# The Welfare and Distributional Consequences of Corporate Tax Cuts in Open Economies*

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October 1, 2024

**Abstract**

We develop an open-economy heterogeneous household model with incomplete markets to quantitatively evaluate the welfare and distributional effects—both within and across countries—of the corporate tax cut (Tax Cuts and Jobs Act, TCJA) implemented in the U.S. in 2017. The model allows for examining outcomes under various possibilities including the tax cut in the U.S. being permanent versus temporary and potential fiscal responses of other countries to the TCJA. We find that the TCJA is regressive in the U.S. and has relatively more regressive outcomes in other countries. Whether the wealth-poor in the U.S. benefit from the TCJA or not depends on the persistence of the tax cut. Finally, when a small country reduces its corporate tax in response to the TCJA, it has a progressive distributional result in its own economy.

**Keywords**: Tax Cuts and Jobs Act, Corporate tax cuts, Distributional effects

**JEL Classification numbers**: E62, F41, H25

*We thank seminar and conference participants at the 2022 Canadian Economics Association (CEA) Conference, Carleton University, and Université du Québec à Montréal as well as Jonathan Créchet and Heejeong Kim for helpful comments. Khan, Lee, and Razo-García acknowledge financial support from the Social Sciences and Humanities Research Council (SSHRC).

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# 1 Introduction

In 2017, the U.S. government reduced the statutory corporate tax rate from 35% to 21% through the Tax Cuts and Jobs Act (TCJA). This 14 percentage point reduction is the largest cut since the early 1940s (see Figure 1) and has generated much discussion and debate.[1] The arguments in favor of the tax cut are that it would boost investment, enhance job creation, increase average household income, and foster economic growth. On the other hand, opponents of the policy argue that the reform will mostly benefit high-wealth households, who will directly gain from higher after-tax corporate income, and not have much of a "trickle-down" effect.

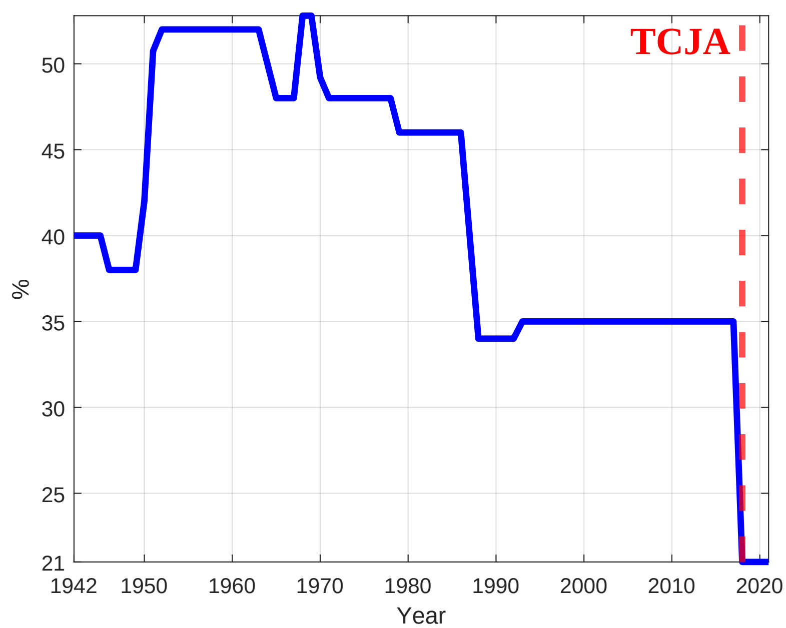



Figure 1: Evolution of the U.S. Statutory Corporate Tax Rates (1942-2021)

These arguments, however, relate to the potential effects of the TCJA on the U.S. economy alone and leave open the question of how the tax cut might affect other countries, in particular, small open economies such as Canada that have strong economic and financial linkages with the U.S. A plausible transmission channel, for example, is through investment: The tax cut in the U.S. creates an incentive for capital owners in Canada to relocate their investment to the U.S. and receive a higher after-tax income. Furthermore, as time progresses, these capital movements may impact

[1] In addition to the reduction in the statutory corporate tax rate, the bill also introduced changes in business deductions and credits.

the Canadian labor market and, therefore, those households who mostly rely on labor income for consumption. Consequently, a U.S. corporate tax cut can in turn affect the evolution of economic inequality in Canada. From a policy perspective, there are two additional important considerations. First, will the tax cut persist or be partially reversed as currently being discussed in policy circles and what will the effects be under these scenarios?[2] Second, what might be the aggregate and distributional effects if Canada were to reciprocate?

To study these issues quantitatively, we develop an open-economy heterogeneous household model with incomplete markets. As in Bewley (1977), Huggett (1993), and Aiyagari (1994), the household heterogeneity arises due to uninsurable idiosyncratic shocks to labor income. The world economy is approximated as three economies: the U.S., a small open economy (SOE) that is tightly linked to the U.S. economy (modeled based on Canada), and the rest of the world (that represents other OECD countries; ROW hereafter). We incorporate realistic features of both the progressive income tax system and the corporate income tax structure that are relevant to study the distributional effects. We use the model to answer three specific questions. First, what are the aggregate and distributional effects of the corporate tax reform in the U.S. on its own economy and other open economies? Second, what are the welfare consequences of a partial reversal of the TCJA? Third, what are the distributional and welfare effects of a reciprocal policy response from the SOE?

We parameterize the model to match key characteristics of the three economies prior to the implementation of the TCJA. The model successfully matches some key moments, including the debt-to-GDP ratio as well as the wealth Gini coefficient. Next, we examine the effects of the TCJA by implementing a one-time unanticipated U.S. corporate tax cut, where we take into account transition-path dynamics. In this baseline experiment, we assume that (i) the tax cut is permanent and (ii) the SOE and ROW fiscal authorities do not change their capital tax rates in response to the TCJA. We further perform two additional experiments that modify these assumptions.

Our first main result reveals that the TCJA is regressive, i.e., resulting in larger welfare gains for wealth-rich households than for wealth-poor households. Perhaps surprisingly, the effect is more regressive in the SOE than in the U.S. Indeed, all the households in the U.S. gain from the tax cut due to a substantial increase in labor demand. On the contrary, households in the bottom 75% of the wealth distribution in the SOE experience a welfare loss while the households in the top 25% of the wealth distribution enjoy a large gain. Moreover, we find that the latter group in the SOE gains

[2]The Biden administration has signaled a potential reversal of the TCJA corporate tax rate from 21% to 28%.

more than their U.S. counterparts. Capital outflow from the SOE to the U.S. explains the welfare loss of the wealth-poor households in the SOE caused by decreased labor demand. The reason for the larger gain among wealth-rich households in the SOE than among those in the U.S. is that U.S. households face a higher income tax burden to finance the corporate tax cut, whereas households in the SOE are not subject to such changes in their tax obligations. Thus, in the absence of a fiscal reaction in the SOE, the wealth-rich households in the SOE benefit from the opportunity of a higher investment return in the U.S. due to the TCJA without any change in domestic income taxation.

The second key result is that the welfare implications for the wealth-poor households in the U.S. depend on the persistence of their corporate tax policy. This result is obtained when we consider the possibility of an anticipated partial reversal of the approved TCJA corporate tax rate from 21% to 28%, 8 years after the implementation of the TCJA. Our quantitative results show that a temporary tax cut does not create a persistent increase in labor demand, whereas the rise in the future personal income tax to finance the corporate tax cut—albeit lower relative to the no-reversal case—is quite lasting. This implies that the latter effect dominates the benefit from a temporary increase in the wage, especially for the wealth-poor households in the U.S., who mainly rely on labor income. As a result, households in the bottom 1% of the U.S. wealth distribution experience a welfare loss while the welfare gain for the bottom 50% becomes trivial. This result has a strong implication for political support for the reversal of the tax cut. Through the lens of the model, we show that a meaningful gain from the TCJA is widespread over the wealth distribution only if the tax cut is maintained for a long time, possibly well over a decade.

In our final experiment, we use the model to investigate the distributional effects of a tax cut reciprocation by the SOE. This brings us to our third key result: The reciprocation by the SOE has progressive distributional effects in its own economy. Specifically, we find that on average SOE households favor a reciprocation, which is not surprising given the findings from the tax competition literature (see, for example, Gross, 2014). What is novel in our finding is that, while the low-wealth households gain, the high-wealth households lose from the SOE's fiscal response to the TCJA. The gain among the low-wealth households is intuitive—the reciprocation limits the capital outflow from the SOE and hence the wage decrease, relative to the no reciprocation scenario. The welfare loss of the wealthy households from the corporate tax cut in the SOE, on the other hand, might seem counter-intuitive. The reason for this result is that the direct benefit of a tax cut in the SOE—a better investment opportunity in the SOE—occurs to all the capital owners in the world, while the cost of providing such an opportunity falls mostly on the wealth-rich households in the SOE. The

SOE's fiscal authority finances the tax cut through debt issuance, which will eventually lead to an increase in the income tax rate of income-rich households in our model set up based on findings from Mertens and Montiel Olea (2018). The difference in the sets of households who benefit from a better investment opportunity and who finance the corporate tax cut is larger, and hence this channel is more important, for a tax cut from the SOE (compared to the U.S.), simply because of its small size relative to the world economy.[3] The model sheds light on this novel mechanism which informs policymakers in SOEs in designing responses to a change in corporate taxation in large countries such as the U.S.

Literature.

Our paper is related to the evaluation of the TCJA using macroeconomic models and empirical approaches. Barro and Furman (2018), Sedlacek and Sterk (2019), Bhattarai et al. (2020), and Zeida (2022) study the effects of the TCJA in a closed-economy environment. Lieberknecht and Wieland (2019) and Bawa and Vu (2020) build an open-economy model with limited household heterogeneity to investigate the spillover effects of the TCJA. On the empirical front, Hanson et al. (2021) investigates the effects of corporate tax cuts—including the TCJA—in the U.S. and their effects on closely linked economies. Chodorow-Reich et al. (2024) examines the impact of the TCJA on domestic and foreign investments of U.S. firms. Our paper contributes to this literature by studying the distributional effects of the TCJA across and within borders, using an open-economy model with realistic wealth distribution among households.

This paper also contributes to the vast literature that studies the effects of corporate taxation using macroeconomic frameworks. The seminal work of Harberger (1962) uses a representative-agent general equilibrium model in a closed economy, which was later extended to an open economy framework (see, for example, Harberger, 1995, Gravelle and Smetters, 2006, Randolph, 2006, and Harberger, 2008). Miao and Wang (2014) studies the impact of corporate taxation on investments under the presence of capital adjustment costs and Peretto (2011) examines the growth and welfare outcomes of dividend taxes in an endogenous growth model. Gourio and Miao (2010), Anagnostopoulos, Carceles-Poveda and Lin (2012), and Anagnostopoulos, Atesagaoglu and Carceles-Poveda (2022) examine dividend and capital gain taxes using a model with heterogeneity among households and/or firms. The closest paper to ours that combines both household heterogeneity and

[3] Recall that it is also through this mechanism that the wealth-rich households in the SOE benefit more than those in the U.S. from the TCJA. But in the case of the TCJA, this mechanism does not result in a welfare loss among the U.S. wealth-rich households, due to the relatively large size of the U.S. economy.

an open-economy framework is Kabukçuoğlu (2017) which investigates the effect of a unilateral capital income tax cut and the distributional effects across borders. Our model resembles that in Kabukçuoğlu (2017), but we focus on modeling an SOE to study the domestic impact of the SOE government's fiscal response, facing a corporate tax cut from a much larger economy (the U.S.) and no change in the rest of the world. A key additional contribution of our paper is to incorporate the possibility of a (partial) reversal of the initial tax cut in the U.S., reflecting the current political discussions on this issue.

Third, we contribute to the growing literature that analyzes aggregate and distributional effects of fiscal policies using incomplete-market models with heterogeneous households. Assuming incomplete markets, Heathcote (2005) re-examines the notion of Ricardian equivalence and finds that the results differ from those observed in a representative-agent framework. Guvenen et al. (2023) uses an incomplete-market framework to analyze the effects of capital income and wealth taxation. Ferriere and Navarro (2018) builds a small-scale heterogeneous-agent New Keynesian model to understand how tax progressivity affects the government spending multiplier. Bachmann et al. (2020) studies the distributional effects of fiscal volatilities. Domeij and Heathcote (2004), closest to this paper, studies the distributional effects of capital taxation in an incomplete-market closed-economy model. This paper expands their approach to an open-economy model to examine the spillover effects of a corporate tax cut across borders.

Finally, we also contribute to the literature studying capital tax competition. Correia (1996) was among the first to investigate international capital income tax competition using a dynamic framework (see also Mendoza and Tesar, 1998, Mendoza and Tesar, 2005, Klein, Quadrini and Rios-Rull, 2005, Gross, 2014, Gross, 2015, and Gross, Klein and Makris, 2020). Mendoza and Tesar (1998) quantifies international spillovers of a tax policy change and shows that these spillovers are large and lead to important deviations from what similar experiments predict in a closed-economy environment. On the contrary, Gross (2015) argues that under full commitment and dynamic taxation, governments of open economies set optimal capital tax rates identical to a closed economy. We contribute to this literature by examining the distributional effects of corporate taxation not only across borders but also within borders. Furthermore, we study how the distributional effects depend on the size of the country that implements a corporate tax cut.

Outline. The rest of the paper is organized as follows. Section 2 presents the model and defines the equilibrium. The calibration is discussed in Section 3. Section 4 discusses the aggregate and welfare consequences of the TCJA and an anticipated reversal of the policy. Section 5 investigates the SOE's response to the TCJA. Section 6 concludes.

# 2 Model

We extend a standard incomplete-market general-equilibrium model with heterogeneous households—as in Bewley (1977), Huggett (1993), and Aiyagari (1994)—to an open-economy setting. We model the world economy to consist of three economies: the U.S., an SOE, and the ROW. Furthermore, our model assumes that there is one consumption good that is traded across countries.[4] We assume free capital flow, which captures foreign direct investments as well as relocation decisions of firms and plants. We also assume no migration of workers. In each of these economies, there are three types of agents: households, firms, and the government. We describe their economic problems in the following subsections. Since the structure of the problem for each type of agent is identical across economies, we describe the problem only for an arbitrarily chosen economy, $m$.

## 2.1 Households

Each country is populated by a continuum of households facing idiosyncratic uninsured labor income shocks. Households are characterized by their wealth, which we define below, and their productivity $s^i_{m,t}$, where the superscript $i$ refers to each household, the subscript $m$ represents the country where the household resides, and the subscript $t$ denotes the time period. We assume that $s^i_{m,t}$ takes a finite number ($N_s$) of values and follows a first-order Markov process.

Households maximize their expected life-time utility, given by

$$\max_{\{c^i_{m,t}, a^i_{m,t+1}\}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t_m U(c^i_{m,t}), \tag{1}$$

where $0 < \beta^t_m < 1$ is the time-discount factor. $c^i_{m,t}$ denotes the household consumption in period $t$ and $a^i_{m,t+1}$ the assets held by that household at the end of period $t$. The utility function ($U(\cdot)$) is assumed to be increasing, continuous, and strictly concave in consumption. The household is subject to the following budget constraint:

[4]This implies we abstract from the changes in the terms of trade. Recent evidence provided by Hanson et al. (2021) suggests that the impact of changes in U.S. corporate taxes on terms of trade between the U.S. and Canada is small and statistically insignificant. On the other hand, the impact on investments in the U.S. and Canada—the channel we focus on in this paper—is large and statistically significant.

$$c^i_{m,t} + \sum_z k^{iz}_{m,t+1} + \sum_z b^{iz}_{m,t+1} = \sum_z k^{iz}_{m,t} + \sum_z b^{iz}_{m,t} + y^i_{m,t} - \tau^m_y(y^i_{m,t}), \tag{2}$$

where the superscript $z$, where applicable, is the source country of the asset held, $y^i_{m,t}$ is the total income before tax, and $\tau^m_y(y^i_{m,t})$ is the household income tax. The left-hand side of the budget constraint indicates the expenditures in period $t$. Households may consume and save in capital ($k$) and government bonds ($b$). Both capital and government bonds are traded internationally. $k^{iz}_{m,t+1}$ is the amount of capital in country $z$ purchased by household $i$ in country $m$ at the end of period $t$ and $b^{iz}_{m,t+1}$ is the amount of bond issued by the government of country $z$ purchased by household $i$ in country $m$ at the end of period $t$. The right-hand side shows the amount of resources available in period $t$, composed of assets purchased in the last period and disposable income (net of taxes), $y^i_{m,t} - \tau^m_y(y^i_{m,t})$.

Our model abstracts from aggregate uncertainties (except changes in corporate tax rates). This implies that the rates of return on all assets (after any applicable source-based taxation) are equalized, and the assets are perfect substitutes. Formally, this return equalization is represented by the following non-arbitrage condition:

$$(1 - \tau_c^{\text{U.S.}})r_t^{\text{U.S.}} = (1 - \tau_c^{\text{SOE}})r_t^{\text{SOE}} = (1 - \tau_c^{\text{ROW}})r_t^{\text{ROW}} = r^b_t = r_t. \tag{3}$$

$\tau^z_c$ is the source-based tax on capital income from country $z$. This models the corporate income tax and is therefore the main focus of this paper.[5] $r^z_t$ is the rate of return on capital before the corporate income tax in country $z$, $r^b_t$ is the rate of return on government bonds that is not subject to any source-based taxation, and $r_t$ is the equalized rate of return. This assumption allows computational tractability, as it is sufficient to keep track of total wealth in solving the household optimization problem: $a^i_{m,t+1} = \sum_z k^{iz}_{m,t+1} + \sum_z b^{iz}_{m,t+1}$. Finally, we impose a borrowing constraint on total wealth:

$$a^i_{m,t+1} \geq \psi, \tag{4}$$

where the negative of $\psi$ is the amount households are allowed to borrow.

[5] We do not distinguish C corporations and S corporations in our analysis. Although S corporations are not subject to corporate income taxes, both the average effective tax rates (Congressional Budget Office, 2014; Barro and Furman, 2018) and the average changes in the effective tax rates enacted by the TCJA (S Corporation Association, 2019) are similar between the two types of corporations. The TCJA changed the effective tax rates of S corporations through the changes in the provisions to them.

The household total income before income tax, $y^i_{m,t}$, is determined as

$$y^i_{m,t} = w^m_t ls^i_{m,t} + \sum_z [r^z_t(1-\tau^z_c)]k^{iz}_{m,t} + \sum_z r^{zb}_t b^{iz}_{m,t} = w^m_t ls^i_{m,t} + r_t a^i_{m,t}. \tag{5}$$

Total income is derived from three sources. The first is labor income with $w^m_t$ being the wage rate determined in the competitive labor market and $ls^i_{m,t}$ being the labor supply in efficiency unit. We assume that household labor supply is fixed at $l$. The second is the return on capital from each country $z$ net of the corporate income tax. The last source is the interest on bonds. The last equality follows from equation (3).

Following Castaneda, Diaz-Gimenez and Rios-Rull (2003), we model the household income tax as the sum of the progressive federal income tax and a linear component that captures other forms of tax revenue such as state, real estate, and excise taxes. We adopt the functional form from Gouveia and Strauss (1994) for the federal income tax. Hence, the income tax function is given as

$$\tau^m_y(y^i_{m,t}) = \underbrace{\tau^m_1\left[y^i_{m,t} - \left((y^i_{m,t})^{-\tau^m_2} + \tau^m_3\right)^{-\frac{1}{\tau^m_2}}\right]}_{\text{Progressive}} + \underbrace{\tau^m_0 y^i_{m,t}}_{\text{Linear}}. \tag{6}$$

The first term denotes the progressive part of the income tax system where $\tau^m_1$ is the top marginal tax rate and $\tau^m_2$ and $\tau^m_3$ capture the progressivity. The second term represents the linear component, where $\tau^m_0$ is the flat tax rate.

## 2.2 Firms

Output ($Y^m_t$) is produced by a representative firm using capital ($K^m_t$) and labor ($L^m_t$) with a constant returns to scale production function ($F$). The firm maximizes profit given as

$$\Pi^m_t = \max_{\{K^m_t, L^m_t\}} F(K^m_t, L^m_t) - R^m_t K^m_t - w^m_t L^m_t, \tag{7}$$

where $R^m_t = r^m_t + \delta^m$ and $\delta^m$ is the annual depreciation rate for country $m$.

## 2.3 Government

The government spending in each country $m$ has two components: government purchases ($G^m_t$) and debt repayments ($(1+r_t)B^m_t$). It finances its expenditures by newly issued bonds ($B^m_{t+1}$) and tax revenues ($T_t^m$). Formally, the budget constraint is as follows:

$$G_t^m + (1+r_t)B_t^m - T_t^m = B_{t+1}^m. \tag{8}$$

The left-hand side represents the primary deficit plus gross debt payments, which should be equal to new debt issuance. Total tax revenue ($T_t^m$) consists of two items: (i) a residence-based household income tax revenue ($Tr^m$) and (ii) a source-based corporate income tax revenue ($Ts^m$). Formally,

$$T_t^m = \underbrace{\int \left( \tau_{1,t}^m \left[ y_{m,t}^i - \left( (y_{m,t}^i)^{-\tau_2^m} + \tau_3^m \right)^{-\frac{1}{\tau_2^m}} \right] + \tau_0^m y_{m,t}^i \right) d\lambda_t^m(a,s)}_{Tr^m} + \underbrace{\tau_c^m (R_t^m - \delta_t^m) K_t^m}_{Ts^m}, \tag{9}$$

where $\lambda_t^m(a,s)$ is the joint distribution of households over wealth and productivity.

We assume the path of $G_t^m$ in equation (8) to be exogenous. Hence, a balanced budget is achieved by adjusting $B_{t+1}^m$ and $T_t^m$ given $B_t^m$.[6] However, we cannot determine both $B_{t+1}^m$ and $T_t^m$ using the balanced budget condition alone. To pin down both endogenous variables, based on Bohn (1998) and Davig and Leeper (2011), we assume the residence-based tax revenue to be a function of the current debt-to-GDP ratio:

$$\frac{Tr_t^m}{Y_t^m} = f_0 + f_B \frac{B_t^m}{Y_t^m} - \chi^m \left( \frac{Ts_t^m - \overline{Ts}^m}{Y_t^m} \right), \tag{10}$$

where $f_B$ reflects the endogenous adjustment of tax revenue to make the debt-to-GDP ratio stationary.[7] The first term, $f_0$, is a constant that determines the average level of tax-to-GDP ratio, and hence the average level of debt-to-GDP ratio. The last term captures how the residence-based tax revenue is adjusted to changes in the corporate income tax. If the corporate income tax revenue deviates from the pre-TCJA steady-state level ($\overline{Ts}^m$), $\chi$ determines whether the deviation is financed through a change in the household income tax ($\chi = 1$), through additional debt ($\chi = 0$), or through a combination of the two ($\chi \in (0,1)$).

Once the required residence-based tax revenue is determined by equations (8) and (10), at least

[6] This assumption is made based on two observations. First, Tax Policy Center (2024) shows that the TCJA was followed by a limited change in government spending and was mostly financed by the increase in government debt. Second, Bachmann et al. (2020) estimates that the increase in government debt results in an increased income tax revenue, while the contemporaneous correlation between government spending and government debt is close to zero.

[7] A necessary condition for the stationarity of the debt-to-GDP ratio is that $f_B > r^b$. In words, the adjustment in the tax revenue should be larger than the increase in the interest payments on the debt.

one tax parameter in the household income tax function (equation (6)) needs to be endogenously adjusted to match it. In our baseline quantitative exercises, we let $\tau_1$, the top marginal tax rate in the progressive component of household income tax, be endogenous. This is consistent with the empirical evidence documented in Mertens and Montiel Olea (2018) that top marginal tax rates have been a key tax instrument used for government budget adjustment.

## 2.4 Equilibrium

An equilibrium in our model is composed of household policy functions $\{a^m_{t+1}(a,s), c^m_t(a,s)\}^\infty_{t=0}$, the sequences of the prices $\{w^m_t, r_t\}^\infty_{t=0}$, the endogenous tax parameters $\{\tau^m_{1,t}\}^\infty_{t=0}$, the aggregates $\{A^m_t, K^m_t, B^m_t, L^m_t, C^m_t, T^m_t\}^\infty_{t=0}$, and the joint distribution of households over wealth and productivity $\{\lambda^m_t(a,s)\}^\infty_{t=0}$, for $m \in \{\text{U.S.}, \text{SOE}, \text{ROW}\}$, such that:

- Household policy functions $\{a^m_{t+1}(a,s), c^m_t(a,s)\}^\infty_{t=0}$ maximize the expected lifetime utility (1) under the constraints (2)-(4) and the given sequence of prices and the tax parameters.

- $\{K^m_t, L^m_t\}^\infty_{t=0}$ maximize firm profits defined in (7) under the given path of the prices.

- The aggregation of individual policies is consistent with their aggregate counterparts: $\int a^m_{t+1}(a,s) d\lambda^m_t(a,s) = A^m_{t+1}$ and $\int c^m_t(a,s) d\lambda^m_t(a,s) = C^m_t$.

- The path of the rate of return $\{r^m_t\}^\infty_{t=0}$ clears the world asset market:

$$\begin{aligned} A^{\text{U.S.}}_t + n_{\text{SOE}} A^{\text{SOE}}_t + n_{\text{ROW}} A^{\text{ROW}}_t &= B^{\text{U.S.}}_t + n_{\text{SOE}} B^{\text{SOE}}_t + n_{\text{ROW}} B^{\text{ROW}}_t \\ &+ K^{\text{U.S.}}_t + n_{\text{SOE}} K^{\text{SOE}}_t + n_{\text{ROW}} K^{\text{ROW}}_t, \end{aligned}$$

  where $n_m$ refers to the size of country $m$ relative to the U.S.

- Labor market clears:

$$L^m_t = \int s^i_{m,t} l d\lambda^m_t(a,s).$$

- Goods market clears:

$$\begin{aligned} Y^{\text{U.S.}}_t + n_{\text{SOE}} Y^{\text{SOE}}_t + n_{\text{ROW}} Y^{\text{ROW}}_t &= C^{\text{U.S.}}_t + n_{\text{SOE}} C^{\text{SOE}}_t + n_{\text{ROW}} C^{\text{ROW}}_t \\ &+ I^{\text{U.S.}}_t + n_{\text{SOE}} I^{\text{SOE}}_t + n_{\text{ROW}} I^{\text{ROW}}_t \\ &+ G^{\text{U.S.}}_t + n_{\text{SOE}} G^{\text{SOE}}_t + n_{\text{ROW}} G^{\text{ROW}}_t, \end{aligned}$$

where $I_t^m = K_{t+1}^m - (1 - \delta^m)K_t^m$.

- The path of the endogenous tax parameter $\{\tau_{1,t}^m\}_{t=0}^{\infty}$, total tax revenues $\{T_t^m\}_{t=0}^{\infty}$, and government bonds $\{B_t^m\}_{t=0}^{\infty}$ are determined by (8)-(10).
- The sequence of the joint distribution $\{\lambda_t^m(a, s)\}_{t=0}^{\infty}$ is generated from the initial distribution $\lambda_0(a, s)$, household policy functions, and given path of prices.

The computational algorithms for solving for the pre-TCJA steady state—the steady-state under the corporate taxes observed prior to the implementation of the TCJA—and the transition equilibrium path after the implementation of the TCJA are presented in Appendix A.

# 3 Calibration

Table 1 summarizes the parameter values we use to calibrate the model. One period in our model is one year. We calibrate the parameters in our model such that the key moments from the pre-TCJA steady state match the corresponding empirical moments from data before the implementation of the TCJA (2017). We calibrate the SOE to Canada. In addition, based on the observation that Canada is close to the median country among the G7 countries in many dimensions including government-expenditure-to-GDP and debt-to-GDP ratios (Kabukçuoğlu, 2017) and the tax level and progressivity (Lim and Hyun, 2006), and hence roughly comparable to many OECD countries, we also calibrate the ROW to the Canadian economy. Thus, the parameter values for the ROW and Canada are identical, except for their sizes. Having the ROW in our model is important as it allows us to have a realistic response in asset returns to corporate tax changes, by having an economy that can provide or absorb capital when the non-arbitrage condition is violated. For that matter, what is important is the size of the ROW economy. On the other hand, we do not focus on the distributional effects within the ROW. Hence, our main findings should not be sensitive to precise calibration of the ROW.

In terms of size, we assume that the Canadian economy is one-tenth of the U.S. economy (i.e., $n_{\text{SOE}} = 0.1$) based on the GDP ratio in 2016. Hence, the SOE in our model is different from the limiting case where its importance compared to large economies such as the U.S. vanishes, which is often assumed in the international economics literature for simplicity. We calibrate the size of the ROW ($n_{\text{ROW}}$) to match the relative size of the GDP between the U.S. and the OECD (excluding the U.S.) in 2016. We focus on the OECD countries as these countries are likely to have less friction in capital flows to and from the U.S. and Canada. The OECD economy size is twice that of the U.S., so we set $n_{\text{ROW}}$ to 2.[8]

Table 1: List of Parameters

| Parameter | Description | Value | Target/Source |
|---|---|---|---|
| $\sigma$ | CRRA parameter | 2 | Standard |
| $\beta$ | Discount factor | 0.9725, 0.9755, 0.9755 | K/Y= 3.5 |
| $\psi$ | Borrowing limit | -2.30, -0.70, -0.70 | Wealth Gini |
| $\tau_c$ | Corporate tax rate (prior to the TCJA) | 0.35, 0.38, 0.38 | Statutory tax rates |
| $\tau_0$ | Tax parameter | 0.060, 0.064, 0.064 | Own estimation |
| $\tau_2$ | Tax parameter | 1.367, 1.915, 1.915 | Lim and Hyun (2006) |
| $\tau_3$ | Tax parameter | 0.59, 3.14, 3.14 | In text |
| $\{s_1, s_2, s_3\}$ | Labor productivity levels | In text | Domeij and Heathcote (2004) |
| $\Pi$ | Labor productivity transition probability matrix | In text | Domeij and Heathcote (2004) |
| $\delta$ | Depreciation rate | 0.07 | Barro and Furman (2018) |
| $\alpha$ | Share of capital | 0.36 | Standard |
| $Z$ | TFP in steady state | 1 | Normalization |
| $f_B$ | Debt coefficient of fiscal rule (10) | 0.088, 0.083, 0.083 | Bachmann et al. (2020), own estimation |
| $f_0$ | Intercept of fiscal rule (10) | 0.097, 0.149, 0.149 | Debt-to-GDP ratio |
| $n$ | Country/economy size | 1, 0.1, 2 | GDP size |

*Note*: The numerical values under the column Value are in the order of the U.S., Canada, and the ROW. Single entries indicate that the values are identical across countries.

[8]The total GDP is determined by both the population size and the TFP in our model. However, what matters in our model is only the size of the ROW, so whether the GDP difference is due to the population size or the TFP level does not affect any of our results. Therefore, for simplicity, we attribute the economy size differences to the population sizes.

## 3.1 Households

We use a utility function with constant relative risk aversion:

$$U(c) = \frac{c^{1-\sigma}}{1-\sigma}, \tag{11}$$

where $\sigma$ is the relative risk aversion coefficient. We set $\sigma$ equal to 2. To calibrate $\beta_m$, we target the average capital-output ratio from 2006 to 2016 from the Penn World Tables. Since our model generates the same capital-output ratio in all the economies (unless we assume different production functions across economies), we use the U.S. average (3.55) as the target. Then $\beta_{\text{U.S.}}$ is calibrated to 0.9725 and $\beta_{\text{SOE}}$ and $\beta_{\text{ROW}}$ are calibrated to 0.9755. The small difference in the calibrated time preferences reflects the difference in the tax function (and hence its incentive for saving) across economies (see Section 3.3).

For the labor productivity process, we adopt the specification from Domeij and Heathcote (2004) for all the economies. To be specific, we assume three productivity levels, low ($s_1 = 0.167$), medium ($s_2 = 0.839$), and high ($s_3 = 5.087$), with the following transition probability matrix

$$\Pi = \begin{bmatrix} \pi_{11} & \pi_{12} & \pi_{13} \\ \pi_{21} & \pi_{22} & \pi_{23} \\ \pi_{31} & \pi_{32} & \pi_{33} \end{bmatrix} = \begin{bmatrix} 0.90 & 0.10 & 0 \\ 0.005 & 0.99 & 0.005 \\ 0 & 0.10 & 0.90 \end{bmatrix}, \tag{12}$$

where $\pi_{ij}$ is the probability of transiting to state $j$ next period conditional on being in state $i$ in the current period. We acknowledge that this earnings process is suggested by Domeij and Heathcote (2004) as a way to produce a realistic wealth inequality instead of being direct estimates from the observed income process. Using an income process directly estimated from the data would not allow us to have realistic wealth distribution unless we add another layer of heterogeneity, such as that in time preferences, or add a so-called "superstar" status to the income process. At the same time, our results show that what determines the welfare gains and losses from the considered policies is households' positions in the wealth distribution, not that in the income distribution. This is not surprising given that the former is more persistent than the latter and also that the former determines how much exposure one has to the asset return changes caused by the corporate tax changes. For this reason, we use the income process from Domeij and Heathcote (2004) as a tool to generate the overall realistic level of wealth inequality. We then use the borrowing constraint, $\psi_m$, to fine-tune the wealth Gini coefficients from the model to match those from the data: 0.80 in the U.S., from Budría-Rodríguez et al. (2002), and 0.70 in Canada, from Brzozowski et al. (2010). The calibrated values are $\psi_{\text{U.S.}} = -2.30$ and $\psi_{\text{SOE}} = \psi_{\text{ROW}} = -0.70$

## 3.2 Firms

The production function is assumed to be Cobb-Douglas with constant returns to scale:

$$F(K, N) = ZK^{\alpha}N^{1-\alpha}.$$

The capital share, $\alpha$, is set to a standard value in the literature, 0.36, for all the economies. The annual depreciation rate, $\delta$, is set to 7% for all the economies. This number is close to the weighted average of the depreciation rates of different types of physical capital reported in Barro and Furman (2018). Finally, we normalize the total factor productivity, $Z$, to one in all the economies because we abstract from its fluctuations as well as from the small differences in its level between the U.S. and Canada.

## 3.3 Government

We set the corporate tax rates at the statutory tax rates: 35 percent for the U.S. and 38 percent for the SOE and ROW based on the Canadian tax rate for the pre-TCJA steady state. We use the statutory tax rates instead of effective tax rates because while calculating the relevant effective tax rates is not straightforward as illustrated by Auerbach (2018), the benefit of using it compared to the statutory tax rate is not obvious. For example, Auerbach (2018) argues that for discrete location decisions of firms—the margin that can be the most relevant after a large corporate tax change such as the TCJA—the statutory tax rate is indeed more relevant than the effective tax rate. In addition, Auerbach (2007) also shows that the difference between the statutory and effective tax rates is typically not large.

We assume the government-purchases-to-GDP ratio ($G_t^m/Y_t^m$) to be constant in each economy. To set its value, we use the average between 2006 and 2016, where $G_t^m$ includes both federal and state/provincial level government purchases. The value is 0.19 for the U.S. and 0.25 for the SOE and ROW.

The coefficient, $f_B$, on the debt-to-GDP ratio in the fiscal rule (equation (10)) is obtained by estimating the following equation:

$$\frac{Tr_t^m}{Y_t^m} = f_0 + f_B \frac{B_t^m}{Y_t^m} + f_G \frac{G_t^m}{Y_t^m} + f_Y \log\left(\frac{Y_t^m}{\bar{Y}_t^m}\right), \tag{13}$$

where $\bar{Y}_t^m$ is the potential GDP. Bachmann et al. (2020) estimates this exact equation for the U.S., using quarterly data from 1960 and 2007.[9] We adopt their estimate for the U.S.: $f_{B,\text{U.S.}} = 0.080$. We estimate the same process using the Canadian data[10] and obtain $f_{B,\text{SOE}} = f_{B,\text{ROW}} = 0.088$. Note that to have a stationary debt process, $f_B$ should be larger than the interest rate. The estimated values meet this condition. Then, from equations (8) and (10), the value of $f_0$ determines the pre-TCJA steady state levels of the debt-to-GDP ratio $(B/Y)$ and the tax-to-GDP ratio $(T/Y)$. We calibrate $f_0$ to match the average debt-to-GDP ratio between 2006 and 2016 calculated from the database built by Jordà, Schularick and Taylor (2017), for both the U.S. and Canada. The calibration of $\chi$ does not affect the pre-TCJA steady state calculation so it will be discussed in Section 4.

In the household income tax function (equation (6)), we need to set three parameters, $\{\tau_0, \tau_2, \tau_3\}$, while $\tau_1$ is endogenously determined to satisfy equation (9). The calibration of the progressive component (i.e., $\tau_2$ and $\tau_3$) is based on the estimates from Lim and Hyun (2006), which uses data from 1997 for the U.S. and from 1998 for Canada. $\tau_2$ is a scale-free parameter that allows us to directly adopt their estimates. On the other hand, $\tau_3$ is scale-dependent, so we cannot directly use their estimates. We calibrate $\tau_3$ by matching the pre-TCJA steady state value of $\tau_1$ to their estimate. The flat tax rate in the linear component of the tax function, $\tau_0$, captures the state/provincial tax rate. For the U.S., we use the estimate from Bachmann et al. (2020); for Canada, we construct this as a weighted average of provincial tax rates by income quintile reported in Kurnaz and Yip (2022).

## 3.4 Pre-TCJA Steady-State Moments

Table 2 compares the key moments from the pre-TCJA steady state with their empirical counterparts. Panel A shows that the model does a good job in closely matching targeted moments such

[9] This time window is longer than what we use for calibrating other parameters (2006-2016). Given the large standard errors associated with this estimation, we adopt the time window used in Bachmann et al. (2020) to have reliable estimates.

[10] One exception is that the data used starts from 1990 as the Canadian government debt data is not in the consistent format before 1990.

as the capital-output ratio, the debt-to-GDP ratio, and the wealth Gini coefficient. In Panel B, we show that our model also successfully generates the fact that the U.S. is a net borrower while the SOE, modeled based on Canada, is a net lender, in terms of the net foreign asset position.

Table 2: Pre-TCJA Moments

| Panel A: Targeted moments | | | | |
|---|---|---|---|---|
| | Model | | Target | |
| Description | U.S. | SOE, ROW | U.S. | Canada |
| $K/Y$ | 3.42 | 3.36 | 3.50 | 3.50 |
| $B/Y$ | 0.882 | 0.827 | 0.882 | 0.827 |
| $\tau_1$ | 0.376 | 0.343 | 0.376 | 0.343 |
| Wealth Gini Coefficient | 0.78 | 0.69 | 0.80 | 0.70 |
| Panel B: Untargeted moments | | | | |
| Net Assets Position | Borrower | Lender | Borrower | Lender |

Notes: The model moments are from the pre-TCJA steady state. The sources for the empirical moments that are used as calibration targets are explained in the text in Sections 3.1-3.3.

# 4 Baseline Results: No Reciprocation by the SOE

In this section, we present our baseline results where the SOE does not reduce the corporate tax rate in response to the TCJA.[11] We examine two versions of the TCJA. First, we assume that the corporate tax cut in the U.S. is permanent. Second, we assume that the tax cut in the U.S. is partially reversed several years after its implementation, and this is anticipated. Both experiments assume $\chi^m$ to be 0 in all economies, meaning that any changes in the corporate-based tax revenue are absorbed by a change in the government debt instead of residence-based tax revenue. This

[11] There will still be some changes in the income tax schedule. The outflow of capital from the SOE reduces the tax base and increases the government debt, and according to equation (10), this increases the income tax rates.

assumption is consistent with Gale (2020), who shows that the TCJA did not result in a noticeable increase in the household income tax revenue. In Appendix B.1, we report the results from assuming $\chi^m$ to be 1—i.e., the corporate tax cut financed through an increase in the residence-based tax revenue. Appendix B.2 also reports the results from assuming $\tau_3$ instead of $\tau_1$ to be the endogenous tax parameter in the residence-based tax function—i.e., the progressivity in the tax function instead of the top marginal tax rate is adjusted when the required revenue changes. In both cases, the key qualitative results are the same as in the baseline model.

## 4.1 Permanent Corporate Tax Cut in the U.S.

We first consider the case originally promulgated in the TCJA, i.e., permanently reducing the corporate tax rate from 35% to 21%. We assume this to be an unanticipated change. We first describe the dynamics of the aggregate variables and then present the distributional results.

### 4.1.1 Aggregate Dynamics

Figure 2 shows the changes in the key aggregate variables along the transition path equilibrium.[12]

On the fiscal side, as the corporate tax cut is financed through additional debt (i.e., $\chi = 0$), the U.S. government debt increases significantly relative to the pre-TCJA steady state. On the other hand, the SOE government debt shows a slight increase due to a reduction in the capital tax base caused by the capital outflow.

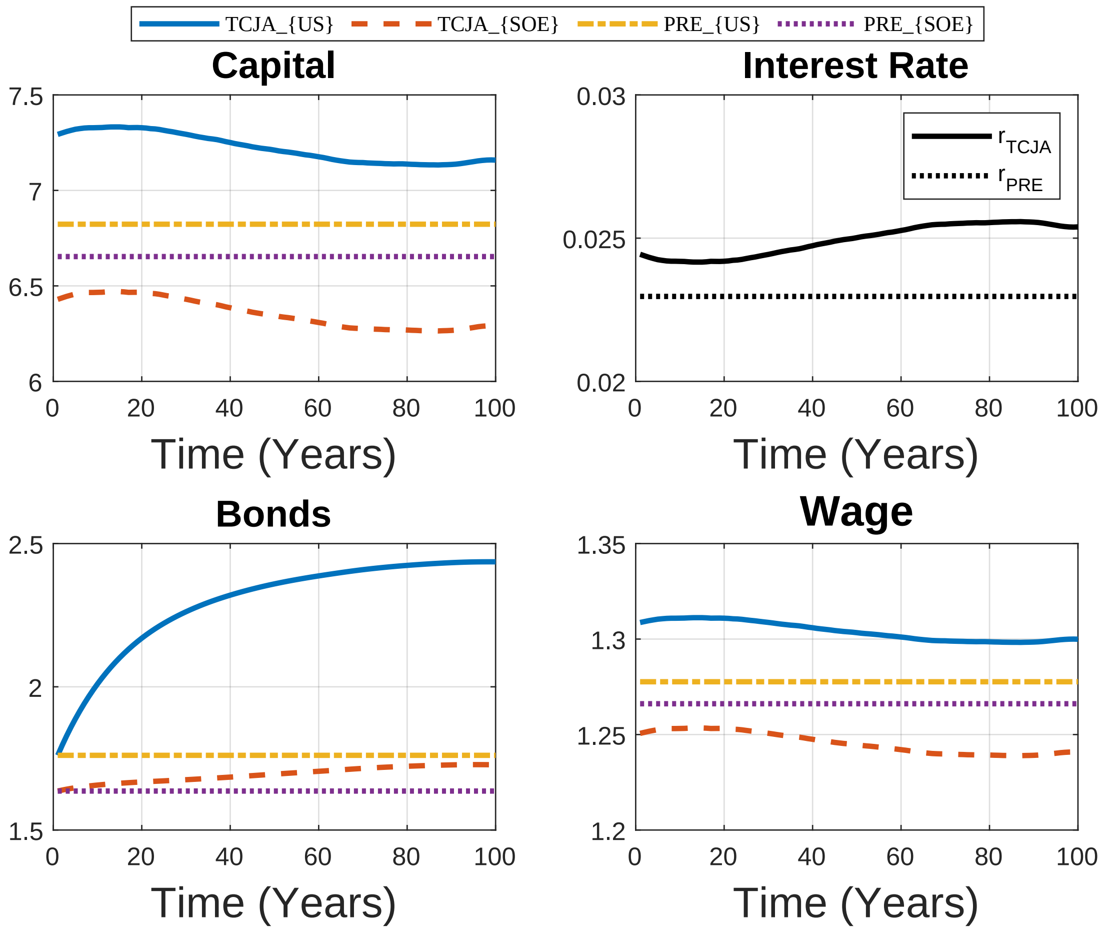
The capital stock in the U.S. experiences an influx on impact due to lower corporate tax obligations. Over time, it decreases due to the crowding-out effect from the accumulation of government debt, though it stays above the pre-TCJA level. On the contrary, capital in Canada decreases relative to the pre-TCJA steady state as capital flows to the U.S. due to a higher after-tax return in the U.S.

The unique after-tax rate of return on the assets stays above the pre-TCJA level due to a lower corporate tax in the U.S. and lower capital stocks in the other economies. It also increases over time due to the crowding-out effect from the U.S. government debt. Finally, wages in the U.S. increase as capital inflows raise the marginal product of labor, while the opposite is the case for the SOE.

[12] Even though we use 300,000 households in simulating each economy, this number is not large enough to completely eliminate fluctuations in aggregate variables on the new steady-state. This is partly because the assumed productivity process is very persistent, requiring a very large number of households to make simulated distributions identical to the theoretical distributions. However, both the aggregate results and the welfare changes are robust to using different seeds for simulations.

The dynamics of prices have important distributional implications for the U.S. and SOE, which we will discuss next.

Figure 2: Dynamics of the aggregate variables under a permanent cut




Notes: The label $\text{TCJA}_m$ for $m = \{US, SOE\}$ refers the post-TCJA paths. $\text{PRE}_m$ denotes the level in the pre-TCJA state.

### 4.1.2 Distributional effects

To examine the distributional effects of the U.S. permanent corporate tax cut in the U.S. and the SOE, we calculate the welfare gain of each household using the consumption equivalent variation. Specifically, we calculate the proportional change in lifetime consumption required for households in a counterfactual economy—where the TCJA was not implemented—to make them as well off as in the actual economy with the TCJA, conditional on the state variables at the moment of the implementation of the TCJA. Formally, it is $\omega$ that satisfies:

$$\mathbb{E}_0 \sum_{t=0} \beta^t u(c^i_{m,t}) = \mathbb{E}_0 \sum_{t=0} \beta^t u([1+\omega]\tilde{c}^i_{m,t}),$$

where $c^i_{m,t}$ represents the consumption in the baseline economy with the policy enacted, whereas $\tilde{c}^i_{m,t}$ denotes that with no change in the corporate tax. A positive value of $\omega$ implies a gain and a negative value indicates a loss from the corporate tax cut.

Table 3: Welfare gains for households in the U.S. and SOE under a permanent corporate tax cut (%)

**Panel A: U.S.**

| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 0.3233 | 0.1749 | 0.2395 | 0.2582 | 0.3119 | 0.3563 | 0.3644 | 0.3996 | 0.4399 |
| $s=1$ | 0.3232 | 0.1841 | 0.2409 | 0.2584 | 0.3093 | 0.3563 | 0.3641 | 0.3981 | 0.4419 |
| $s=2$ | 0.3234 | 0.1749 | 0.2394 | 0.2582 | 0.3120 | 0.3563 | 0.3644 | 0.3999 | 0.4398 |
| $s=3$ | 0.3216 | 0.1713 | 0.2423 | 0.2578 | 0.3118 | 0.3563 | 0.3647 | 0.3969 | 0.4399 |

**Panel B: SOE**

| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | -0.5855 | -1.2061 | -1.0681 | -0.9527 | -0.9343 | -0.7268 | 0.0641 | 1.0885 | 1.8711 |
| $s=1$ | -0.5722 | -1.2059 | -1.0620 | -0.9536 | -0.9348 | -0.7271 | 0.0729 | 1.0621 | 1.9039 |
| $s=2$ | -0.5853 | -1.2060 | -1.0688 | -0.9526 | -0.9342 | -0.7267 | 0.0626 | 1.0932 | 1.8705 |
| $s=3$ | -0.6016 | -1.2077 | -1.0605 | -0.9539 | -0.9352 | -0.7267 | 0.0889 | 1.0349 | 1.8567 |

Notes: The columns represent the wealth groups and the rows represent the productivity types. The column and rows labeled "All" indicate unconditional values. The figures in the table are in percentages and are averages from the particular wealth group.

We compute $\omega$ for the U.S. and SOE conditional on wealth and productivity levels. Table 3 shows the welfare gains and losses from the policy change. While the average welfare gain across the U.S. population is about 0.32%, the households in the SOE on average experience a loss of 0.59%, as shown in panels A and B, respectively.

In terms of the distributional effects, the results indicate that the wealth-rich households are the winners in both economies relative to households at the opposite end of the distribution, indicating that the policy is regressive. The intuition for these results is as follows. For high-wealth households, the gain comes from the higher after-tax return on savings after the tax cut, since most of their total income is generated from their non-labor income and they hold a large share of the aggregate capital stock. On the other hand, households with lower levels of wealth rely mostly on labor income, so they do not directly benefit from the higher after-tax return.

At the same time, the U.S. tax cut yields a much more regressive outcome in the SOE than in the U.S. The loss of the wealth-poor households is much larger in the SOE than in the U.S. In the U.S., on the one hand, capital inflow from the SOE and ROW increases wages, which benefits the wealth-poor households. On the other hand, they will be subject to a higher income tax rate as the U.S. government debt accumulates. The results indicate that the benefit from the former channel is larger than the cost from the latter channel.[13] Therefore, the key argument of the supporters of the TCJA—that this will also help workers in the U.S. by raising the labor demand—is supported when the tax cut is permanent. The wealth-poor households in the SOE experience a large welfare loss due to a drop in wages caused by the capital outflow, with those approximately in the bottom 80% of the wealth distribution experiencing a welfare loss.

Perhaps surprisingly, the wealth-rich households in the SOE benefit more than the wealth-rich households in the U.S. With frictionless capital flow, a better investment opportunity created by a lower U.S. corporate tax rate is enjoyed by every saver in the world. On the contrary, only U.S. households face the price of the policy in terms of an increased residence-based tax due to the accumulated government debt. This significantly reduces the welfare gain of the wealth-rich households in the U.S., while the wealth-rich households in the SOE enjoy a free lunch.[14] These mechanisms explain why the corporate tax cut in the U.S. results in a more regressive outcome in the SOE than in the U.S.

[13] Even though the adjustment in the residence-based tax is made through variation in $\tau_1^m$, the top marginal tax rate, it affects not only the top income households but all the households. The progressive component of the income tax is proportional to $\tau_1^m$, so all the households face the same proportional change in the tax rates, though, in terms of percentage point change, it is larger for the top income households. When the adjustment in the income tax is made through $\tau_3^m$, the progressivity of the tax function, the additional tax burden is mostly on the wealth-poor households. In that case, the tax cut turns out to be much more regressive in the U.S., with approximately the bottom 50 percent in the wealth distribution experiencing a welfare loss (Appendix B.2: Table B.2, Panel A). When the tax cut is financed through an increase in the residence-based tax ($\chi = 1$) instead of the increase in the government debt ($\chi = 0$), the increase in the income tax is immediate, and its cost dominates the benefit from the wage increase, again making it more regressive than in the baseline (Appendix B.1).

[14] Again, when the adjustment in the residence-based tax is made through $\tau_3^m$ instead of $\tau_1^m$, U.S. wealth-rich households face a much smaller increase in their tax burden, and hence their welfare gains become larger, though still smaller than those enjoyed by the wealth-rich households in the SOE (Appendix B.2).

## 4.2 Anticipated Reversal

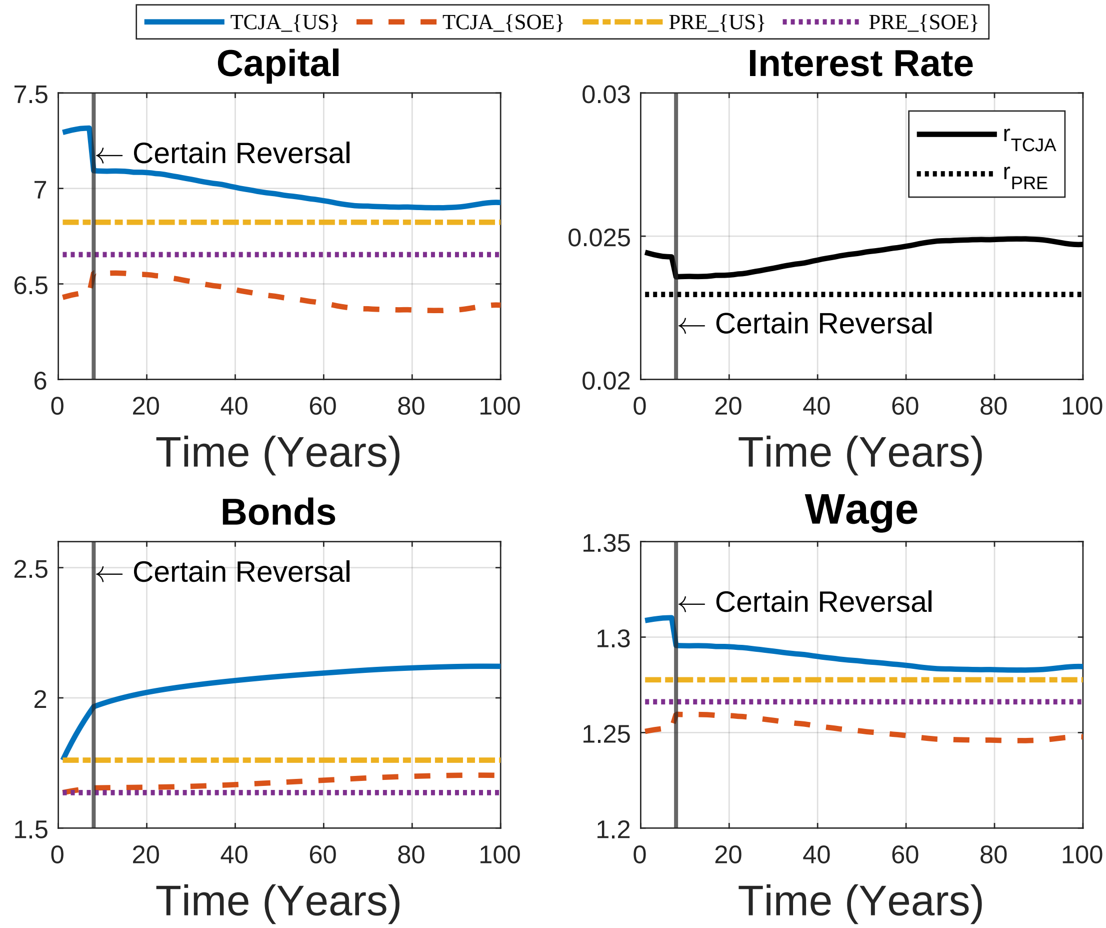
The previous analysis assumed the corporate tax cut in the U.S. to be permanent. In this subsection, we instead perform an experiment in which the corporate tax rate is partially reversed after maintaining the TCJA rate for 7 years. In particular, we assume that the corporate tax rate in the U.S. permanently reverts to 28%. This analysis is motivated by discussions in the current U.S. administration about a potential increase in the corporate tax rate.[15] We assume that the reversal is certain and anticipated. The results are similar when the reversal is uncertain (see Appendix B.3).

### 4.2.1 Aggregate Dynamics

The paths of the aggregate variables are shown in Figure 3. The reversal implies that the capital stock in the U.S. falls sharply at the moment of the reversal (indicated by the dark vertical line); after that, it stabilizes at the level that is close to its pre-TCJA level. The U.S. capital stock in the new steady state is similar to that from the pre-TCJA steady state for the following reasons. On the one hand, even after the reversal, the U.S. tax rate (28%) is lower than its pre-TCJA level (35%), so capital inflow from the SOE and ROW is not fully reversed, implying a higher capital stock than the pre-TCJA level. On the other hand, the U.S. government bond increases significantly even with the reversal, though not as much as under the permanent tax cut. This crowding-out effect reduces the capital stock in every economy. The size of these two effects is similar in this case for the U.S., resulting in similar steady-state levels of capital before and after the TCJA. The capital stock dynamics in the SOE are the opposite at the reversal, reflecting a partial reversal of the capital outflow from the SOE. After that, it decreases as in the U.S. due to the crowding out effect. The new steady-state level in the SOE is higher than under a permanent tax cut due to a smaller capital outflow accompanied by a smaller crowding-out effect. As a result, after the reversal, the gap between the capital levels in the U.S. and SOE is much smaller compared to the case with a permanent tax cut.

[15] This possibility has been discussed by Janet Yellen, U.S. Secretary of the Treasury, and President Biden. For media coverage, see https://www.wsj.com/articles/treasurys-yellen-to-call-for-global-minimum-corporate-tax-rate-11617633701 and https://www.wsj.com/articles/whats-in-bidens-2-trillion-corporate-tax-plan-11617206009.

Figure 3: Dynamics of the aggregate variables under an anticipated reversal of the TCJA




Notes: The label $\text{TCJA}_m$ for $m = \{US, SOE\}$ refers the post-TCJA paths. $\text{PRE}_m$ denotes the level in the pre-TCJA state. The vertical line represents the time period (year 8) at which the reversal rate (28%) is in effect.

The price dynamics reflect the capital dynamics. In particular, for the wages, after the reversal, the gap between the U.S. and SOE wages is much smaller. Compared to the case with a permanent tax cut, the drop in the wage in the U.S. is larger than the increase in the wage in the SOE. As discussed in the next subsection, this plays an important role in shaping the distributional effects.

### 4.2.2 Distributional effects

Table 4 reports the distributional results from the anticipated reversal of the tax cut. The two key findings from the case with a permanent tax cut, namely, that the tax cut is regressive and that it is more regressive in the SOE, still hold under a partial reversal of the tax cut.

Table 4: Welfare gains for households in the U.S. and SOE under an anticipated reversal of the corporate tax cut (%)

**Panel A: U.S.**

| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 0.0847 | -0.0290 | 0.0321 | 0.0533 | 0.0802 | 0.0904 | 0.1107 | 0.1604 | 0.1862 |
| $s = 1$ | 0.0852 | -0.0282 | 0.0334 | 0.0534 | 0.0791 | 0.0904 | 0.1107 | 0.1592 | 0.1866 |
| $s = 2$ | 0.0847 | -0.0289 | 0.0319 | 0.0533 | 0.0802 | 0.0904 | 0.1107 | 0.1606 | 0.1862 |
| $s = 3$ | 0.0838 | -0.0296 | 0.0358 | 0.0530 | 0.0804 | 0.0904 | 0.1118 | 0.1579 | 0.1858 |

**Panel B: SOE**

| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | -0.5911 | -1.0059 | -0.9175 | -0.8463 | -0.8332 | -0.6883 | -0.1420 | 0.5652 | 1.1048 |
| $s = 1$ | -0.5821 | -1.0057 | -0.9137 | -0.8469 | -0.8336 | -0.6886 | -0.1361 | 0.5470 | 1.1272 |
| $s = 2$ | -0.5910 | -1.0058 | -0.9179 | -0.8462 | -0.8332 | -0.6883 | -0.1431 | 0.5685 | 1.1044 |
| $s = 3$ | -0.6023 | -1.0072 | -0.9129 | -0.8471 | -0.8338 | -0.6883 | -0.1249 | 0.5281 | 1.0949 |

Notes: The columns represent the wealth groups and the rows represent the productivity types. The column and rows labeled "All" indicate unconditional values. The figures in the table are in percentages and are averages from the particular wealth group.

There are also two noticeable differences compared to the permanent tax cut. First, the welfare gains of the wealth-rich households in the two countries are smaller with the reversal of the tax cut. This is a direct effect of a worsened investment opportunity due to the reversal of the TCJA.

The second difference is that the U.S. households at the bottom of the wealth distribution experience a welfare loss when the tax cut is temporary. The welfare gains are also trivial for all the households in the bottom half of the wealth distribution. As described in Section 4.2.1, the increase in the U.S. wage due to the tax cut is limited after the reversal and much smaller compared to the permanent tax cut scenario. The households also have less tax burden with the reversal due to a smaller increase in the government debt, but the increase in the government debt is persistent and remains at a higher level in the new steady state. Our quantitative results from a reversal of the tax cut show that the cost of a higher tax burden is almost at par with the benefit of a higher wage for these households. Compared to the permanent tax cut, this analysis shows that whether the U.S. corporate tax cut also benefits wealth-poor households in the U.S. or not depends on the persistence of the tax cut. When the tax cut is short-lived, the meaningful benefit is concentrated only among the wealth-rich households.

The welfare loss among the wealth-poor households in the SOE is slightly smaller than that under the permanent tax cut, reflecting limited changes in their wages compared to that scenario. Together with the reduced welfare gains among the wealth-rich, this makes the temporary tax cut less regressive than the permanent tax cut in the SOE.

Appendix B.3 shows that the results are overall similar when we assume that the reversal is uncertain. The welfare numbers are in between those under a permanent cut and under an anticipated reversal.

# 5 Reciprocal Fiscal Response of the SOE

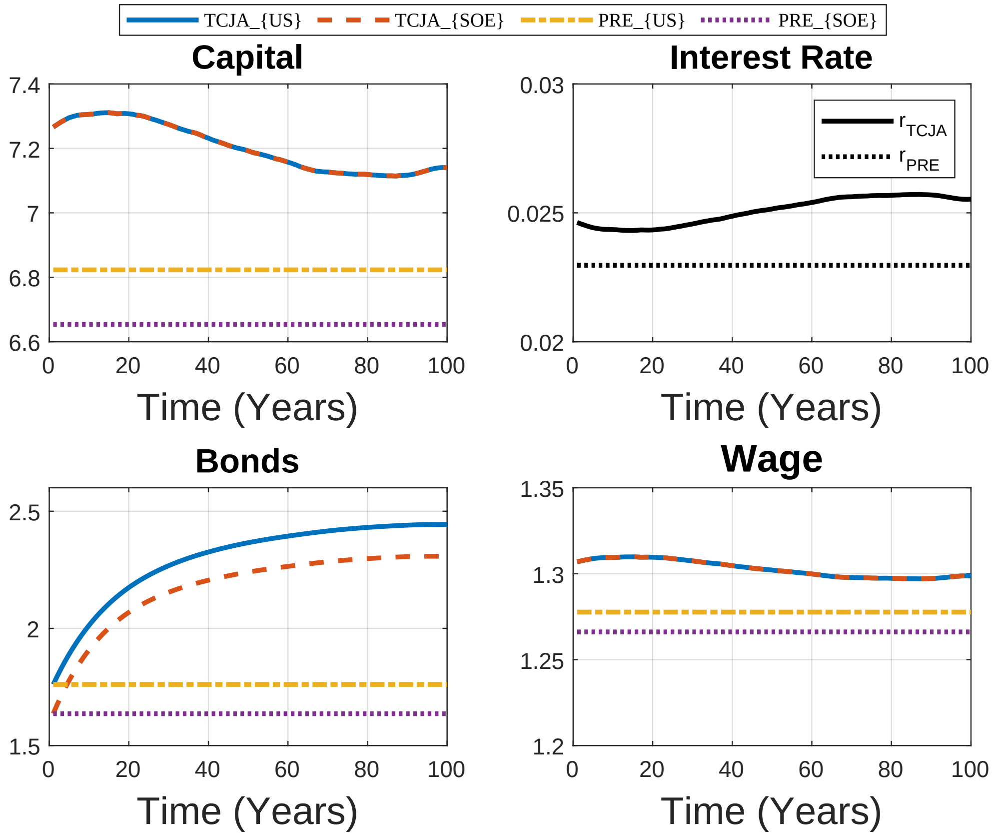
The preceding experiments assumed that the government of the SOE does not change its corporate tax rate in response to the TCJA. In this section, we examine the consequences of the SOE government reducing its corporate tax rate to the same level as the post-TCJA level in the U.S. (21%) at the moment of the implementation of the TCJA.[16] In the following exercises, we assume that a corporate tax cut in the SOE is initially financed by debt ($\chi^{SOE} = 0$). Appendix C.2 reports the results under a corporate tax cut financed by an increase in the residence-based tax ($\chi^{SOE} = 1$).

## 5.1 Aggregate Dynamics

The dynamics of the aggregate variables are shown in Figure 4. The post-TCJA capital paths are identical between the two countries due to the identical corporate tax rates. The levels are higher in both countries than the pre-TCJA level reflecting the corporate tax cuts in both countries. Reflecting the capital paths, the wages are identical between the two countries and higher than the pre-TCJA level. Not only the U.S. government but also the government of the SOE now has a large increase in their borrowings to finance the corporate tax cut. The interest rate jumps initially due to a lower tax rate on the returns to capital and then further increases over time with the crowding-out effect of the government debt.

[16] Appendix C.1 analyzes the case where the SOE reduces its corporate tax rate to 30%. The results are linear in the size of the tax cut by the SOE.

Figure 4: Dynamics of the aggregate variables under a reciprocal fiscal response by the SOE




Notes: The label $\text{TCJA}_m$ for $m = \{US, SOE\}$ refers the post-TCJA paths. $\text{PRE}_m$ denotes the level in the pre-TCJA state.

## 5.2 Distributional effects

The reciprocal fiscal response from the SOE has relatively small effects on U.S. households. The welfare gains of households in the U.S. under this scenario, shown in Table 5 (Panel A), are similar to the baseline case (Table 3, Panel A). With the SOE being considerably smaller than the U.S. economy, changes in its corporate tax rate have little impact on prices in the U.S.

Table 5: Welfare gains for households in the U.S. and SOE under a reciprocal fiscal response by the SOE to the TCJA (%)

**Panel A: U.S.**

| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 0.2854 | 0.1681 | 0.2311 | 0.2543 | 0.2808 | 0.2897 | 0.3138 | 0.3599 | 0.3823 |
| $s=1$ | 0.2859 | 0.1689 | 0.2326 | 0.2543 | 0.2798 | 0.2897 | 0.3140 | 0.3588 | 0.3821 |
| $s=2$ | 0.2854 | 0.1681 | 0.2309 | 0.2543 | 0.2808 | 0.2897 | 0.3137 | 0.3600 | 0.3824 |
| $s=3$ | 0.2845 | 0.1674 | 0.2348 | 0.2540 | 0.2810 | 0.2897 | 0.3150 | 0.3582 | 0.3817 |

**Panel B: SOE**

| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 0.6125 | 0.3575 | 0.4869 | 0.5145 | 0.6017 | 0.6555 | 0.6699 | 0.7405 | 0.8683 |
| $s=1$ | 0.6124 | 0.3593 | 0.4870 | 0.5146 | 0.5979 | 0.6555 | 0.6695 | 0.7370 | 0.8752 |
| $s=2$ | 0.6127 | 0.3576 | 0.4868 | 0.5145 | 0.6019 | 0.6555 | 0.6698 | 0.7411 | 0.8682 |
| $s=3$ | 0.6096 | 0.3557 | 0.4895 | 0.5137 | 0.6017 | 0.6554 | 0.6705 | 0.7343 | 0.8653 |

**Panel C: SOE, welfare gains from the reciprocation**

**(welfare gains under the reciprocation minus gains under no fiscal response)**

| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 1.1980 | 1.5636 | 1.5550 | 1.4672 | 1.5360 | 1.3822 | 0.6057 | -0.3480 | -1.0028 |
| $s=1$ | 1.1846 | 1.5652 | 1.5490 | 1.4682 | 1.5327 | 1.3826 | 0.5967 | -0.3251 | -1.0287 |
| $s=2$ | 1.1980 | 1.5636 | 1.5555 | 1.4672 | 1.5361 | 1.3822 | 0.6073 | -0.3522 | -1.0023 |
| $s=3$ | 1.2112 | 1.5634 | 1.5500 | 1.4676 | 1.5369 | 1.3821 | 0.5816 | -0.3006 | -0.9914 |

Notes: The columns represent the wealth groups and the rows represent the productivity types. The column and rows labeled "All" indicate unconditional values. The figures in the table are in percentages and are averages from the particular wealth group. Panel C reports the difference between Panel B of this table and Panel B of Table 3.

