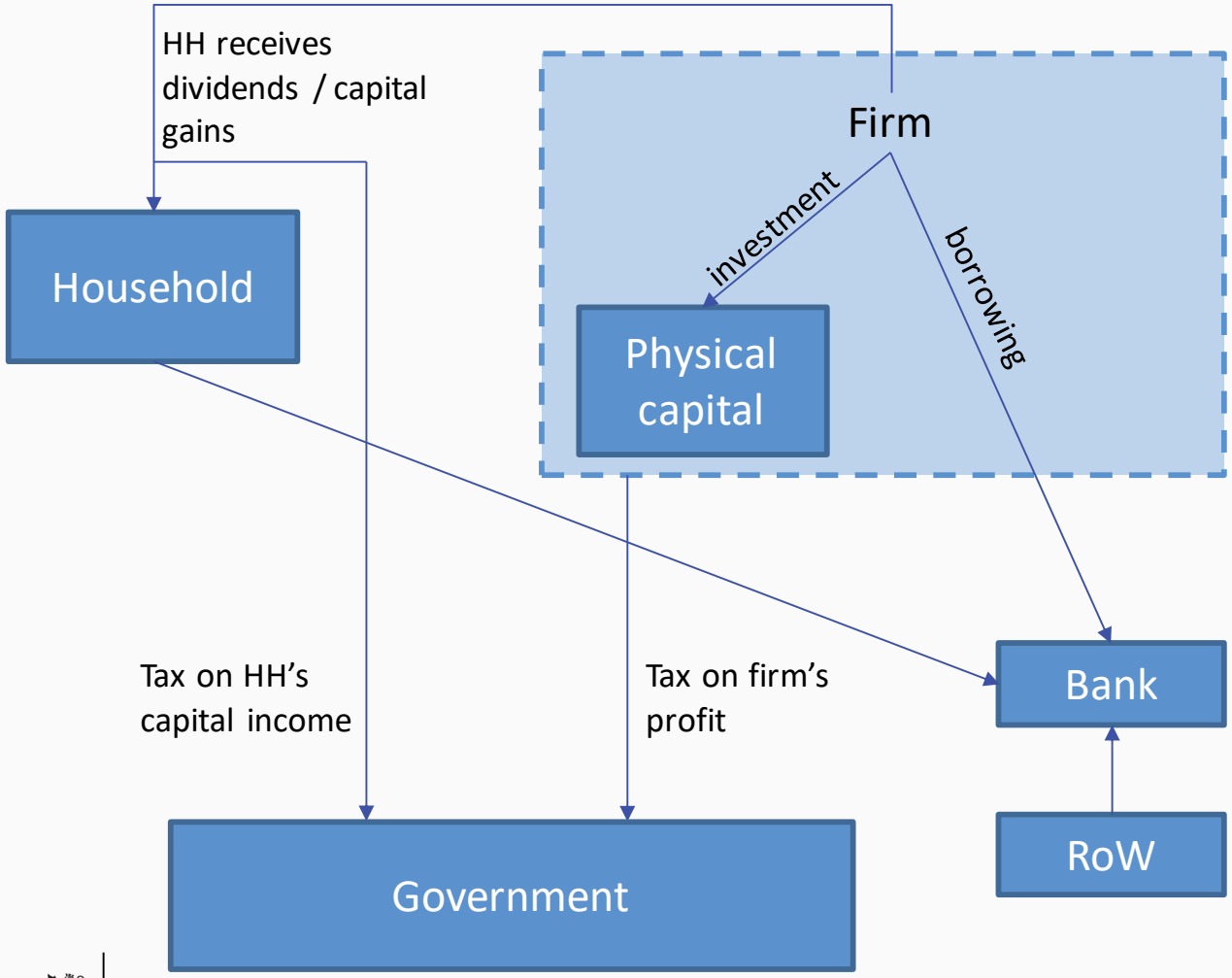
Taxation of capital income and corporate profits in NORA

