

EFFECTS OF INCOME AND CONSUMPTION TAX

INTRODUCTION

Title: Macroeconomic Effects of Income and Consumption Tax: Insights from a Life-Cycle Model with New Zealand Microdata

We study macroeconomic effects of income and consumption tax using a life-cycle model with New Zealand microdata from the Integrated Data Infrastructure (IDI).

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EMPIRICAL ANALYSIS

Earnings dynamics

- Mean earnings
- Gini coefficient of earnings
- Mean-to-median earnings ratio

all increase over most of the working life-cycle

IR data: Earnings from wages/salary, 2006-2015
Selection criteria: individuals (i) aged 23-60; (ii) earn at least \$9,500 a year (or \$6,500 a year if under 30)

Regression model:

$$stat_{j,t} = \alpha_c^{stat} + \beta_j^{stat} + \gamma_t^{stat} + \epsilon_{j,t}^{stat}$$

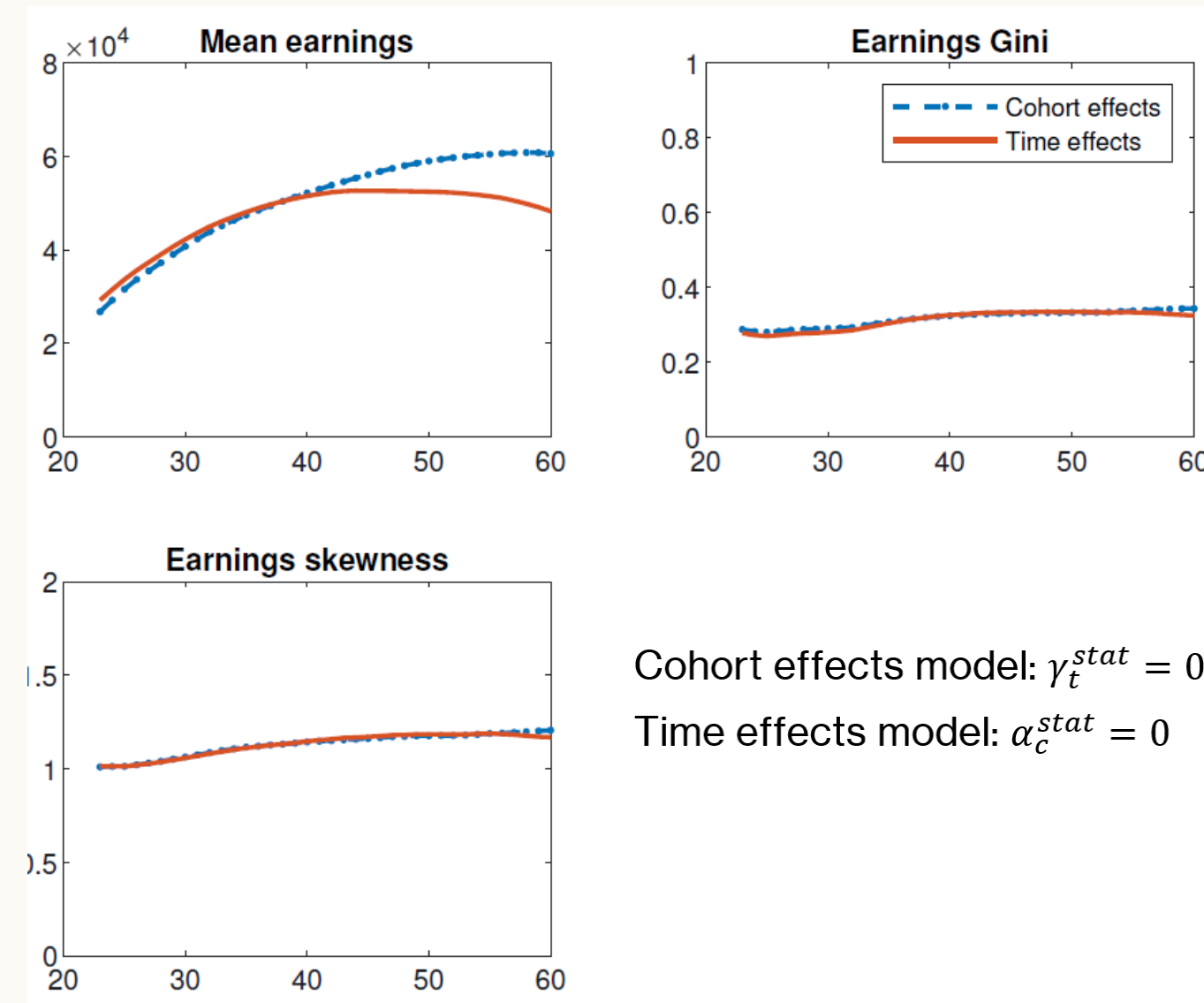


Figure 1: Mean earnings, Gini coefficient of earnings, and Mean-to-median earnings ratio by age