In contrast, the fiscal response by the SOE has significant distributional impacts on the households in the SOE. With the reciprocation, all the households in the SOE experience a welfare gain, though the final result is still regressive (Panel B). To isolate the effects of the reciprocation (from those of the TCJA), in Panel C, we compare the welfare gains with and without the reciprocation.

The result shows that, strikingly, the reciprocation is very progressive. Compared to the baseline experiment, the tax cut in the SOE results in large welfare gains among wealth-poor households and large welfare losses among wealth-rich households in the SOE. The economic mechanism for the gains among the low-wealth households is straightforward: The corporate tax cut in the SOE, which is larger than the tax cut under the TCJA, results in a large capital flow into the SOE and hence an increase in wages, as shown in Figure 4. The mechanisms behind the welfare loss among the wealth-rich households are as follows. On the one hand, with free capital flow across countries, a favorable investment opportunity created by the tax cut in the SOE benefits all the capital owners in the world. As capital owners in the world share the benefits, the share taken by the wealth-rich households of the SOE is small. On the other hand, the cost of a corporate tax reduction in the SOE—a larger government debt and hence an increase in the residence-based tax—falls mostly on the wealth-rich households in the SOE. The welfare loss of the wealth-rich households in the SOE reflects this asymmetry—the gains are shared with the other wealth-rich households in the world, but the costs are not. Obviously, the same mechanism exists for the tax cut in the U.S. But in that case, there was a much smaller asymmetry between who enjoys the benefits and who pays the costs, as the U.S. economy is ten times larger than the SOE. Hence, our result reveals that there is a threshold country size below which a corporate tax cut becomes progressive.

# 6 Conclusion

This paper quantitatively evaluates the aggregate and distributional effects of the TCJA on the U.S. and other economies using an open-economy heterogeneous household model. Our framework consists of a rich set of tax and financing instruments that are relevant to studying these effects thoroughly.

We apply our framework to investigate outcomes under various possibilities, including the tax cut in the U.S. being permanent versus temporary and potential reciprocal fiscal responses of other countries to the TCJA. Our main findings are threefold. First, the effect of the TCJA is regressive in all the economies and more so in the SOE than in the U.S. Second, the welfare implications at the bottom of the wealth distribution in the U.S. depend on the persistence of the corporate tax rate. Our quantitative results show that households at the bottom of the wealth distribution experience a welfare loss if the TCJA rate is not maintained for a long time. Our final key result is that a reciprocation by the SOE is progressive in its own economy relative to the no-reaction case. In particular, the wealth-rich households in the SOE experience a large welfare loss from the tax cut in the SOE relative to the no-reaction case. This is because the wealth-rich households in the SOE are bearing most of the cost (in terms of higher tax obligations) of providing a better investment opportunity to everyone in the world. It is worth mentioning that our analysis assumes free capital flow and no change in terms of trade to keep our model tractable. Relaxing these assumptions, if anything, may dampen the welfare effects of the policies considered, though as we discussed above, the evidence suggests limited roles of these factors, at least between the U.S. and Canada. Those features, however, will not affect our three key findings discussed above as they will not alter the key mechanisms behind those findings.

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# A Computational Algorithms

## A.1 Pre-TCJA Steady State

In presenting the algorithm for the pre-TCJA steady state, we drop the time subscript.

1. Guess the equalized rate of return after corporate income tax ($r^0$) and the tax parameters $\tau_3^{m,0}$.[17]

2. Using the no-arbitrage condition (3), obtain the rates of return on capital ($R^m$). Under fixed labor supply, the wages ($w^m$) are calculated from the rates of return on capital.

3. Given the prices from Steps 1 and 2, solve the household's maximization problem to obtain policy functions using the value function iteration.

4. Using the obtained policy functions, run a simulation of one household in each country for 330,000 periods, starting with an arbitrary initial condition. Discard observations from the initial 30,000 periods to reduce the impact of the arbitrarily chosen initial state. Treat the remaining observations as the time-invariant distribution of households in each country.

5. Under the time-invariant distribution obtained from Step 4, solve for the value of $\tau_3^m$ ($\tau_3^{m,1}$) that satisfy equation (9). If $\tau_3^{m,1}$ is close enough to $\tau_3^{m,0}$ for all the countries, proceed to the next step. If not, update $\tau_3^{m,0}$ as the weighted average of $\tau_3^{m,1}$ and $\tau_3^{m,0}$ and go back to Step 3.

6. Check whether the asset market clears under the obtained time-invariant distribution of households. If the market clears, the pre-TCJA steady state is obtained. If there is excess supply of assets, increase $r^0$ and go back to Step 2. If there is excess demand for assets, reduce $r^0$ and go back to Step 2. We use a bisection search in updating $r^0$.

## A.2 Post-TCJA Steady State and Transition Path

1. Guess the number of periods required to reach the new steady state after the implementation of TCJA, $T^0$.

[17] The tax parameters $\tau_0^m$, $\tau_1^m$, and $\tau_2^m$ are scale-independent so we can directly apply the estimates from the data to the model, while $\tau_3^m$ is scale-dependent. Therefore, we search for the value of $\tau_3^m$ that satisfies equation (9) under the pre-TCJA steady state. In implementing policy experiments, we fix $\tau_3^m$ at the value obtained from the pre-TCJA steady state calculation and treat $\tau_1^m$ as the endogenous tax parameter.

2. Guess the sequence of $\{r_t^0\}_{t=1}^{T^0}$ and $\{\tau_{1,t}^{m,0}\}_{t=1}^{T^0}$. Note that these include the values at the new steady state (at $T^0$).

3. $\{r_t^0\}_{t=1}^{T^0}$ with the no-arbitrage condition (3) pins down the sequence $\{R_t^{m,0}\}_{t=1}^{T^0}$. The latter, in turn, pins down the sequence of the aggregates $\{K_t^{m,0}, Y_t^{m,0}, T_{s,t}^{m,0}\}_{t=1}^{T^0}$ and wages $\{w_t^{m,0}\}_{t=1}^{T^0}$. The sequence of government bonds, $\{B_t^{m,0}\}_{t=1}^{T^0}$, is determined as follows. The amount of bonds at the new steady state, $B_{T^0}^{m,0}$, is obtained by the fiscal budget constraint (8) combined with equations (9) and (10), all evaluated with the aggregates at the new steady state. Then the sequence $\{B_t^{m,0}\}_{t=1}^{T^0-1}$ is obtained by backward induction, recursively applying the government budget constraint (8), again combined with equations (9) and (10), given the sequence of the aggregates.

4. Solve the household maximization problem at the new steady state, under the prices and the endogenous tax parameter at $T^0$, using the value function iteration. Then obtain the policy functions for the transition path using backward induction under the prices and the endogenous tax parameter during the transition path.

5. Using the policy functions obtained from Step 4, run simulations for the transition path. The simulation starts from the invariant distribution obtained from the pre-TCJA steady state. Therefore, the simulation has 300,000 households per period and runs for $T^0$ periods. The simulation results provide the sequence of the distribution of households during the transition path as well as at the new steady state.

6. Under the sequence of the distribution of households obtained from Step 5, solve for the sequence of $\{\tau_{1,t}^{m,1}\}_{t=1}^{T^0}$ that satisfy equation (9) every period. If $\{\tau_{1,t}^{m,1}\}_{t=1}^{T^0}$ is close enough to $\{\tau_{1,t}^{m,0}\}_{t=1}^{T^0}$, proceed to the next step. If not, update $\{\tau_{1,t}^{m,0}\}_{t=1}^{T^0}$ as the weighted average of $\{\tau_{1,t}^{m,1}\}_{t=1}^{T^0}$ and $\{\tau_{1,t}^{m,0}\}_{t=1}^{T^0}$ and go back to Step 4.

7. Check whether the asset market clears every period under the sequence of the distribution of households. If the market clears for every period, proceed to the next step. If the market does not clear for any period, update the sequence $\{r_t^0\}_{t=1}^{T^0}$ and go back to Step 3. In searching for the new guess $\{r_t^0\}_{t=1}^{T^0}$, look for the level of $r_t^1$, where the aggregate capital corresponding to that rate of return clears the market under the given asset demand as well as bond supplies. The new guess is obtained as the weighted average of $\{r_t^1\}_{t=1}^{T^0}$ and $\{r_t^0\}_{t=1}^{T^0}$.

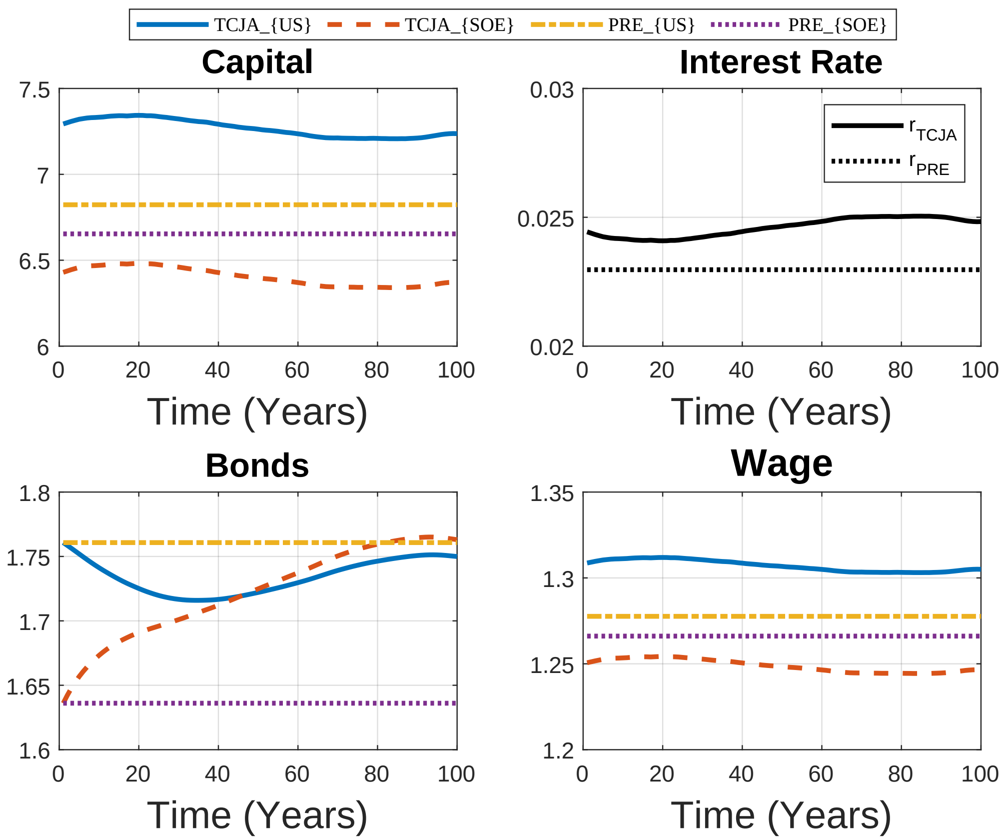
8. Check whether the changes in the aggregates between $T^0 - 1$ and $T^0$ is small enough. If yes, the equilibrium transition path and the post-TCJA steady state are obtained. If not, increase $T^0$ and go back to Step 2.

# B Alternative Specifications

## B.1 Baseline Specification under Residence-based Tax financing

In this subsection, we perform the baseline experiment (Section 4.1) with the modification that the TCJA is financed with residence-based tax ($\chi = 1$). As in the main text, we first show the aggregate dynamics (Figure B.1) and then the distributional consequences (Table B.1).

Figure B.1: Dynamics of the aggregate variables under tax financing ($\chi = 1$) of the TCJA




Notes: The label $\text{TCJA}_m$ for $m = \{US, SOE\}$ refers the post-TCJA paths. $\text{PRE}_m$ denotes the level in the pre-TCJA state.