Capital income and corporate taxation in NORA



Household

- invests in firm by buying shares, which pay out dividends and increase in value (capital gains)
- Income from shares is subject to shareholder tax
  - Only equity premium is taxed
  - Tax rate equals top marginal tax rate on labor

Firm

- Maintains a physical capital stock
- Maximizes firm value by choosing
  - labor demand, prices
  - *investment*
  - *borrowing*
  - *dividend payments*
- Profit after deductions is taxed with the corporate profit tax
  - Tax is distortionary: affects level of output and investment

Taxation of Ricardian Household

- Labor income $$LI_t^r = \left(W_t N_t^P + W_t^G N_t^G\right)$$

Private and **G**overnment hours worked

- Ordinary income $$OI_t^r = \underbrace{LI_t^r}_{\text{labor income}} + \underbrace{UB_t(L_t - E_t)}_{\text{unemployment benefits}} + \underbrace{TR_t^r}_{\text{transfers}} + \underbrace{\frac{P_{t-1}}{P_t} DP_{t-1}^r (R_{t-1} - 1)}_{\text{return on deposits}}$$
$$+ \underbrace{(DIV_t^M + AV_t^M) S_{t-1}^{M,r} + (DIV_t^S + AV_t^S) S_{t-1}^{S,r}}_{\text{dividends and capital gains}}$$

Service sector dividends per stock

Service sector capital gains per stock

Service sector number of stocks

Taxation of Ricardians

- Splitting up capital income in two components

Rate-of-return allowance

$$\underbrace{(DIV_t^M + AV_t^M)}_{\text{Total return on stock}} S_{t-1}^{M,r} = \underbrace{(DIV_t^M + AV_t^M - RRA_t P_{t-1}^{E,M}/P_t)}_{\text{Equity premium}} S_{t-1}^{M,r} + \underbrace{(RRA_t P_{t-1}^{E,M}/P_t)}_{\text{Risk-free return}} S_{t-1}^{M,r}.$$

Price of the stock

- Taxation only of equity premium:

Scale-up factor

$$T_t^S = (DIV_t^S + AV_t^S - RRA_t \frac{P_{t-1}^{E,S}}{P_t}) S_{t-1}^{S,r} \tau_t^{OI,H} \alpha_t^{OI,H}$$

- Effective marginal tax factor on equity

$$\underbrace{(1 - \tau_t^{OI,F})}_{\text{at firm level}} \underbrace{(1 - \tau_t^{OI,H} \alpha_t^{OI,H})}_{\text{at shareholder level}}$$

Used to obtain effective marginal tax on equity equal to top marginal tax rate on labor → no incentive to shift income

Budget constraint of Ricardians

Financial fees as in Graeve and Iversen (2017)

Savings for next period

Savings from last period

$$P_t DP_t^r + P_t^{E,M}(1+F_t^S)S_t^{M,r} + P_t^{E,S}(1+F_t^S)S_t^{S,r} = P_{t-1}DP_{t-1}^r + P_{t-1}^{E,M}S_{t-1}^{M,r} + P_{t-1}^{E,S}S_{t-1}^{S,r}$$
$$+P_t OI_t^r - P_t T_t^r - P_t C_t^r(1+\tau_t^C+\tau_t^f) + \underbrace{P_t AVT_t^r + \Pi_t^{X,r} + \Pi_t^{F,r}}_{\text{other income and costs}}$$

- Financial fees generate equity premium
- Utility maximization gives rise to pricing equation for stocks

Firms

- Domestic production either in **M**anufacturing or **S**ervice sector
- Monopolistically competitive; decide on hours worked and price, investment and new debt
- Profits of firms are given by

$$\Pi_t^M(i) = \underbrace{P_t^m Y_t^M}_{\text{sales}} - \underbrace{(1+\tau_t^{SS,F}) w_t N_t^M}_{\text{labor costs}} - \underbrace{\delta P_t^i K_t^M}_{\text{depreciation costs}} - \underbrace{(R_{t-1}^L \phi_{t-1}^m - 1)\frac{B_{t-1}^M}{\pi_t}}_{\text{interest on debt}} - \underbrace{AC_t}_{\text{Adj. costs}}$$