Income tax

Effective income tax rates closely align with statutory tax rates in New Zealand

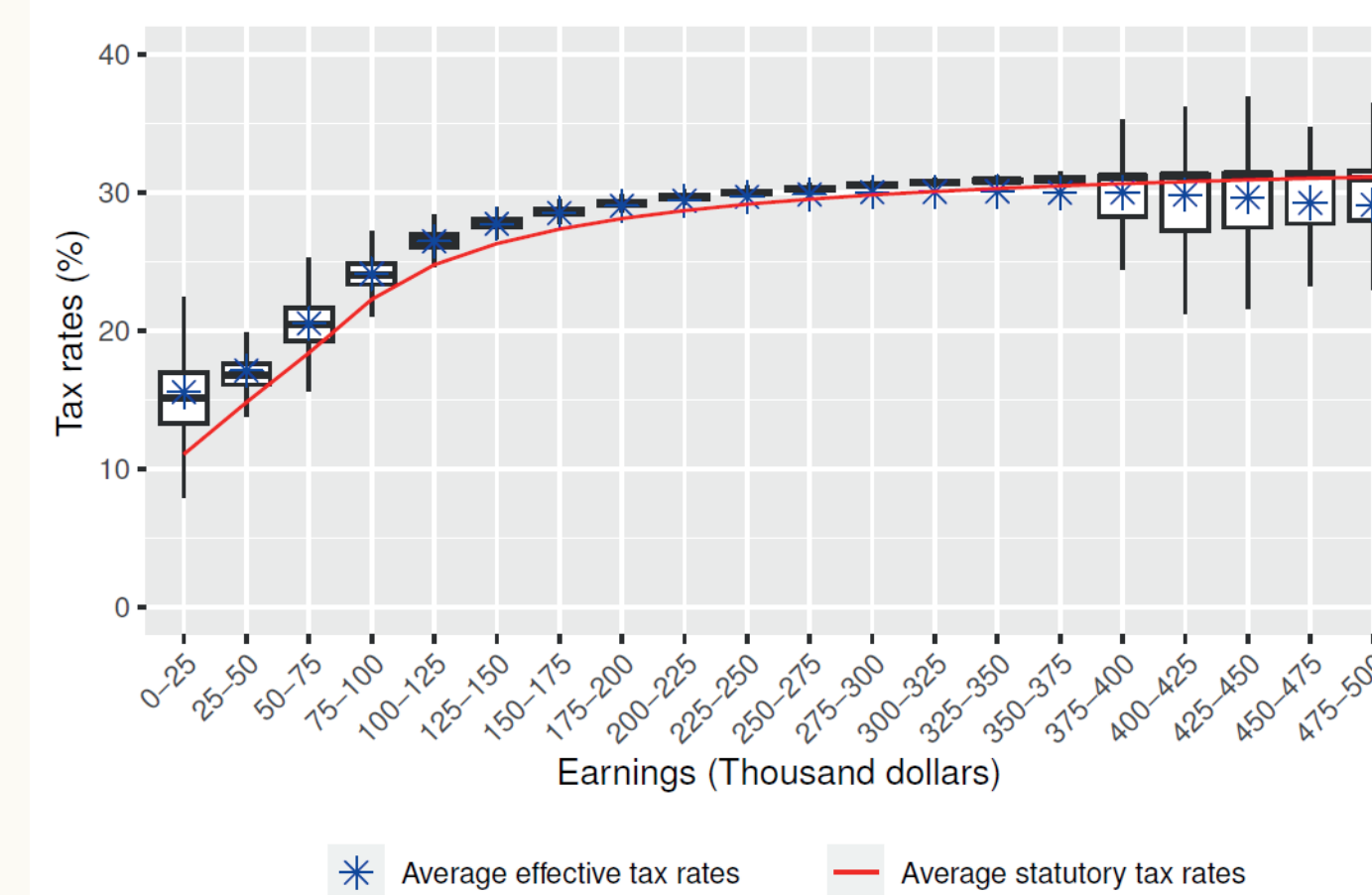


Figure 2: Average tax rates paid by tax payers in New Zealand, IR data, 2011-2015.

$$\text{Effective tax rate: } \tau^{eff} = \frac{T}{E}$$

Statutory tax rate:

$$\tau^{stat} = \sum_i \tau_i^{stat} \cdot \max(0, \min(E, E_{i+1}) - E_i)$$
$$\tau^{stat} = \frac{\tau^{stat}}{E}$$

OBJECTIVE

1. Build a model which can generate earnings dynamics in New Zealand

2. Model income tax using statutory tax

3. Use the model to study effects of income and consumption tax

MODEL

An agent maximizes expected lifetime utility, considering their initial savings, human capital, and learning ability. They make decisions about consumption, savings, work, and learning throughout their life.

$$\max_{\{c_j, k_j, h_j, l_j, s_j\}_{j=1}^J} E \left[\sum_{j=1}^J \beta^{j-1} \frac{c_j^{1-\sigma}}{1-\sigma} \right] \text{ subject to}$$
$$c_j + k_{j+1} = e_j + k_j(1 + r_{t+j-1}) - T_{j,t+j-1}(e_j, c_j), \forall j;$$
$$e_j = w_{t+j-1}h_jl_j \text{ if } j \leq J_R, \text{ and } e_j = 0 \text{ otherwise;}$$
$$h_{j+1} = H(h_j, s_j, a^l, z_{j+1});$$
$$w_{t+j-1} = (1 + g)w_{t+j-2};$$
$$k_{j+1} \geq 0; k_{j+1} = 0; \text{ and } l_j + s_j = 1, \forall j$$

CALIBRATION

- Calibrate human capital shock using wage data in New Zealand
- Jointly calibrate the distribution of initial human capital and learning ability to match the observed earnings dynamics

RESULTS

The model:

- can generate increasing age profiles of mean earnings, Gini coefficient of earnings, and mean-to-median earnings ratio
- cannot generate the hump shape of mean earnings profile