Table B.1: Welfare Comparison for the U.S. and SOE under tax financing of the TCJA

**Panel A: U.S.**

| | Wealth group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | -0.1026 | -0.3951 | -0.3439 | -0.1191 | -0.1055 | -0.0967 | -0.0936 | 0.1450 | 0.2388 |
| $s=1$ | -0.0996 | -0.3877 | -0.3340 | -0.1203 | -0.1059 | -0.0967 | -0.0938 | 0.1401 | 0.2404 |
| $s=2$ | -0.1027 | -0.3951 | -0.3445 | -0.1189 | -0.1055 | -0.0967 | -0.0936 | 0.1476 | 0.2387 |
| $s=3$ | -0.1041 | -0.3984 | -0.3421 | -0.1207 | -0.1056 | -0.0968 | -0.0935 | 0.1027 | 0.2387 |

**Panel B: SOE**

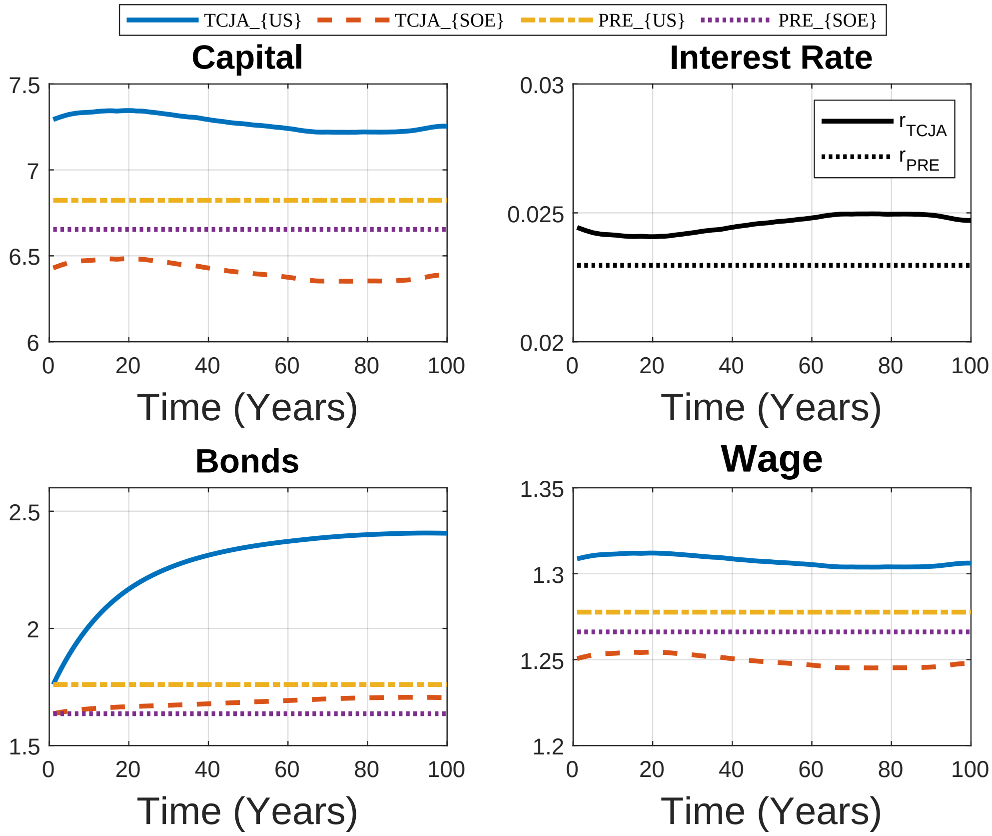
| | Wealth group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | -0.5793 | -1.1292 | -1.0028 | -0.8979 | -0.8813 | -0.6974 | -0.0132 | 0.8513 | 1.4999 |
| $s=1$ | -0.5679 | -1.1290 | -0.9972 | -0.8987 | -0.8818 | -0.6978 | -0.0055 | 0.8293 | 1.5270 |
| $s=2$ | -0.5791 | -1.1291 | -1.0034 | -0.8978 | -0.8813 | -0.6974 | -0.0145 | 0.8552 | 1.4994 |
| $s=3$ | -0.5932 | -1.1307 | -0.9959 | -0.8990 | -0.8821 | -0.6974 | 0.0081 | 0.8065 | 1.4882 |

Notes: The columns represent the wealth groups and the rows represent the productivity types. The column and rows labeled "All" indicate unconditional values. The figures in the table are in percentages and are averages from the particular wealth group.

## B.2 Baseline Specification under Adjustment of the Tax Progressivity

Figure B.2 and Table B.2, respectively, show the aggregate dynamics and welfare consequences under debt-financing ($\chi = 0$) when the government decides to vary the progressivity ($\tau_3$) in the tax function in response to the corporate tax reform.

Figure B.2: Dynamics of the aggregate variables under an adjustment in the progressivity of the tax system to the TCJA




Notes: The label $\text{TCJA}_m$ for $m = \{US, SOE\}$ refers the post-TCJA paths. $\text{PRE}_m$ denotes the level in the pre-TCJA state.

Table B.2: Welfare Comparison for the U.S. and SOE under adjusting $\tau_3$ to the TCJA

**Panel A: U.S.**

| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 0.0108 | -0.1745 | -0.0757 | -0.0436 | -0.0043 | 0.0093 | 0.0494 | 0.2160 | 0.4551 |
| $s=1$ | 0.0121 | -0.1734 | -0.0739 | -0.0435 | -0.0058 | 0.0093 | 0.0489 | 0.2091 | 0.4630 |
| $s=2$ | 0.0109 | -0.1745 | -0.0760 | -0.0435 | -0.0043 | 0.0093 | 0.0494 | 0.2172 | 0.4552 |
| $s=3$ | 0.0088 | -0.1756 | -0.0700 | -0.0440 | -0.0040 | 0.0093 | 0.0514 | 0.2027 | 0.4464 |

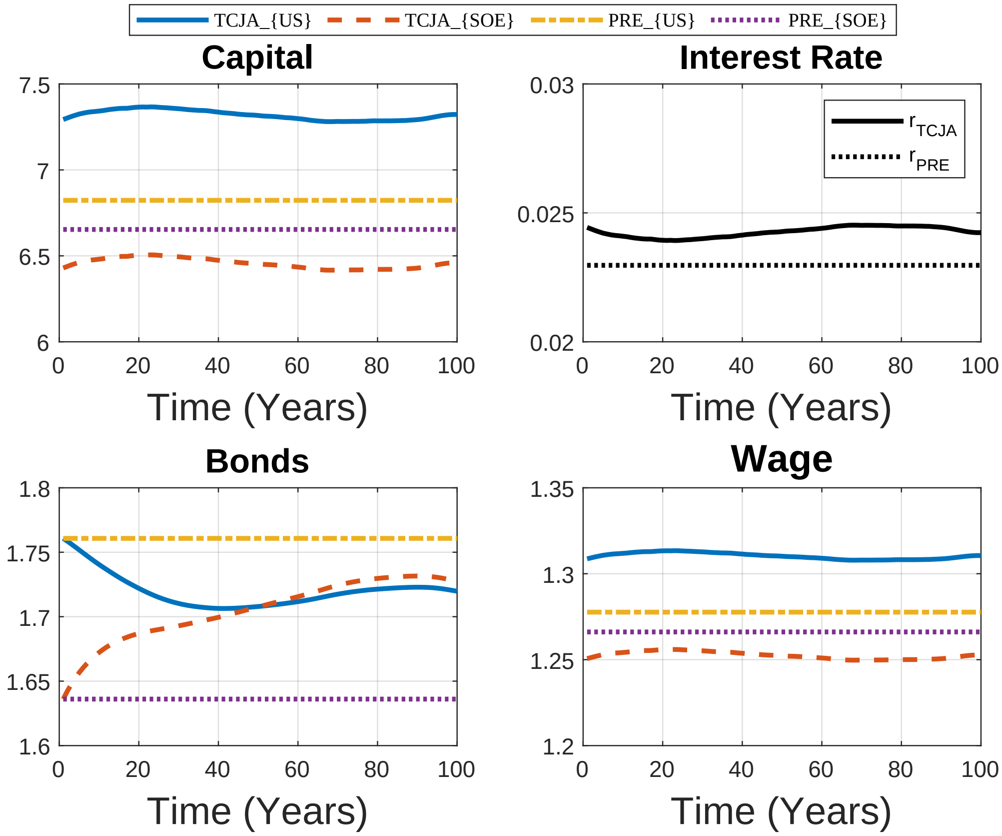
**Panel B: SOE**

| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | -0.6388 | -1.2072 | -1.0832 | -0.9804 | -0.9629 | -0.7667 | -0.0344 | 0.8972 | 1.6033 |
| $s=1$ | -0.6267 | -1.2070 | -1.0776 | -0.9813 | -0.9634 | -0.7671 | -0.0262 | 0.8734 | 1.6329 |
| $s=2$ | -0.6387 | -1.2071 | -1.0838 | -0.9803 | -0.9628 | -0.7666 | -0.0358 | 0.9015 | 1.6027 |
| $s=3$ | -0.6537 | -1.2087 | -1.0761 | -0.9815 | -0.9637 | -0.7667 | -0.0117 | 0.8486 | 1.5905 |

Notes: The columns represent the wealth groups and the rows represent the productivity types. The column and rows labeled "All" indicate unconditional values. The figures in the table are in percentages and are averages from the particular wealth group.

Similarly Figure B.3 and Table B.3 display the results under the previous specification except with residence-based tax financing ($\chi = 1$).

Figure B.3: Dynamics of the aggregate variables under $\tau_3$ adjustment and tax financing of the TCJA




Notes: The label $\text{TCJA}_m$ for $m = \{US, SOE\}$ refers the post-TCJA paths. $\text{PRE}_m$ denotes the level in the pre-TCJA state.

Table B.3: Welfare Comparison for the U.S. and SOE under adjusting $\tau_3$ and tax financing ($\chi = 1$) to the TCJA

**Panel A: U.S.**

| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1 - 5\%$ | $5 - 25\%$ | $25 - 50\%$ | $50 - 75\%$ | $75 - 95\%$ | $95 - 99\%$ | $> 99\%$ |
| All | -0.2030 | -0.3032 | -0.2832 | -0.2422 | -0.2410 | -0.2278 | -0.1361 | 0.0421 | 0.2517 |
| $s = 1$ | -0.2010 | -0.3032 | -0.2800 | -0.2422 | -0.2410 | -0.2278 | -0.1355 | 0.0361 | 0.2588 |
| $s = 2$ | -0.2030 | -0.3032 | -0.2834 | -0.2422 | -0.2410 | -0.2278 | -0.1363 | 0.0431 | 0.2517 |
| $s = 3$ | -0.2049 | -0.3032 | -0.2834 | -0.2423 | -0.2411 | -0.2277 | -0.1329 | 0.0306 | 0.2438 |

**Panel B: SOE**

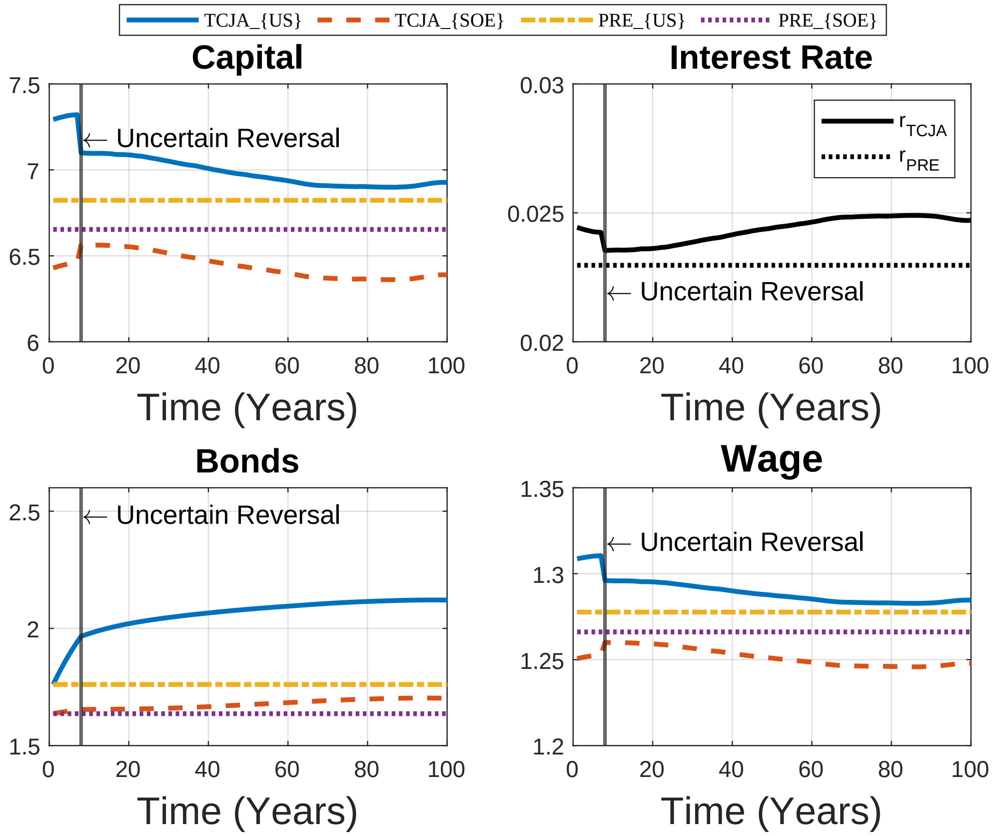
| | | Wealth group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1 - 5\%$ | $5 - 25\%$ | $25 - 50\%$ | $50 - 75\%$ | $75 - 95\%$ | $95 - 99\%$ | $> 99\%$ |
| All | -0.6426 | -1.1223 | -1.0206 | -0.9367 | -0.9214 | -0.7508 | -0.1221 | 0.6670 | 1.2612 |
| $s = 1$ | -0.6323 | -1.1221 | -1.0162 | -0.9374 | -0.9219 | -0.7512 | -0.1151 | 0.6469 | 1.2859 |
| $s = 2$ | -0.6424 | -1.1222 | -1.0211 | -0.9366 | -0.9214 | -0.7507 | -0.1233 | 0.6706 | 1.2607 |
| $s = 3$ | -0.6554 | -1.1237 | -1.0149 | -0.9376 | -0.9222 | -0.7508 | -0.1027 | 0.6261 | 1.2504 |

Notes: The columns represent the wealth groups and the rows represent the productivity types. The column and rows labeled "All" indicate unconditional values. The figures in the table are in percentages and are averages from the particular wealth group.

## B.3 Uncertain Reversal

In this section we perform a variation of the experiment in Section 4.2. In particular, we assume that the reversal of the TCJA policy is uncertain with a 50% probability of increasing to a higher corporate tax rate (28%) and a 50% chance of maintaining the TCJA corporate tax rate. Figure B.4 and Table B.4 show the results from this analysis.

Figure B.4: Dynamics of aggregate variables under an uncertain reversal of the TCJA




Notes: The label $\text{TCJA}_m$ for $m = \{US, SOE\}$ shows the path of the post-TCJA effects. Similarly, $\text{PRE}_m$ denotes the level in the pre-TCJA state.The vertical line represents the time period (year 8) at which the (uncertain) reversal rate (28%) is in effect.

Table B.4: Welfare gains for households in the U.S. and SOE under an unanticipated reversal of the corporate tax cut (%)

**Panel A: U.S.**

| | Wealth group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 0.2040 | 0.0869 | 0.1488 | 0.1624 | 0.1977 | 0.2234 | 0.2303 | 0.2587 | 0.2995 |
| $s=1$ | 0.2040 | 0.0879 | 0.1494 | 0.1624 | 0.1962 | 0.2234 | 0.2302 | 0.2573 | 0.3016 |
| $s=2$ | 0.2040 | 0.0869 | 0.1487 | 0.1624 | 0.1977 | 0.2234 | 0.2303 | 0.2589 | 0.2994 |
| $s=3$ | 0.2027 | 0.0861 | 0.1508 | 0.1620 | 0.1975 | 0.2234 | 0.2306 | 0.2562 | 0.2992 |

**Panel B: SOE**

| | Wealth group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | -0.5885 | -1.1063 | -0.9930 | -0.8997 | -0.8839 | -0.7077 | -0.0390 | 0.8263 | 1.4867 |
| $s=1$ | -0.5773 | -1.1061 | -0.9879 | -0.9005 | -0.8844 | -0.7080 | -0.0316 | 0.8042 | 1.5143 |
| $s=2$ | -0.5884 | -1.1062 | -0.9935 | -0.8996 | -0.8839 | -0.7076 | -0.0403 | 0.8304 | 1.4862 |
| $s=3$ | -0.6021 | -1.1078 | -0.9865 | -0.9007 | -0.8847 | -0.7076 | -0.0181 | 0.7809 | 1.4747 |

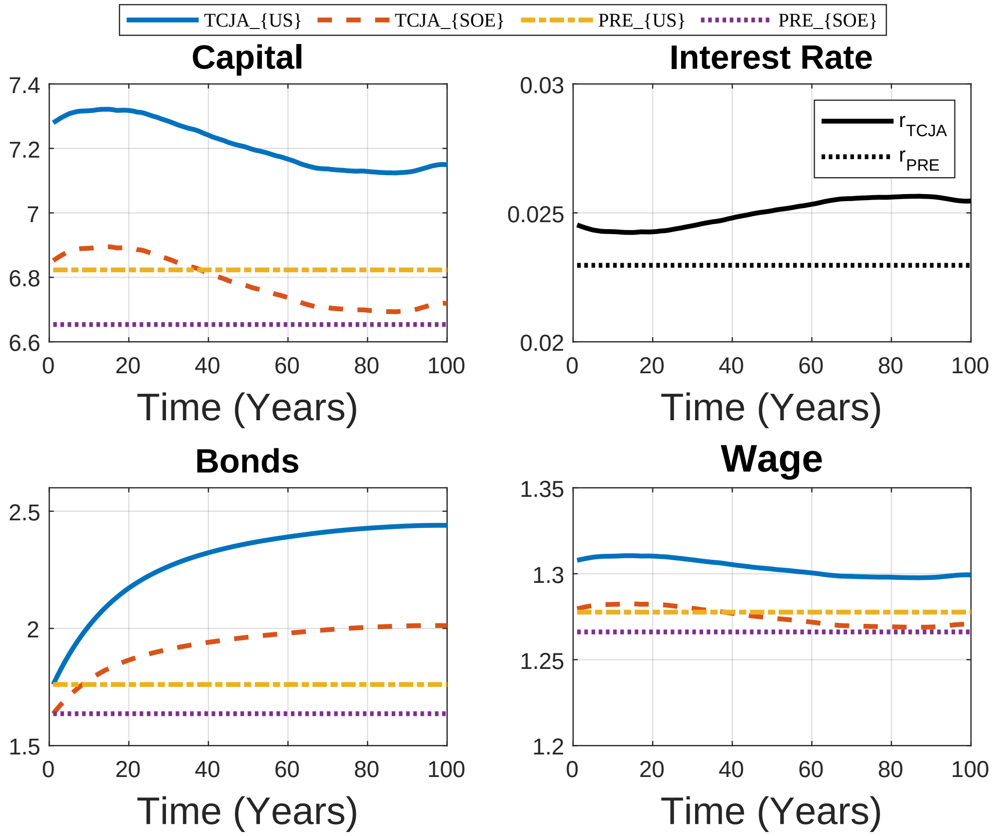
Notes: The columns represent the wealth groups and the rows represent the productivity types. The column and rows labeled "All" indicate unconditional values. The figures in the table are in percentages and are averages from the particular wealth group.

# C Additional SOE Fiscal Response Experiments

## C.1 Alternative Fiscal Response: $\tau_c^{US} = 21\%$, $\tau_c^{SOE} = 30\%$

Figure C.1 and Table C.1 shows the outcomes when the SOE economy reciprocates to the TCJA by setting it's corporate tax rate to 30% instead of 21% as examined in Section 5.

Figure C.1: Dynamics of the aggregate variables under a reciprocal fiscal response ($\tau_c^{SOE} = 30\%$) by the SOE




*Note*: The label $\text{TCJA}_m$ for $m = \{U.S., SOE\}$ shows the path of the post-TCJA effects. Similarly, $\text{PRE}_m$ denotes the level in the pre-TCJA state.

Table C.1: Welfare gains for households in the U.S. and SOE under a reciprocal fiscal response ($\tau_c^{SOE} = 30\%$) by the SOE to the TCJA (%)

**Panel A: U.S.**

| | Wealth group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 0.3042 | 0.1833 | 0.2490 | 0.2638 | 0.2981 | 0.3229 | 0.3305 | 0.3585 | 0.3997 |
| $s=1$ | 0.3044 | 0.1862 | 0.2495 | 0.2639 | 0.2967 | 0.3229 | 0.3305 | 0.3573 | 0.4017 |
| $s=2$ | 0.3043 | 0.1833 | 0.2489 | 0.2638 | 0.2982 | 0.3229 | 0.3305 | 0.3587 | 0.3996 |
| $s=3$ | 0.3030 | 0.1814 | 0.2516 | 0.2635 | 0.2980 | 0.3228 | 0.3309 | 0.3561 | 0.3994 |

**Panel B: SOE**

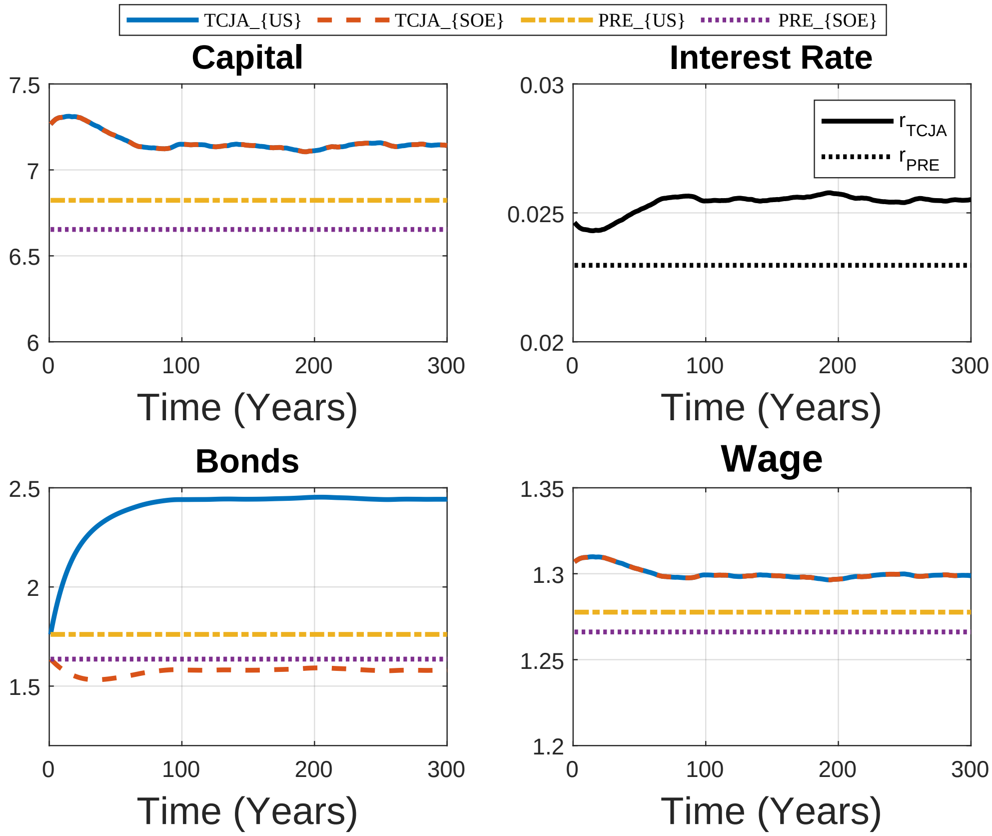
| | Wealth group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 0.1146 | -0.1815 | -0.1207 | -0.0341 | -0.0323 | 0.0237 | 0.3882 | 0.9591 | 1.4234 |
| $s=1$ | 0.1220 | -0.1815 | -0.1109 | -0.0341 | -0.0324 | 0.0236 | 0.3916 | 0.9436 | 1.4431 |
| $s=2$ | 0.1146 | -0.1815 | -0.1211 | -0.0341 | -0.0323 | 0.0236 | 0.3875 | 0.9619 | 1.4230 |
| $s=3$ | 0.1078 | -0.1815 | -0.1234 | -0.0341 | -0.0324 | 0.0240 | 0.4010 | 0.9282 | 1.4144 |

Notes: The columns represent the wealth groups and the rows represent the productivity types. The column and rows labeled "All" indicate unconditional values. The figures in the table are in percentages and are averages from the particular wealth group.

## C.2 SOE Fiscal Reciprocation under Residence-based Tax Financing

Figure C.2 and Table C.2 show the result under the assumption of residence-based financing ($\chi^{SOE} = 1$) when the SOE decides to reciprocate to the TCJA by reducing its corporate tax rate to 21%.

Figure C.2: Dynamics of the aggregate variables under the reciprocation with a tax finance by the SOE to the TCJA




Notes: The label $\text{TCJA}_m$ for $m = \{US, SOE\}$ refers the post-TCJA paths. $\text{PRE}_m$ denotes the level in the pre-TCJA state.

Table C.2: Welfare gains for households in the U.S. and SOE under a tax finance of the reciprocal fiscal response by the SOE to the TCJA (%)

**Panel A: U.S.**

| | Wealth group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 0.2905 | 0.1760 | 0.2384 | 0.2591 | 0.2875 | 0.2984 | 0.3157 | 0.3507 | 0.3744 |
| $s=1$ | 0.2909 | 0.1770 | 0.2396 | 0.2591 | 0.2864 | 0.2984 | 0.3159 | 0.3497 | 0.3757 |
| $s=2$ | 0.2905 | 0.1760 | 0.2382 | 0.2591 | 0.2875 | 0.2984 | 0.3156 | 0.3509 | 0.3744 |
| $s=3$ | 0.2896 | 0.1755 | 0.2422 | 0.2588 | 0.2877 | 0.2984 | 0.3165 | 0.3484 | 0.3738 |

**Panel B: SOE**

| | Wealth group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | $< 1\%$ | $1-5\%$ | $5-25\%$ | $25-50\%$ | $50-75\%$ | $75-95\%$ | $95-99\%$ | $> 99\%$ |
| All | 0.2666 | 0.1101 | 0.2075 | 0.2220 | 0.2270 | 0.2328 | 0.3419 | 0.5465 | 0.7644 |
| $s=1$ | 0.2694 | 0.1123 | 0.2090 | 0.2220 | 0.2269 | 0.2329 | 0.3440 | 0.5396 | 0.7740 |
| $s=2$ | 0.2666 | 0.1102 | 0.2072 | 0.2220 | 0.2270 | 0.2328 | 0.3416 | 0.5477 | 0.7643 |
| $s=3$ | 0.2642 | 0.1085 | 0.2119 | 0.2219 | 0.2270 | 0.2330 | 0.3464 | 0.5328 | 0.7595 |

Notes: The columns represent the wealth groups and the rows represent the productivity types. The column and rows labeled "All" indicate unconditional values. The figures in the table are in percentages and are averages from the particular wealth group.