- After-tax profits: $(1-\tau_t^{OI,F})\Pi_t^M = DIV_t^M + \Pi_t^{M,R}$

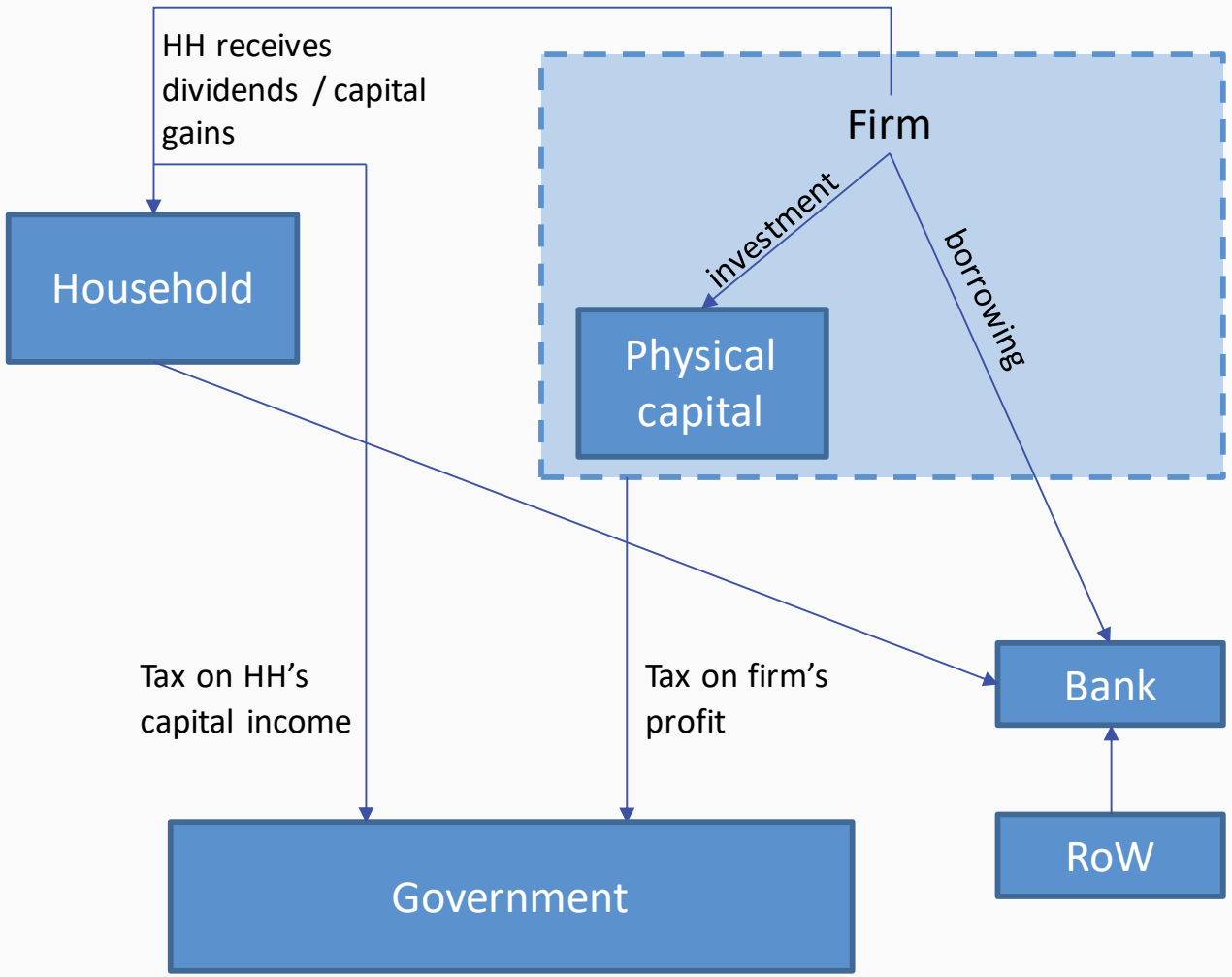
  where $\Pi_t^{M,R}$ are retained profits. These and new borrowing are used to finance net-investments

$$P_t^i IN_t^M(i) = \Pi_t^{M,R} + BN_t^M$$

- Objective of the firm is to maximize its value, i.e. its stock price

See Radulescu and Stimmelmayr (2010) or Chen, Karabarbounis and Neiman (2017)