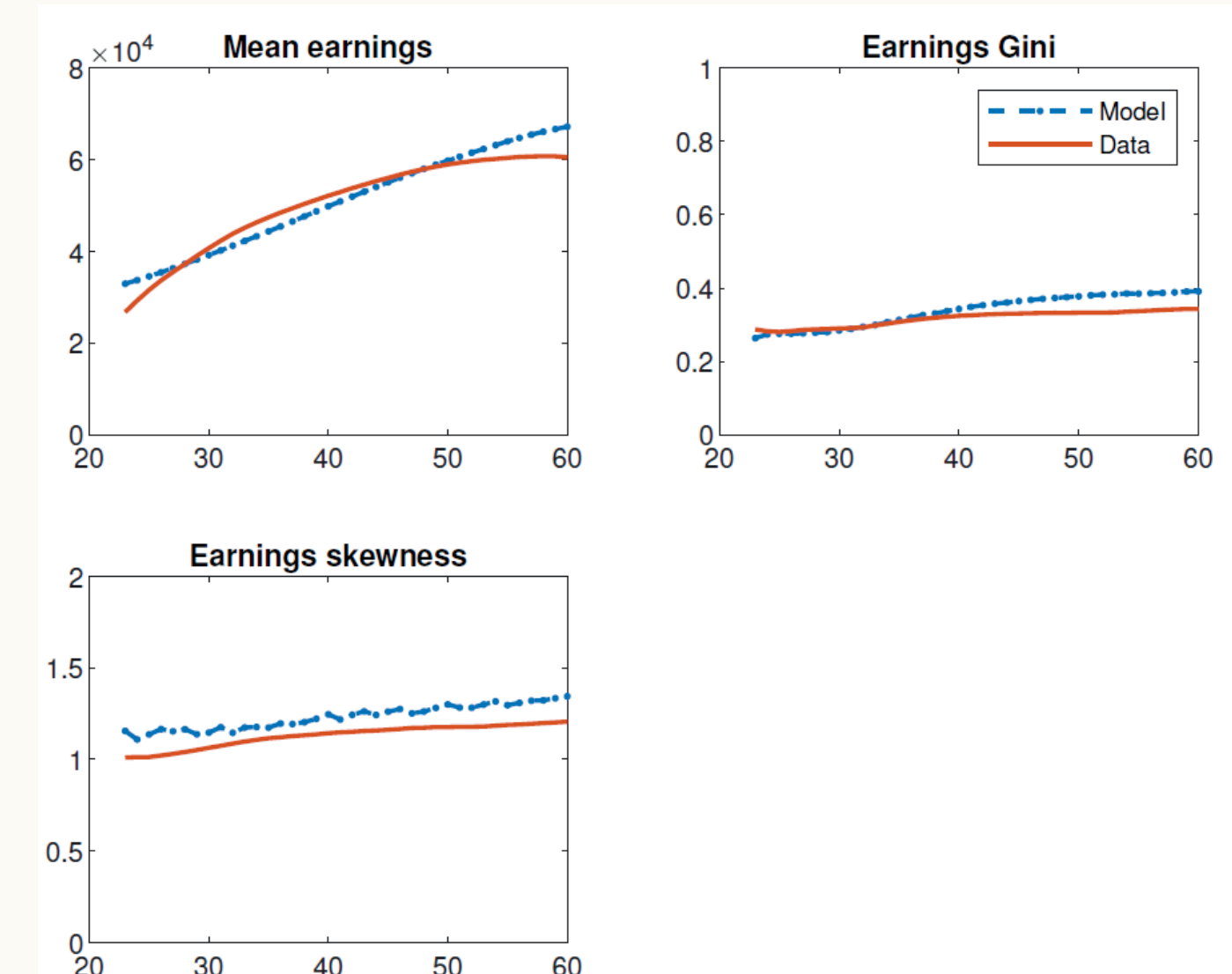


Figure 3: Model versus Data (Cohort effects)

POLICY EXPERIMENTS

1. Changing consumption tax

- Benchmark model: 15%
- High consumption tax: 17%
- Low consumption tax: 13%

Finding: Higher consumption tax leads to lower consumption without affecting savings, labor supply, or human capital investment.