Where does double taxation occur



The case of firm loans

- Household provides firm with resources by lending
- Firm makes investments, creates productive capacity and generates profit
- The interest payed on loans are fully deductible, hence no tax payed on the return of invested resources at firm level
- Return to firm loan is taxed as ordinary income at household level (1)

The case of equity-financed corporate investment

- Household provides firm with resources by buying shares
- Firm makes investment, creates productive capacity and generates profit
- Corporate profits are taxed (1)
- After-tax profits are payed out as dividends or increase value of firm
- Dividends and capital gains are taxed (2)

Role of the rate-of-return allowance (RRA)

- RRA = after-tax return on gov. bonds / firm bonds
- Relieves (2) such that disadvantage of equity financing is removed

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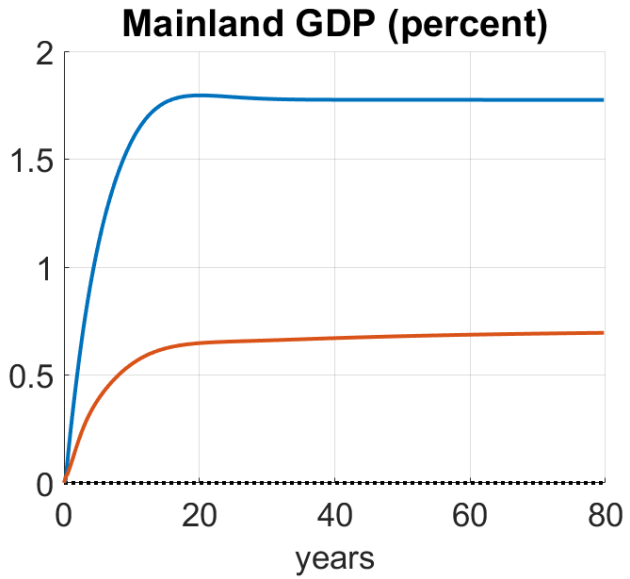
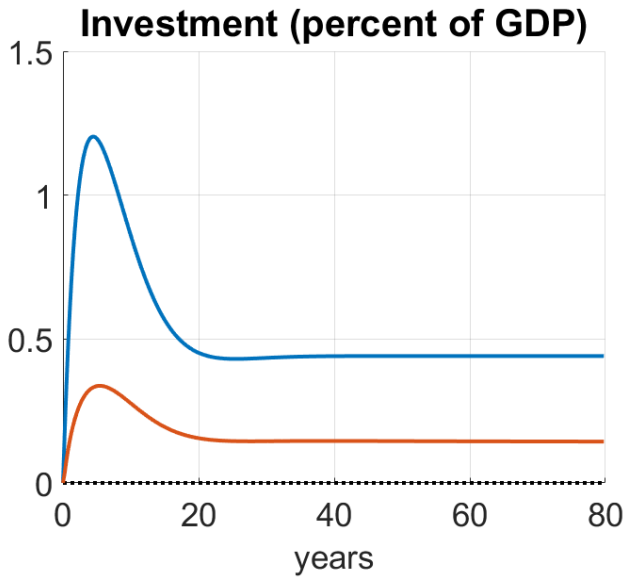
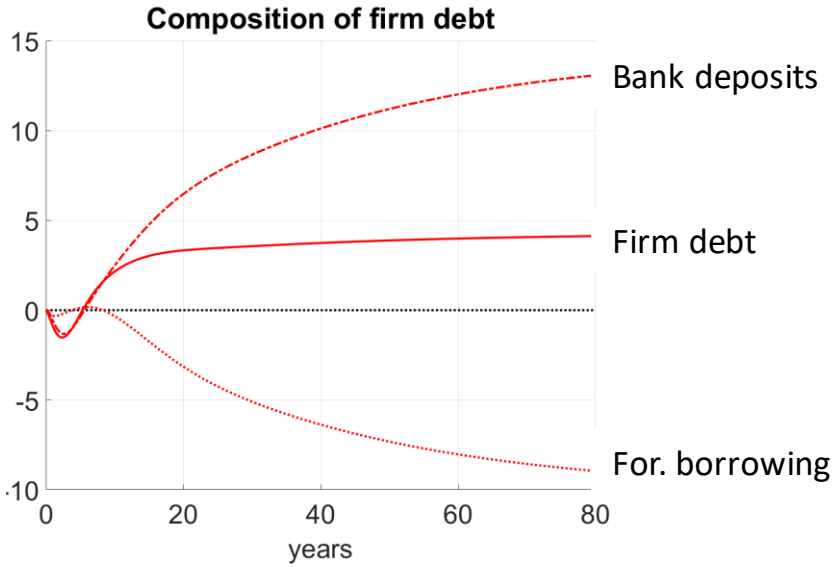
Illustration of the taxation of capital income and corporate profits