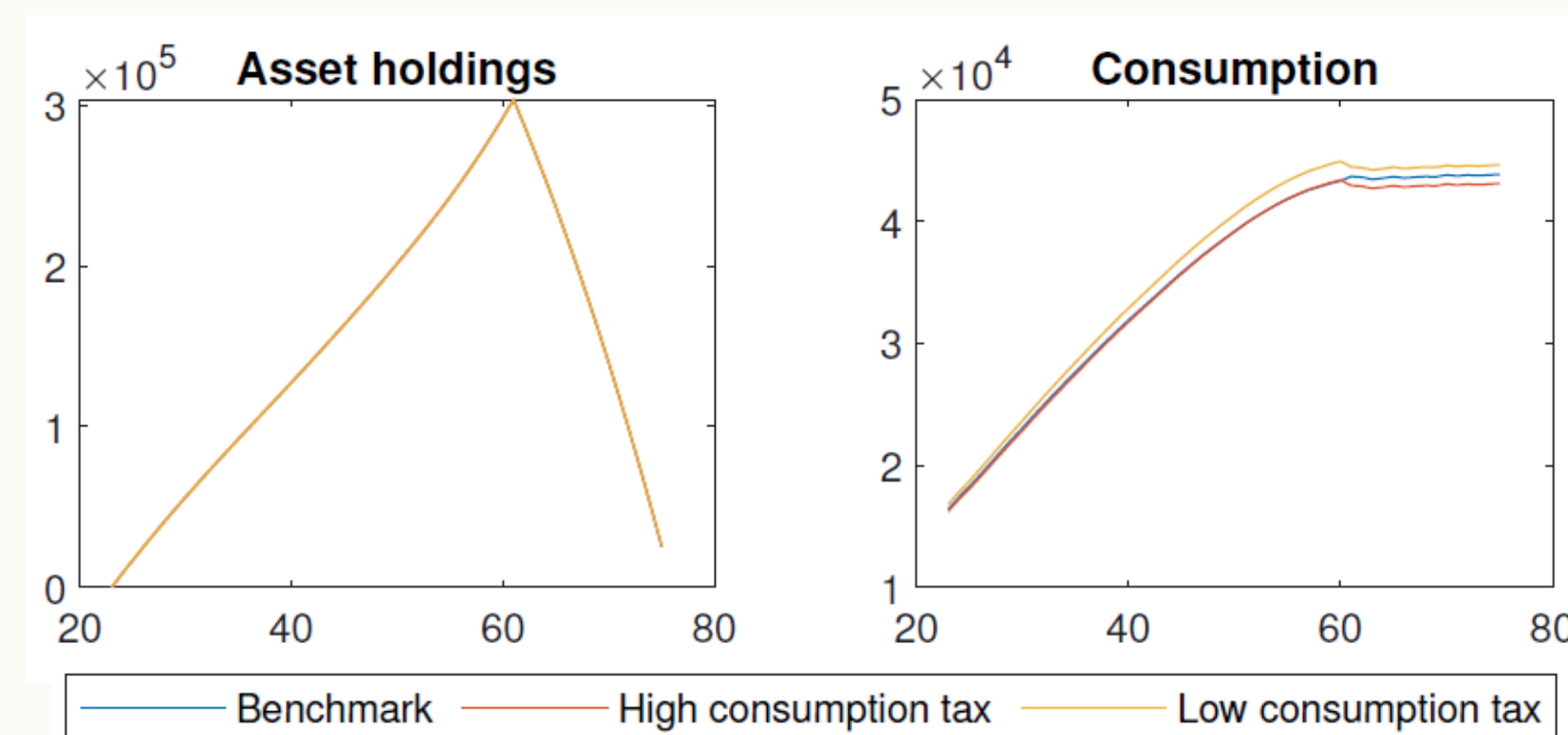


Figure 4: Age profiles with different consumption tax rates

2. Changing income tax

Income bracket	Tax rate - Benchmark	High tax	Low tax
\$0 - \$14,000	10.5%	10.5%	10.5%
\$14,001 - \$48,000	17.5%	17.5%	17.5%
\$48,001 - \$70,000	30%	33%	27%
\$70,001 and over	33%	39%	30%

Higher level
More progressive

Lower level
Less progressive

Finding: Higher income tax leads to lower labor supply, human capital investment, savings, and consumption.

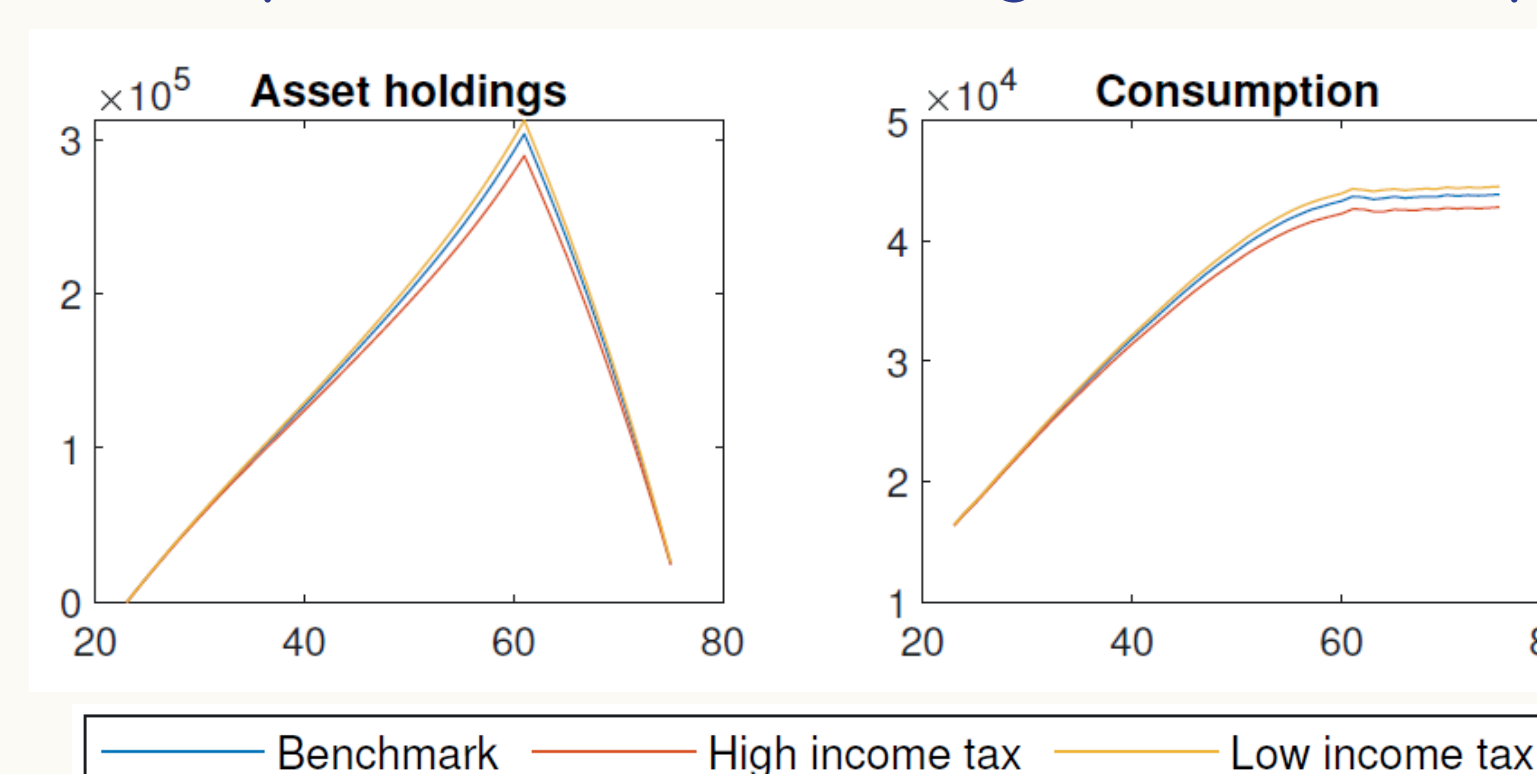


Figure 5: Age profiles with different income tax rates

3. Changing both taxes

- Benchmark model
- High income tax, high consumption tax
- Low income tax, low consumption tax
- High income tax, low consumption tax
- Low income tax, high consumption tax

Finding: Higher income tax leads to lower labor supply, human capital investment, savings, and consumption. The combination with higher consumption tax results in further decrease in consumption.