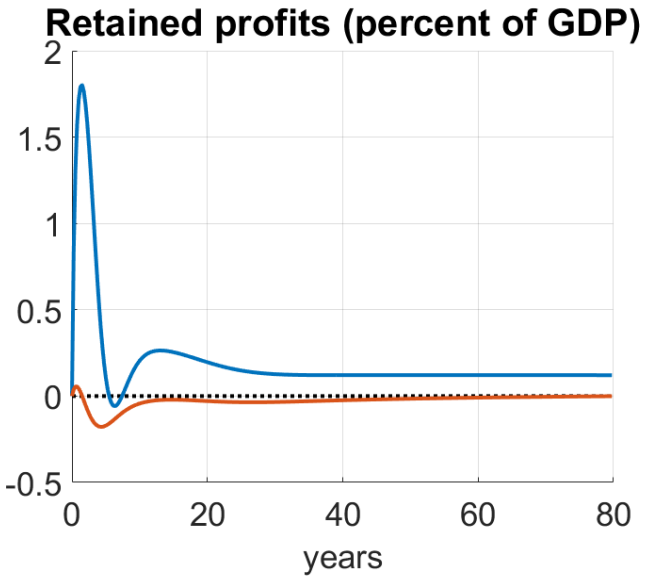
Permanent decrease of the firm's corporate profit tax (by 0.5 % of GDP)

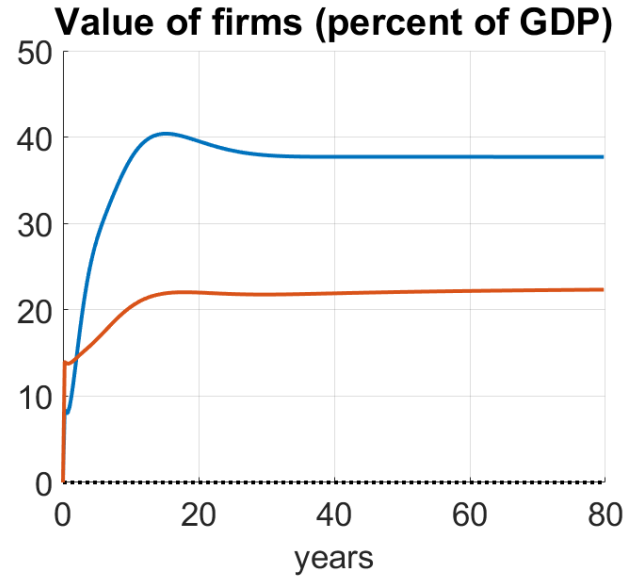
Permanent decrease of the household's ordinary income tax (by 0.5 % of GDP)

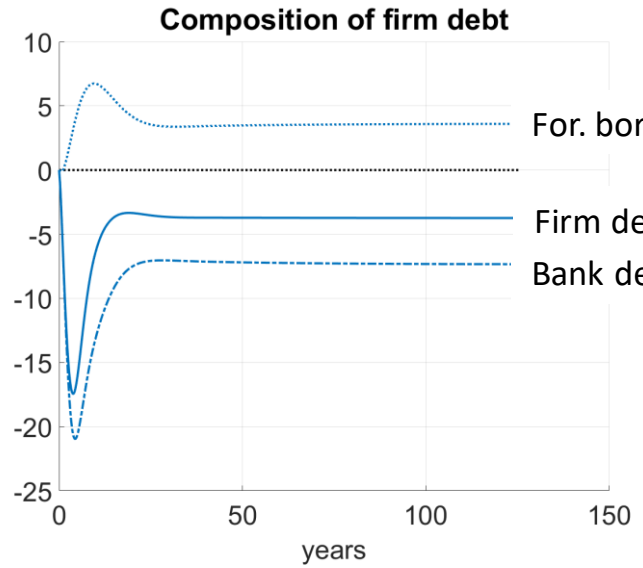












Model validation

Comparison with ifoMod (Radulescu and Stimmelmayr, 2010 & German Council of Economic Advisors)

Long-run results; **0.3 percentage points reduction in the corporate profit tax rate;** financed by transfers

	NORA	ifoMod
GDP	+0.16%	+0.15%
Investment	+0.29%	+0.27%
Labor demand	+0.03%	+0.05%
Consumption	+0.04%	+0.05%

Comparison with De Mooij and Ederveen (2008) / Finansdepartmentet (2017) / NOU (2014:13, Scheel utvalget)

Long-run results; 1 percentage points reduction in the corporate profit tax rate; unfinanced / transfer financed

	NORA	DE / FINDEP
Investment	+0.99%	1.4-1.7%
Tax base corp. profits	+0.90%	1.4-1.7%

Comparison with Bjertnæs (2018), MSG6

Long-run results; 3 percentage points reduction in the corporate profit tax rate; labor tax financed

	NORA	MSG6
GDP	+1.28%	-0.26%
Investment	+2.94%	-0.26%

Summary

1. We model both a tax to corporate profits, and a tax to shareholder income and their corresponding tax bases

2. The corporate profit tax is distortionary and affects the level of investment (more than household level taxation of capital income)

3. The marginal investor sits abroad. Changes to taxes of saving does not affect investments directly nor strongly

4. The rate-of-return allowance prevents a distortion away from investments into equity

5. Taxation affects the financing decision of firms (debt vs. equity)

6. Firms exhibit cash-hoarding behavior

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Thank you!

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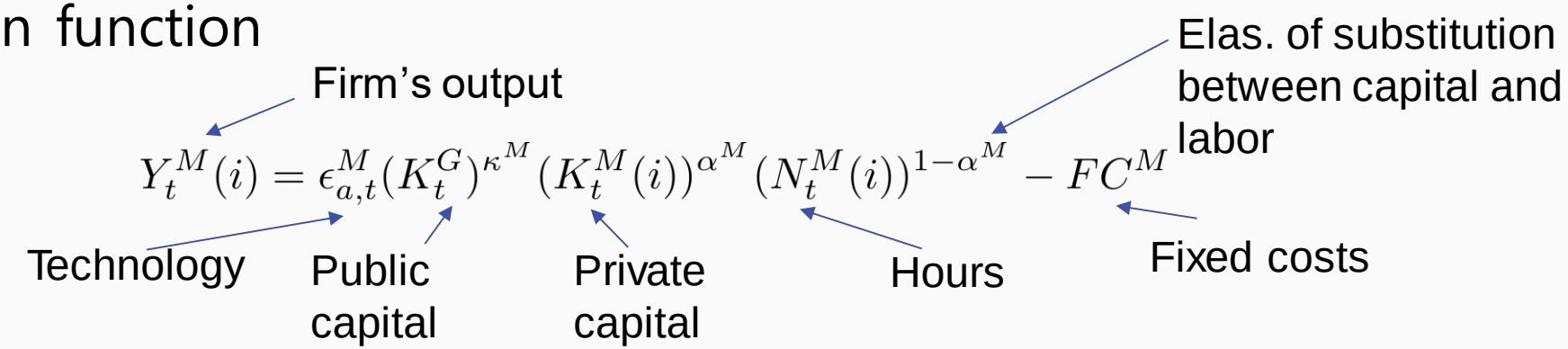
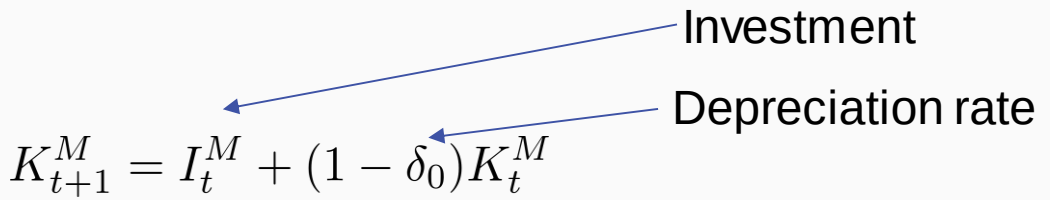
Appendix

Firm's

- Production function



- Capital accumulation follows



subject to investment adjustment costs

$$\gamma_t^K := \left(\frac{\chi_K}{2} \left(\frac{I_t^M}{I_{t-1}^M} - 1 \right)^2 \right) I_t^M$$

Firm borrowing

- Firms borrow from banks and pay interest on debt $(R^L_{t-1}\phi^m_{t-1} - 1)B^M_{t-1}$

Firm-debt (real terms)

R^L_{t-1} lending rate of banks (not firm-specific)

$\phi^m_t = \exp^{\chi_B\left(b^M_t - \overline{b^M}\right)}$ risk-premium on borrowing

$b^M_t = \frac{B^M_t}{P^i_t K^M_{t+1}}$ borrowing to asset ratio

- Nominal debt accumulation equation $P_t B^M_t = P_t BN^M_t + P_{t-1}B^M_{t-1}$

New debt

Nominal debt held at t

Nominal debt purchased at t-1

$$B^M_t = BN^M_t + \frac{1}{\pi_t}B^M_{t-1}$$

First-order condition on hours

$$\mathcal{L} = E_0 \sum_{t=0}^{\infty} \frac{1}{R_t^e} \Bigg\{ \Big[P_t^m Y_t^M - (1+\tau_t^{SS,F}) w_t N_t^M - \delta P_t^i K_t^M - (R_{t-1}^L \phi_{t-1}^m - 1) \frac{B_{t-1}^M}{\pi_t}$$

$$- (AC_t^M + \gamma_t^K) \Big] (1-\tau_t^{OI,F}) - \left[P_t^i (I_t^M - \delta K_t^M) - BN_t^M \right] +$$

$$+ \mu_t^M \left[I_t^M + (1-\delta) K_t^M - K_{t+1}^M \right] + \lambda_t^{B^M} \left[BN_t^M + B_{t-1}^M/\pi_t - B_t^M \right] + \lambda_t^{Y,M} \left[Y_t^M(i) - \left(\frac{P_t^m(i)}{P_t^m} \right)^{-\epsilon_M} Y_t^M \right] \Bigg\}$$

$$\frac{\partial L}{\partial N_t^M} = 0 \quad = \quad \frac{1+\tau_t^{SS,F}}{R_t^e} (-w_t)(1-\tau_t^{OI,F}) + \lambda_t^{Y,M} (1-\alpha^M) \frac{Y_t^M(i) + FC^M}{N_t^M} \frac{1}{R_t^e}$$

$$\Leftrightarrow \underbrace{(1+\tau_t^{SS,F}) w_t}_{\text{Effective wage rate}} \quad = \quad \underbrace{\frac{\lambda_t^{Y,M}}{(1-\tau_t^{OI,F})}}_{\text{Marginal value of one production unit}} \underbrace{(1-\alpha^M) \frac{Y_t^M(i) + FC^M}{N_t^M}}_{\text{Marginal product of labor } \frac{\partial Y_t^M}{\partial N_t^{P,M}}}$$

$$\mathcal{L} = E_0 \sum_{t=0}^{\infty} \frac{1}{R_t^e} \Bigg\{ \Big[P_t^m Y_t^M - (1+\tau_t^{SS,F}) w_t N_t^M - \delta P_t^i K_t^M - (R_{t-1}^L \phi_{t-1}^m - 1) \frac{B_{t-1}^M}{\pi_t}$$

$$-(AC_t^M + \gamma_t^K)\Big](1-\tau_t^{OI,F}) - \Big[P_t^i (I_t^M - \delta K_t^M) - BN_t^M\Big] +$$

$$+\mu_t^M \left[I_t^M + (1-\delta) K_t^M - K_{t+1}^M \right] + \lambda_t^{B^M} \left[BN_t^M + B_{t-1}^M/\pi_t - B_t^M \right] + \lambda_t^{Y,M} \left[Y_t^M(i) - \left(\frac{P_t^m(i)}{P_t^m} \right)^{-\epsilon_M} Y_t^M \right] \Bigg\}$$

$$\begin{aligned}
\frac{\partial L}{\partial I_t^M} = 0 \quad &= \quad -\frac{1}{R_t^e} P_t^i - \frac{(1-\tau_t^{OI,F})}{R_t^e} \left(\chi_K (\frac{I_t^M}{I_{t-1}^M} - 1) I_t^M / I_{t-1}^M + \frac{\chi_K}{2} (\frac{I_t^M}{I_{t-1}^M} - 1)^2 \right) \\
&+ \quad \frac{\mu_t^M}{R_t^e} - \frac{(1-\tau_{t+1}^{OI,F})}{R_{t+1}^e} \chi_K (\frac{I_{t+1}^M}{I_t^M} - 1) I_{t+1}^M \frac{-I_{t+1}^M}{(I_t^M)^2} \\
\Leftrightarrow P_t^i \quad &= \quad -(1-\tau_t^{OI,F}) \left(\chi_K (\frac{I_t^M}{I_{t-1}^M} - 1) I_t^M / I_{t-1}^M + \frac{\chi_K}{2} (\frac{I_t^M}{I_{t-1}^M} - 1)^2 \right) + \mu_t^M + \frac{(1-\tau_{t+1}^{OI,F})}{\Theta_{t+1}} \chi_K (\frac{I_{t+1}^M}{I_t^M} - 1) I_{t+1}^M \frac{I_{t+1}^M}{(I_t^M)^2}
\end{aligned}$$

Absent investment adjustment costs $P_t^i = \mu_t^M$, implying that investment is chosen such that the marginal value of capital equals the price of the investment.

First-order condition on prices

- Price-setting equation

$$DAC_t^M = (1-\epsilon_M) + \epsilon_M \frac{\lambda_t^{Y,M}}{P_t^m(1-\tau_t^{OI,F})} + \frac{R_t^e}{R_{t+1}^e}\frac{Y_{t+1}^M}{Y_t^M}\frac{P_{t+1}^m}{P_t^m}\frac{1-\tau_{t+1}^{OI,F}}{1-\tau_t^{OI,F}}DAC_{t+1}^M$$

- In absence of price adjustment cost

$$\underbrace{(1-\tau_t^{OI,F})P_t^m}_{\text{effective price}} = \lambda_t^{Y,M}\frac{\epsilon_M}{\epsilon_M - 1}$$

- where $\lambda_t^{Y,M}$ denotes the marginal value of one unit of output produced. The effective price is thus set as a mark-up over marginal value.