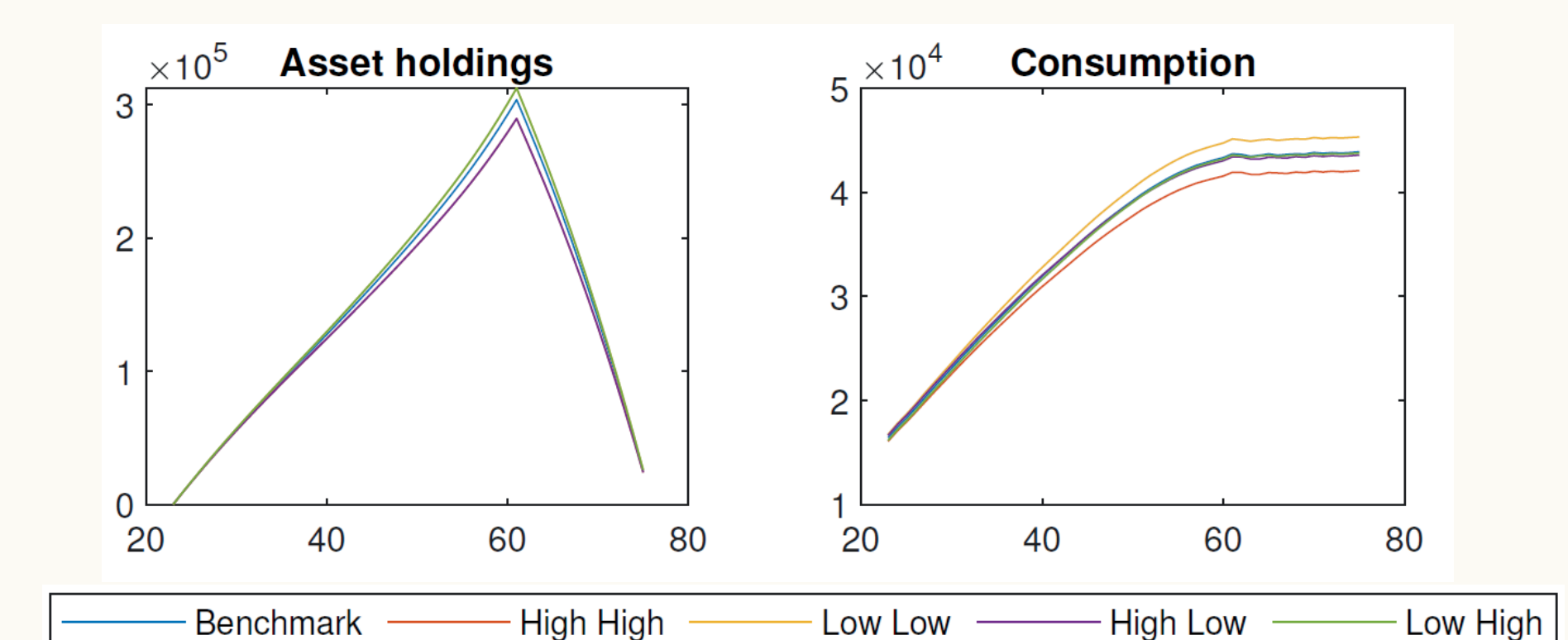


Figure 6: Age profiles with different income and consumption tax rates

CONCLUSION

- We document key features of the New Zealand economy regarding (i) earnings dynamics and (ii) income tax.
- We show that a human capital model can replicate these empirical features.

3. We reveal effects of income and consumption tax using our model.

4. Future work will focus on:

- improving model's fit
- incorporating general equilibrium effects
- finding the optimal combination of income and consumption taxes

DISCLAIMER

These results are not official statistics. They have been created for research purposes from the [Integrated Data Infrastructure (IDI) and/or Longitudinal Business Database (LBD)] which [is/are] carefully managed by Stats NZ. For more information about the [IDI and/or LBD] please visit <https://www.stats.govt.nz/integrated-data/>.

The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements.