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Taxing Capital, Rewarding Labor? The International and Generational Dimensions*

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Abstract

This paper studies revenue-neutral tax reforms that reduce labor income taxation and finance the resulting revenue loss through alternative forms of capital-income taxation. We develop a two-region overlapping-generations model with life-cycle saving, labor-market frictions, and integrated capital markets, calibrated to Germany and the rest of the European Union. The analysis compares three instruments: a tax on household savings income, a tax on productive capital, and a tax on accidental bequests. In the benchmark reform, savings-income-tax financing raises employment and output in the short run, but lowers aggregate saving and worsens the net foreign asset position over time. Taxing productive capital performs worst in long-run efficiency terms because it raises firms' user cost of capital and depresses domestic capital accumulation. A tax on accidental bequests avoids this investment distortion and generates stronger aggregate activity, but yields a more uneven intergenerational welfare profile. The results show that labor-to-capital tax shifts cannot be evaluated at the level of broad tax categories alone: the relevant tax base matters.

Keywords: Labor income taxation, capital income taxation, tax reform, overlapping generations, open economy

JEL classification: E21, E24, F41, H31, D91

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1 Introduction

A central question in fiscal policy is whether part of the tax burden can be shifted away from labor income and toward capital income without imposing larger efficiency costs elsewhere in the economy. This question is especially relevant in Germany, where the high labor tax wedge and the treatment of capital income remain recurring themes in the policy debate. Yet capital income is not a single tax base: governments may tax returns to household saving, capital used in production, or intergenerational transfers, and these instruments need not have similar macroeconomic and distributional effects.

Classic results in optimal taxation theory imply that capital income should not be taxed in the long run (Chamley, 1986). Those results, however, rely on strong assumptions, including infinitely lived households, complete markets, and the absence of life-cycle saving. In an environment with overlapping generations, incomplete annuity markets, and internationally mobile capital, capital taxation affects not only aggregate efficiency but also the intertemporal allocation of resources across cohorts and countries. These considerations make the relevant policy question less whether capital should be taxed at all, and more which form of capital taxation is most suitable when governments seek to reduce reliance on labor taxation.

This paper studies revenue-neutral tax reforms that reduce labor income taxation and offset the associated revenue loss through higher taxation of capital income. To do so, we develop a two-region overlapping-generations model with life-cycle saving, labor market frictions, and integrated capital markets, calibrated to Germany and the rest of the European Union. We compare three instruments: a tax on household saving income, a tax on capital used in production, and a tax on accidental bequests. Our central contribution is to show that broad statements about shifting taxation from labor to capital are incomplete unless the composition of capital taxation is specified explicitly.

The distinction across tax bases matters because the three instruments operate through different margins. A tax on household saving income primarily distorts households' intertemporal saving decisions. A tax on productive capital raises firms' user cost of capital and directly weakens capital demand. A tax on accidental bequests leaves firms' investment incentives largely unaffected, but it changes the intergenerational incidence of the reform more sharply. In an open economy with life-cycle saving, these differences also shape external borrowing, net foreign assets, and the world interest rate.

Our benchmark experiment considers a permanent, revenue-neutral reform that lowers the labor income tax rate by 5 percentage points and offsets the resulting revenue loss through a higher tax on household saving income. This experiment provides a transparent benchmark for studying how a shift in the tax mix affects macroeconomic adjustment over time. In the short run, the lower labor tax wedge improves firms' labor demand and raises employment. In our benchmark, employment increases by about 2.5 percentage points and output rises temporarily by roughly 2.4 percent.

The overlapping-generations structure of the model is essential for the longer-run effects of the reform. Because households save over the life cycle, higher taxation of saving lowers the after-tax return to asset accumulation and gradually reduces aggregate domestic saving. In the long run, this response widens the saving–investment gap and worsens the net foreign asset position. In the benchmark, aggregate saving declines by more than 1.5 percent and net foreign assets fall by roughly 10 percentage points of GDP. The

open-economy environment therefore matters not only for the domestic transmission, but also for the international implications of the reform through capital flows and the world interest rate.

We then compare the benchmark with two alternative revenue-neutral reforms that leave the saving tax unchanged and instead finance the labor-tax cut through either a tax on capital used in production or a tax on accidental bequests. The choice of instrument proves to be quantitatively important. Taxing capital used in production raises the user cost of capital, depresses domestic capital accumulation, and reduces long-run output by about 3 percent, making it the least attractive instrument in efficiency terms. By contrast, taxing accidental bequests avoids a direct distortion to firms' investment decisions and therefore performs better on aggregate activity, but it generates a less favorable intergenerational allocation. Across instruments, welfare effects differ sharply by cohort. In our quantitative environment, financing the labor-tax cut through household saving taxation delivers the most favorable benchmark trade-off for future cohorts, whereas productive-capital taxation yields weaker long-run outcomes and bequest taxation involves a sharper efficiency–incidence trade-off.

The central message of the paper is that replacing labor income taxation with capital income taxation cannot be evaluated at the level of broad tax categories alone. What matters is which component of capital income is taxed. In our quantitative analysis, a shift from labor taxation toward household saving taxation dominates taxation of productive capital, while bequest taxation involves a distinct efficiency–incidence trade-off.

The paper focuses on intergenerational incidence rather than within-cohort heterogeneity in income and wealth. This emphasis is natural in an overlapping-generations environment, because exposure to labor taxation, savings-income taxation, and pension incidence varies systematically over the life cycle together with households' asset-accumulation patterns. Age is therefore an economically meaningful source of heterogeneity for the reforms studied here. At the same time, the analysis does not treat age as a sufficient statistic for the full distribution of income and wealth within cohorts. Rather, it isolates the intergenerational component of tax incidence that arises from life-cycle labor income, saving behavior, and pension entitlements.

Related Literature This paper contributes to three closely related strands of the literature. First, it relates to work on fiscal devaluation and tax shifts away from labor income. Microsimulation and DSGE studies for European economies generally find that lowering labor taxes can improve employment and external competitiveness, especially when reforms are implemented in open economies with labor market frictions (Stähler and Thomas, 2012; Boscá, Doménech, and Ferri, 2013; Langot, Patureau, and Sopraseuth, 2014; Annicchiarico, Dio, and Felici, 2015; Gadatsch, Stähler, and Weigert, 2016; Gomes, Jacquinot, and Pisani, 2016; Lipińska and von Thadden, 2019). This literature also shows that the effects of labor-tax reforms depend on the financing instrument and on the broader policy environment (Burgert and Roeger, 2014; Engler, Ganelli, Tervala, and Voigts, 2017; Jacquinot, Lozej, and Pisani, 2018; Kaufmann, 2019; Attinasi, Prammer, Stähler, Tasso, and van Parys, 2019; Hinterlang, Martin, Röhe, Stähler, and Strobel, 2022). Our paper differs from this work by shifting attention from broad tax substitutions toward the composition of capital taxation itself. We ask whether a reduction in labor income taxation should be financed through taxation of household saving in-

come, capital used in production, or accidental bequests, and we study this question in a quantitative life-cycle framework with international capital mobility.

Second, the paper contributes to the literature on capital taxation, life-cycle saving, and intergenerational incidence in overlapping-generations models. A large body of work shows that once households save over the life cycle and differ by age and asset holdings, the effects of taxation depend not only on aggregate efficiency, but also on how reforms redistribute resources across cohorts (Attanasio, Kitao, and Violante, 2007; Krueger and Ludwig, 2007; Kitao, 2018). Particularly closely related is Makarski, Tyrowicz, and Komada (2024), who study capital-income taxation in the context of social-security reform in an OLG economy. Our focus is different. We do not study pension-system restructuring, but rather revenue-neutral tax reforms that reduce labor income taxation and offset the revenue loss through alternative forms of capital-income taxation. This distinction matters because the relevant comparison in our setting is not whether capital should help finance a transition to a different pension regime, but which capital-income tax base is least distortive and most attractive once labor taxation is reduced.

Third, our analysis is related to open-economy OLG models that emphasize international capital flows, external adjustment, and labor-market transmission (Poterba, 2001; Attanasio, Kitao, and Violante, 2006; de la Croix, Pierrard, and Sneessens, 2013; Börsch-Supan, Härtl, and Ludwig, 2014; Marchiori, Pierrard, and Sneessens, 2017; Schön and Stähler, 2020; Devriendt and Heylen, 2020). In particular, Groneck and Kaufmann (2017) show that demographic change can affect relative sectoral prices and real exchange rates in an open economy. Their mechanism is complementary to ours. Whereas they focus on demographic structure and relative-price adjustment, we study how the composition of taxation across labor income and different capital-income tax bases shapes employment, saving, net foreign assets, and welfare across cohorts. By combining an open-economy OLG framework with labor-market search frictions, the paper highlights margins of adjustment that are largely absent from representative-agent model of fiscal-devaluation.

The remainder of the paper is organized as follows. Section 2 presents the model. Section 3 describes the calibration. Section 4 reports the benchmark reform results. Section 5 analyzes welfare effects across cohorts. Section 6 compares alternative capital-tax instruments. Section 7 concludes.

2 The Quantitative Model

This section presents a two-region overlapping-generations general-equilibrium model designed to evaluate revenue-neutral tax reforms that reduce labor income taxation and offset the resulting revenue loss through alternative forms of capital-income taxation. The framework combines life-cycle saving, labor-market frictions, and integrated international capital markets, so that tax reforms affect not only employment and output, but also saving behavior, external adjustment, and welfare across cohorts.

The model builds on Ruppert, Schön, and Stähler (2024) and is closely related to de la Croix et al. (2013) and Marchiori et al. (2017). The world economy consists of two regions, indexed by $i \in \{H, F\}$, where region H denotes Germany and region F the rest of the European Union excluding Germany. Households are finitely lived and save over the life cycle. Labor is immobile across regions, whereas capital is internationally mobile. Firms operate under search and matching frictions in the labor market.

Governments finance public expenditures through taxes on labor income and three distinct forms of capital-income taxation: a tax on household saving income, a tax on productive capital, and a tax on accidental bequests. Public debt is positive in the initial steady state, but in all transition experiments considered below the debt stock is held fixed at its initial steady-state level. The relevant financing tax therefore adjusts period by period so that the government budget constraint is satisfied under a constant debt target. Lump-sum taxes are used only to close the budget in the initial steady state.[1] One model period corresponds to five years.

Unlike Marchiori et al. (2017), who assume a single tradable good, we model international trade between two regions that specialize in and exchange differentiated goods. This allows us to capture terms-of-trade adjustment between Germany and the rest of the European Union.

2.1 Population Structure

Time is discrete and measured in five-year periods. In each region $i \in \{H, F\}$, the population is composed of overlapping cohorts indexed by age $a \in \{0, \dots, A\}$. Let $P^i_{a,t}$ denote the measure of age-a individuals in region i at time t. Newborn cohorts ($a = 0$) grow at the gross rate $1 + \hat{g}_t$,

$$P^i_{0,t} = (1 + \hat{g}_t)\, P^i_{0,t-1}. \tag{1}$$

Cohorts evolve according to age- and time-specific survival probabilities $\theta_{a,t} \in (0, 1)$:

$$P^i_{a+1,t+1} = \theta_{a,t}\, P^i_{a,t}, \qquad a = 0, \dots, A-1. \tag{2}$$

Total population in region i is

$$P^i_t = \sum_{a=0}^{A} P^i_{a,t}. \tag{3}$$

Throughout, we take $\{\hat{g}_t, \theta_{a,t}\}$ as exogenous population processes. The notation allows for time variation for generality, but the benchmark tax experiments below hold the population structure fixed. The purpose of the quantitative analysis is therefore to isolate the effects of tax-base reallocation rather than changes in demographic structure.

We assume a mandatory retirement age $\bar{a}$, so that individuals with $a \geq \bar{a}$ are retired and do not participate in the labor market. Among working-age individuals ($a < \bar{a}$), each person is either employed (L), unemployed (U), or out of the labor force (N), and these states exhaust the working-age population. Let $L^i_{a,t}$, $U^i_{a,t}$, and $N^i_{a,t}$ denote the corresponding measures in region i. Then,

$$P^i_{a,t} = L^i_{a,t} + U^i_{a,t} + N^i_{a,t}, \qquad a = 0, \dots, \bar{a} - 1. \tag{4}$$

Defining population shares by $l^i_{a,t} \equiv L^i_{a,t}/P^i_{a,t}$, $u^i_{a,t} \equiv U^i_{a,t}/P^i_{a,t}$, and $n^i_{a,t} \equiv N^i_{a,t}/P^i_{a,t}$ implies

$$1 = l^i_{a,t} + u^i_{a,t} + n^i_{a,t}, \qquad a = 0, \dots, \bar{a} - 1. \tag{5}$$

For expositional brevity, we suppress the regional index i in Sections 2.2–2.5 whenever

[1] Because households are finitely lived, lump-sum taxes are non-Ricardian and therefore have real effects.

no confusion can arise, and restore it in the open-economy block and in the equilibrium definition.

2.2 Labor-Market Flows

Unemployed individuals find jobs through a constant-returns-to-scale matching function:

$$M_t = M(V_t, Z_t), \tag{6}$$

where V_t denotes the total number of vacancies, and Z_t is the total number of effective job seekers at the beginning of period t.

The effective number of job seekers is computed as:

$$Z_t = \sum_{a=0}^{\bar{a}-1} \psi_a \cdot Z_{a,t}, \tag{7}$$

where $\psi_a \in (0, 1]$ captures age-specific search effectiveness. The age-specific pool of job seekers $Z_{a,t}$ is defined as:

$$\begin{aligned} Z_{0,t} &= P_{0,t}(1 - n_{0,t}), \\ Z_{a,t} &= P_{a,t}(1 - n_{a,t}) \left[u_{a-1,t-1} + \chi l_{a-1,t-1}\right], \quad \text{for } 1 \leq a \leq \bar{a} - 1. \end{aligned} \tag{8}$$

New entrants ($a = 0$) who choose to participate in the labor market, i.e., $(1 - n_{0,t})P_{0,t}$, are automatically considered job seekers. For age groups $a \in [1, \bar{a} - 1]$, the pool consists of individuals who were unemployed in the previous period and those whose jobs were destroyed at rate $\chi \in (0, 1)$ which is constant and exogenous.

The probability that an individual of age a finds a job is:

$$p_{a,t} = \psi_a \cdot p_t = \psi_a \cdot \underbrace{\frac{M_t}{Z_t}}_{=p_t}, \tag{9}$$

where p_t is the aggregate job-finding probability across all effective job seekers. This probability is identical across individuals in its aggregate form, but adjusted at the individual level by age-specific search efficiency.

The law of motion for employment shares $l_{a,t}$ is:

$$\begin{aligned} l_{0,t} &= (1 - n_{0,t})p_{0,t}, \\ l_{a,t} &= (1 - n_{a,t}) \left[p_{a,t}(u_{a-1,t-1} + \chi l_{a-1,t-1}) + (1 - \chi) l_{a-1,t-1}\right], \text{ for } 1 \leq a \leq \bar{a} - 1. \end{aligned} \tag{10}$$

Total employment is defined by:

$$L_t = \sum_{a=0}^{\bar{a}-1} L_{a,t}, \quad \text{with} \quad L_{a,t} = l_{a,t} P_{a,t}. \tag{11}$$

2.3 Households

There is no aggregate uncertainty and households have perfect foresight. Following Merz (1995) and Andolfatto (1996), we assume full intra-household insurance against idiosyncratic labor market risk. Mortality nevertheless introduces idiosyncratic uncertainty through imperfect annuity markets: when an individual dies at the end of a period, her remaining assets are only partially redistributed among surviving members of the same birth cohort. The residual is either transferred to newborns or taxed and accrues to the government.

A newborn at date t chooses $\{c_{a,t+a}, n_{a,t+a}, s_{a,t+a}\}_{a=0}^{A}$, subject to a lifetime budget constraint, employment dynamics, and pension-point accumulation (described below), to maximize

$$\mathscr{V}_t = \sum_{a=0}^{A} \beta^a \left(\prod_{m=0}^{a-1} \theta_{m,t+m} \right) \begin{cases} \log(c_{a,t+a}) + \xi_a \dfrac{(n_{a,t+a})^{1-\kappa}}{1-\kappa}, & \text{for } 0 \leq a < \bar{a}, \\ \log(c_{a,t+a}), & \text{for } a \geq \bar{a}, \end{cases} \tag{12}$$

where $\beta \in (0,1)$ is the subjective discount factor. The period utility function is separable in consumption and nonparticipation. Preferences over consumption are logarithmic, and utility from nonparticipation follows a constant-elasticity specification governed by $\kappa \in (0,1)$. Age-specific weights ξ_a allow the value of nonparticipation to vary over the life cycle.

The household's per-period flow budget constraint is given by:

$$I_{a,t} + \theta_{a-1,t-1}^{-\omega}(1 + r_t^*(1-\tau_t^s))s_{a-1,t-1} = c_{a,t} + s_{a,t}, \tag{13}$$

where $s_{a,t}$ denotes end-of-period financial saving (with $s_{-1,t} = 0$), and $I_{a,t}$ is total non-capital income. The term $\theta_{a-1,t-1}^{-\omega}$ captures imperfect annuity markets. When $\omega = 1$, the assets of deceased households are fully redistributed among surviving members of the same cohort. For $\omega < 1$, redistribution is incomplete, so that part of accidental bequests is either transferred to newborn households or taxed by the government.[2]

At the household level, saving is modeled as a composite financial asset that earns the world return net of the saving-income tax and adjusted for mortality risk. The composition of aggregate wealth across physical capital, government debt, firm value, and net foreign assets is determined by arbitrage and market-clearing conditions below. This keeps the household problem tractable while preserving the open-economy transmission mechanism relevant for the tax reforms.

Total income $I_{a,t}$ consists of labor earnings, unemployment benefits, pension payments, and – in the first period of life – received bequests X_t, all net of age-invariant lump-sum

[2]Imperfect annuity markets help generate hump-shaped consumption profiles over the life cycle; see de la Croix et al. (2013).

taxes T_t:

$$I_{a,t} = \begin{cases} (1-\tau_t^w) w_{a,t} l_{a,t} + \rho_u w_{a,t} u_{a,t} - T_t + X_t^N, & \text{for } a = 0, \\ (1-\tau_t^w) w_{a,t} l_{a,t} + \rho_u w_{a,t} u_{a,t} - T_t, & \text{for } 1 \le a \le \bar{a} - 1, \\ \rho_h \bar{w}_t \dfrac{h_{a,t}}{\bar{a}} - T_t, & \text{for } a \ge \bar{a}. \end{cases} \tag{14}$$

Total accidental bequests are the saving of deceased households that are not redistributed through annuity markets.

$$X_t = \left(1 + r_t^*(1-\tau_t^s)\right) \sum_{a=1}^{A} \theta_{a-1,t-1}^{-\omega} \left(1 - \theta_{a-1,t-1}^{1-\omega}\right) s_{a-1,t-1} \, P_{a-1,t-1}. \tag{15}$$

These are split into a taxed component accruing to the government, X_t^G, and the remaining portion received by newborn households:

$$X_t^N = (1-\tau_t^x) \cdot X_t = X_t - X_t^G, \tag{16}$$

so that the bequest term in the income equation (14) captures transfers to generation $a = 0$. Savings income is taxed before mortality is realized, so accidental bequests are formed out of post-tax gross asset returns.

Labor income is taxed at rate τ_t^w, and unemployed individuals receive a benefit equal to a fraction $\rho_u \in [0, 1)$ of the wage. Retirees receive pension benefits based on their accumulated pension points $h_{a,t}$, with a replacement rate $\rho_h \in [0, 1)$. While unemployment benefits depend on age-specific earnings, pension payments are tied to the average wage.

Pension-point accumulation is conditional on labor-market participation. Individuals can earn at most one pension point per period during working life:

$$h_{0,t} = 0, \qquad h_{a+1,t+1} = h_{a,t} + (1 - n_{a,t}), \qquad a = 0, \ldots, \bar{a} - 1. \tag{17}$$

Households can therefore accumulate at most $\bar{a}$ pension points over the life cycle. This device aligns the retirement block with the institutional structure of Germany and many other European economies, but it is not central to the paper's tax-comparison mechanism.

The return on saving depends on the international interest rate r_t^*, adjusted for mortality risk via the survival probability $\theta_{a,t}$. Under perfect annuity markets, the gross return is $(1 + r_t^*)/\theta_{a,t}$, and for $\omega < 1$, returns are adjusted downward to reflect incomplete redistribution.

Optimal consumption follows the Euler equation:

$$\frac{c_{a+1,t+1}}{c_{a,t}} = \beta \, \theta_{a,t}^{1-\omega} \Big[1 + r_{t+1}^* \big(1 - \tau_{t+1}^s\big)\Big]. \tag{18}$$

The recursive value of having one additional employed household member is:

$$W_{a,t}^{HH} = (1 - \tau_t^w - \rho_u) w_{a,t} + (1-\chi)(1 - p_{a+1,t+1})(1 - n_{a+1,t+1}) \beta \theta_{a,t} \frac{c_{a,t}}{c_{a+1,t+1}} W_{a+1,t+1}^{HH} \tag{19}$$

where the first term reflects current net labor income (net of forgone unemployment

benefits), and the second term is the discounted continuation value of employment, accounting for job destruction, participation, and survival. For the last working-age cohort ($a = \bar{a} - 1$), this value vanishes since retirement follows.

The optimal labor-force participation decision equates the marginal utility of nonparticipation to the expected marginal utility gain from current labor-market income and the continuation value from pension accrual. Because pension benefits are received only conditional on surviving until retirement, the pension component is weighted by the probability of reaching retirement age:

$$\xi_a n_{a,t}^{-\kappa} = \frac{1}{c_{a,t}} \left[p_{a,t}(1 - \tau_t^w) w_{a,t} + (1 - p_{a,t}) \rho_u w_{a,t} \right] + \sum_{j=\bar{a}}^{A} \beta^{j-a} \left(\prod_{m=a}^{j-1} \theta_{m,t-a+m} \right) \rho_h \frac{\bar{w}_{t-a+j}}{c_{j,t-a+j}}. \tag{20}$$

2.4 Firms

Production in each region relies on capital and labor. A representative firm operates a constant-returns-to-scale Cobb–Douglas production function:

$$Y_t = \mathcal{A}_t K_t^{\alpha} L_t^{1-\alpha}, \tag{21}$$

where Y_t is output, $\mathcal{A}_t$ denotes total factor productivity, K_t is the capital stock, and L_t is aggregate employment.

Capital is rented on competitive international markets at gross user cost $(1+\tau_t^k)r_t^* + \delta$, where r_t^* is the net world interest rate, δ is the depreciation rate, and τ_t^k is the tax on productive capital. Labor of age a is hired at gross wage $w_{a,t}$. Firms also post vacancies at per-vacancy cost ϕ_t. The representative firm chooses K_t and V_t. Period profits in consumption units are

$$\Pi_t \equiv Y_t - \big((1 + \tau_t^k) r_t^* + \delta\big) K_t - \sum_{a=0}^{\bar{a}-1} w_{a,t} L_{a,t} - \phi_t V_t. \tag{22}$$

The firm's first-order condition with respect to capital determines optimal capital demand:

$$(1 + \tau_t^k) r_t^* + \delta = \alpha \mathcal{A}_t \left(\frac{L_t}{K_t} \right)^{1-\alpha}. \tag{23}$$

Vacancy posting is determined by equating the marginal cost of posting a vacancy to the expected value of a successful match:

$$\phi_t = q_t \sum_{a=0}^{\bar{a}-1} \frac{Z_{a,t}}{Z_t} W_{a,t}^{Firm}, \tag{24}$$

where $q_t = M_t / V_t$ is the job-filling probability.

The value of employing a worker of age a is:

$$W_{a,t}^{Firm} = (1 - \alpha) \mathcal{A}_t \left(\frac{K_t}{L_t} \right)^{\alpha} - w_{a,t} + \frac{(1 - \chi)(1 - n_{a+1,t+1})}{(1 + r_{t+1}^*)} \theta_{a,t} W_{a+1,t+1}^{Firm}. \tag{25}$$

The first term captures the marginal product of labor, the second term represents the gross wage cost including payroll tax, and the final term reflects the discounted continuation value of employment, adjusted for survival, job destruction, and participation.

Firms earn positive profits in equilibrium. These rents arise from labor market frictions and endogenous wage bargaining, which decouple wages from the marginal product of labor. Wages are determined through a bargaining process detailed in the next subsection, where the match surplus is split between workers and firms according to their relative bargaining power.

The investment process is implicitly funded by household saving and firm retained earnings, subject to aggregate market clearing. Capital evolves according to:

$$K_{t+1} = I_t + (1 - \delta)K_t,$$

and is consistent with the goods market resource constraint used in general equilibrium.

2.5 Wages

Wages are determined separately for each working-age cohort through a standard Nash bargaining process. Let $w_{a,t}$ denote the gross wage paid to an employed worker of age $a \in \{0, \ldots, \bar{a} - 1\}$ at time t. For each age a, the bargained wage solves

$$\max_{w_{a,t}} \left(W_{a,t}^{HH}\right)^{\eta} \left(W_{a,t}^{Firm}\right)^{1-\eta}, \tag{26}$$

where $W_{a,t}^{HH}$ and $W_{a,t}^{Firm}$ denote the surplus to the household and the firm from a match with a worker of age a, and $\eta \in [0, 1]$ is the bargaining power of the worker.

We assume that unemployment benefits are taken as given by the individual worker and do not depend on the negotiated wage. The surplus-sharing rule is therefore

$$(1 - \eta)W_{a,t}^{HH} = \eta(1 - \tau_t^w)W_{a,t}^{Firm}. \tag{27}$$

Because household surplus varies systematically over the life cycle through age-dependent labor-market prospects, survival, pension accrual, and remaining horizon length, the bargained wage is allowed to differ across cohorts.

The term $1 - \tau_t^w$ captures the tax wedge between the firm's cost of labor and the worker's after-tax wage. The equation ensures that the total match surplus is divided in proportion to the bargaining weights, while accounting for the distortionary effects of labor taxation on both sides of the market.

2.6 Government

The government finances government consumption, unemployment benefits, and pension payments. Government consumption is assumed to be a fixed share $\bar{g}$ of output net of vacancy posting costs. Total government spending is given by

$$G_t = \bar{g}(Y_t - \phi_t V_t) + \rho_u \sum_{a=0}^{\bar{a}-1} w_{a,t} u_{a,t} P_{a,t} + \rho_h \bar{w}_t \sum_{a=\bar{a}}^{A} \frac{h_{a,t}}{\bar{a}} P_{a,t}, \tag{28}$$

where the second term denotes total unemployment benefits and the third term pension payments.

Government revenue comes from labor income taxes, payroll taxes, saving-income taxes, capital taxes, lump-sum taxes, and bequest taxes. Let $\mathcal{S}_t$ denote aggregate household financial wealth at the beginning of period t:

$$\mathcal{S}_t = \sum_{a=1}^{A} \theta_{a-1,t-1}^{-\omega} s_{a-1,t-1} P_{a-1,t-1}. \tag{29}$$

The primary deficit is

$$D_t = G_t - \left[\tau_t^w \sum_{a=0}^{\bar{a}-1} w_{a,t} l_{a,t} P_{a,t} + \tau_t^k r_t^* K_t + \tau_t^s r_t^* \mathcal{S}_t + T_t P_t + X_t^G \right]. \tag{30}$$

The term $\tau_t^s r_t^* \mathcal{S}_t$ therefore represents revenue from taxing household saving income rather than the underlying asset stock.

Tax revenue from accidental bequests (see 15) is given by

$$X_t^G = \tau_t^x X_t \tag{31}$$

In all policy experiments, public debt is held fixed at its initial steady-state level,

$$B_t = \bar{B} \qquad \text{for all } t, \tag{32}$$

and the relevant financing tax rate—τ_t^s, τ_t^k, or τ_t^x, depending on the reform considered—adjusts endogenously in each period so that the government budget constraint is satisfied under this fixed debt target.

2.7 International Capital Markets and Trade

Let Q_t denote the aggregate market value of firms at time t. In a deterministic environment, no-arbitrage requires the return on equity to equal the return on international bonds:

$$\frac{Q_{t+1} + \Pi_{t+1}}{Q_t} = R_{t+1}^*, \tag{33}$$

where the left-hand side is the gross return on equity and the right-hand side is the gross world interest rate.

The regional asset-market identities are

$$K_{t+1}^H + Q_t^H + B_t^H + NFA_t^H = \sum_{a=0}^{A} s_{a,t}^H P_{a,t}^H, \tag{34}$$

$$K_{t+1}^F + Q_t^F + B_t^F + NFA_t^F = \sum_{a=0}^{A} s_{a,t}^F P_{a,t}^F, \tag{35}$$

where NFA_t^i denotes the net foreign asset position of region i. Labor is immobile across regions, whereas capital flows freely in response to returns.

To avoid mixing units across regional consumption-price numeraires, net foreign asset positions are measured in a common numeraire. Global bond-market clearing therefore requires

$$NFA_t^H + NFA_t^F = 0. \tag{36}$$

For each region $i \in \{H, F\}$, the current account equals net exports:

$$CA_t^i = NFA_{t+1}^i - R_t^* NFA_t^i = NX_t^i, \tag{37}$$

so that net foreign assets evolve according to

$$NFA_{t+1}^i = R_t^* NFA_t^i + NX_t^i. \tag{38}$$

Net exports are given by

$$NX_t^i = f_t^{i,i}\big(C_t^{i,j} + I_t^{i,j} + G_t^{i,j}\big) - f_t^{j,i}\big(C_t^{j,i} + I_t^{j,i} + G_t^{j,i}\big), \tag{39}$$

where $f_t^{j,i}$ denotes the CPI-deflated price of goods from region j sold in region i, and $C_t^{j,i}$, $I_t^{j,i}$, and $G_t^{j,i}$ are the corresponding imports of consumption, investment, and government goods.

Under CES demand, expenditure allocations satisfy

$$C_t^{i,i} + I_t^{i,i} + G_t^{i,i} = \gamma^i \left(\frac{1}{f_t^{i,i}}\right)^{1/(1-\sigma)} \big(C_t^i + I_t^i + G_t^i\big), \tag{40}$$

$$C_t^{j,i} + I_t^{j,i} + G_t^{j,i} = (1-\gamma^i) \left(\frac{1}{f_t^{j,i}}\right)^{1/(1-\sigma)} \big(C_t^i + I_t^i + G_t^i\big), \tag{41}$$

where $\gamma^i \in (0,1)$ captures home bias and $\sigma \in (0,1)$ is the CES curvature parameter. The implied elasticity of substitution between domestic and foreign goods is $1/(1-\sigma)$.[3]

The CPI in each region, which serves as the regional numeraire, is

$$1 = \left[\gamma^i (f_t^{i,i})^{-\sigma/(1-\sigma)} + (1-\gamma^i)(f_t^{j,i})^{-\sigma/(1-\sigma)}\right]^{-(1-\sigma)/\sigma}. \tag{42}$$

Consistency of cross-regional pricing implies

$$f_t^{F,H} = rer_t\, f_t^{H,H}, \qquad f_t^{H,F} = \frac{f_t^{F,F}}{rer_t}, \tag{43}$$

where rer_t is the real exchange rate, defined as region H's CPI relative to region F's.

[3]The underlying CES aggregator is

$$C_t^i = \left[(\gamma^i)^{1-\sigma}(C_t^{i,i})^{\sigma} + (1-\gamma^i)^{1-\sigma}(C_t^{j,i})^{\sigma}\right]^{1/\sigma},$$

and analogously for I_t^i and G_t^i.

Market clearing. Labor markets clear in each region:

$$L_t^i = \sum_{a=0}^{\bar{a}-1} l_{a,t}^i P_{a,t}^i, \qquad i \in \{H, F\}. \tag{44}$$

Goods markets clear:

$$Y_t^i = C_t^i + I_t^i + G_t^i + NX_t^i, \qquad i \in \{H, F\}, \tag{45}$$

with

$$C_t^i = \sum_{a=0}^{A} c_{a,t}^i P_{a,t}^i, \qquad I_t^i = K_{t+1}^i - (1-\delta)K_t^i.$$

2.8 Intertemporal General Equilibrium

Given initial conditions for household savings, pension-point holdings, public debt, firm values, capital stocks, and external asset positions, and given sequences of exogenous processes and policy instruments, an intertemporal perfect-foresight equilibrium[4] is a sequence of

$$\left\{c_{a,t}^i, n_{a,t}^i, s_{a,t}^i, u_{a,t}^i, l_{a,t}^i, h_{a,t}^i, K_t^i, L_t^i, V_t^i, M_t^i, Z_t^i, p_t^i, q_t^i, Q_t^i, NFA_t^i, w_{a,t}^i, \bar{w}_t^i, R_t^*, rer_t, f_t^{i,j}, T_t^i\right\}_{t=0}^{\infty},$$

with $j \neq i$, such that:

1. **Households.** For each region i and age a, households choose $\{c_{a,t}^i, n_{a,t}^i, s_{a,t}^i\}$ to maximize lifetime utility (12) subject to the budget constraint (13), the employment law of motion (10), and demographic constraints.

2. **Firms.** In each region i, firms choose $\{K_t^i, V_t^i\}$ so that profits satisfy (22) and the optimality conditions (23) and (24) hold.

3. **Wages.** For each region i and each working-age cohort a, wages satisfy the Nash-bargaining conditions in Section 2.5.

4. **Labor market.** Matching, job-finding, job-filling, and employment dynamics satisfy (6)–(9) and (10).

5. **Government.** In each region, fiscal policy satisfies the spending rules above, public debt remains fixed at its initial steady-state level, and the relevant financing tax adjusts in each period to satisfy the government budget constraint.

6. **Asset pricing and international capital markets.** Equity pricing satisfies (33), the regional asset-market identities (34)–(35) hold, bond markets clear according to (36), and net foreign assets evolve according to (38).

[4]The model is solved under perfect foresight using deterministic simulations in Dynare. For each reform experiment, we compute the nonlinear transition path from the initial steady state to the final steady state after the permanent policy change.

7. **Goods markets.** Labor and goods markets clear according to (44) and (45), while relative prices $\{f_t^{i,j}\}$ and the real exchange rate rer_t adjust so that CES demand is satisfied.

3 Calibration

The quantitative analysis is designed to evaluate revenue-neutral tax reforms that reduce labor income taxation and offset the resulting revenue loss through alternative forms of capital-income taxation. To this end, we calibrate the model to a two-region European environment in which the home region corresponds to Germany and the foreign region to the rest of the European Union excluding Germany. The calibration is chosen to match standard macroeconomic targets, labor-market moments, fiscal institutions, and trade patterns relevant for this setting. We group parameters into five categories:

1. population structure;
2. technology and preferences;
3. labor-market frictions;
4. taxes and transfers;
5. international trade.

One model period corresponds to five years. This frequency is natural in a life-cycle model with retirement and medium-run fiscal adjustment, while still allowing us to study transitional dynamics over a finite horizon. When empirical targets or parameter estimates are reported at an annual or quarterly frequency, we convert them into five-year model-period objects. For an annual rate x^{ann}, the five-year counterpart is given by

$$x = 1 - (1 - x^{\text{ann}})^5,$$

and for a quarterly rate x^{q} we use

$$x = 1 - (1 - x^{\text{q}})^{20}.$$

Similarly, the five-year discount factor is $\beta = (\beta^{\text{ann}})^5$ and the five-year gross world interest rate is $R^* = (1 + r^{*\text{ann}})^5$.

Appendix A reports the full set of calibrated parameter values, empirical targets, and external data sources.

3.1 Population Structure

In both regions, individuals enter the economy at age 20 and remain of working age for nine model periods (45 years), which implies retirement at age 65.[5] The maximum lifespan is set to 16 model periods (80 years), implying a terminal age of 100. Accordingly, the maximum model age is $A = 15$ and the retirement age is $\bar{a} = 9$.

[5]This aligns with statutory retirement ages in most OECD countries.

While the model allows for time-varying survival probabilities $\theta_{a,t}$ and cohort growth $\hat{g}_t$, the baseline calibration abstracts from demographic change by setting $\theta_{a,t} = \theta_a$ and $\hat{g}_t = 0$ for all t. This ensures that the quantitative exercises isolate the effects of tax-base reallocation from changes in population structure.

Age-specific survival probabilities $\{\theta_a\}$ are constructed from the Human Mortality Database. The initial population distribution is chosen such that the home region accounts for approximately 16% of the total EU population, consistent with demographic aggregates once mapped into model ages using the survival profile.

3.2 Technology and Preferences

Production in both regions follows a Cobb–Douglas production function with constant returns to scale. We set the capital share in output to $\alpha = 0.33$, in line with standard macroeconomic estimates. To isolate policy-induced transitional dynamics, we abstract from trend growth and set exogenous technological progress to zero.

We take an annual depreciation rate of $\delta^{\text{ann}} = 0.096$ and convert it into the five-year model-period depreciation rate using

$$\delta = 1 - (1 - \delta^{\text{ann}})^5, \tag{46}$$

which implies $\delta \approx 0.396$ per model period.

Households have logarithmic utility over consumption. We set the annual subjective discount factor to $\beta^{\text{ann}} = 0.9698$ and convert it to the five-year model-period discount factor according to $\beta = (\beta^{\text{ann}})^5$. This calibration yields plausible life-cycle saving behavior in the steady state. The curvature of the disutility from work is governed by $\kappa = 0.80$, which implies a Frisch elasticity of approximately 0.6, consistent with the micro evidence summarized by Den Haan and Kaltenbrunner (2009).

We abstract from intentional bequests in preferences. To match realistic life-cycle consumption profiles, we allow for imperfect annuity markets and calibrate the degree of mortality-contingent redistribution via the survival-weighting parameter $\omega = 0.75$. This specification introduces mortality-related income risk and helps generate an inverse-U-shaped consumption profile over the life cycle.

Given these preference parameters and the absence of trend growth, the model implies a steady-state annual real world interest rate of 5.54%.

3.3 Labor Market

Labor markets in both regions are characterized by search and matching frictions. Matches are formed according to a Cobb–Douglas matching technology,

$$M_t = \mu V_t^{1-\nu} Z_t^{\nu},$$

where V_t denotes vacancies, Z_t the effective number of job seekers, and μ matching efficiency. We set the elasticity of matches with respect to job seekers to $\nu = 0.5$, following the empirical estimates in Petrongolo and Pissarides (2001).

Wages are determined by Nash bargaining. We set workers' bargaining power to $\eta = 0.5$ following Christoffel, Kuester, and Linzert (2009). With $\eta = \nu$, the Hosios

condition holds absent taxes and other distortions (Burda and Wyplosz, 1994), implying an efficient decentralized allocation in the frictional labor market.

Because one model period spans five years, labor-market transition probabilities at the model frequency should be interpreted as reduced-form objects governing medium-run employment dynamics. Consistent with the labor-market law of motion in Section 2.2, we denote the quarterly job-destruction probability by χ^{q} and set $\chi^{\mathrm{q}} = 0.04$. The corresponding five-year separation probability is then given by

$$\chi = 1 - (1 - \chi^{\mathrm{q}})^{20}.$$

By contrast, quarterly job-finding probabilities close to unity would translate into near-certain transitions over five years. We therefore calibrate the model-period job-finding probabilities $\bar{p}_H$ and $\bar{p}_F$ jointly with the remaining labor-market parameters to match steady-state unemployment rates and vacancy-filling rates in the data. Specifically, we target a vacancy-filling rate of $q = 0.7$ and unemployment rates of approximately 5% in Germany and 10% in the rest of the EU, consistent with recent European labor-market evidence (Moyen, Stähler, and Winkler, 2019).

To match age profiles of employment and participation, we jointly calibrate matching efficiency μ, the vacancy-posting cost ϕ, age-specific search effectiveness ψ_a, and age-specific leisure weights ξ_a to OECD employment rates by age.[6] Further calibration details, including implied matching rates and participation profiles, are reported in Appendix A.

3.4 Taxes and Transfers

We calibrate the fiscal block to reflect institutional features of Germany and the broader euro area. Our calibration draws on Gadatsch, Hauzenberger, and Stähler (2016), who develop a DSGE model with involuntary unemployment for Germany and the rest of the euro area. In line with their calibration and with European fiscal rules, we set government consumption to 20% of GDP and the steady-state government debt-to-GDP ratio to 60%.

The gross replacement rate for unemployment benefits is set to $\rho_u = 0.35$, reflecting an average of short- and long-term benefits relative to gross wages. Pension replacement rates are calibrated to match country-specific averages. Using OECD data (OECD, 2019), we set the pension replacement rate to $\rho_h^H = 0.519$ for Germany and to $\rho_h^F = 0.635$ for the rest of the European Union.

3.5 International Trade

International trade follows a standard Armington structure with differentiated home and foreign goods. In the model, σ denotes the CES curvature parameter rather than the elasticity of substitution itself. We set $\sigma = 1/3$, which implies an elasticity of substitution between domestic and foreign goods of $1/(1-\sigma) = 1.5$. This implied elasticity lies within the empirical range reported for euro-area economies by Gomes, Jacquinot, and Pisani (2012), Osbat and Corbo (2013), and Gomes, Jacquinot, Mohr, and Pisani (2013).

To capture trade asymmetries, we allow for home bias in final demand. Specifically, we set the domestic expenditure share in Germany to 0.6, consistent with the average

[6] https://stats.oecd.org/index.aspx?queryid=54742

domestic absorption share reported by Balta and Delgado (2009). The corresponding home-bias parameter for the foreign region is then chosen to ensure that (i) the relative price of home and foreign goods is normalized to one in the initial steady state and (ii) net exports are zero at baseline, so that global trade is balanced in the initial steady state.

4 Results

This section reports the quantitative effects of the benchmark reform. The domestic government permanently reduces the labor income tax rate by 5 percentage points from period $t = 1$ onward and offsets the resulting revenue loss through an endogenous increase in the domestic saving-income tax τ^s while public debt is held fixed at its initial steady-state level. The reform is implemented unilaterally in the domestic region, while the foreign region keeps its initial fiscal structure. This setup isolates the domestic effects of the reform together with its cross-border spillovers in general equilibrium.

4.1 Mechanisms: Shifting from Labor to Savings Taxation

The benchmark reform operates through two main channels: a labor-market channel and an intertemporal saving channel.

The labor-market channel works through the reduction in the labor tax wedge. Lower labor income taxation raises workers' after-tax return to employment. Under Nash bargaining, part of this gain is reflected in lower gross wages, which reduces firms' labor costs and stimulates vacancy posting and hiring. Employment therefore rises, and the domestic economy experiences a short-run expansion in labor input and output.

The intertemporal saving channel works through household asset accumulation. Financing the labor-tax cut with a higher saving-income tax lowers the after-tax return on financial wealth and thereby weakens the incentive to save. In the overlapping-generations setting, however, this force is attenuated by life-cycle adjustment. Because lower gross wages also reduce future pension entitlements, some working-age households partially offset the decline in retirement resources by adjusting their saving profiles. This mechanism moderates, but does not reverse, the fall in aggregate saving.

Together, these two channels generate a nontrivial transition path. The labor market improves immediately, while the saving response unfolds more gradually. In the open economy, the resulting gap between domestic saving and investment is absorbed through external borrowing, which feeds back into net foreign assets and the world interest rate.

Labor-Market Adjustment Figure 1 shows the dynamic responses of net wages, gross wages, and employment after the shift from labor taxation to saving-income taxation.

Net wages rise immediately after the reform and stabilize at about 5.2 percentage points above their initial steady-state level. This reflects the direct effect of the lower labor tax wedge on households' disposable labor income.

At the same time, gross wages decline persistently, by roughly 1.7 percentage points on impact. This wage moderation is a direct consequence of Nash bargaining: workers benefit from higher after-tax pay even when pre-tax wages fall, and firms face lower labor costs as a result.

The decline in gross labor costs stimulates labor demand. Employment increases by more than 2.5 percentage points and remains persistently above its pre-reform level. The benchmark reform therefore generates a strong and lasting labor-market response, combining higher take-home pay with lower gross wage costs and higher employment.

Figure 1: Marginal Costs of Labor: Wage and Employment Effects



Notes: The figure shows the dynamic responses of net wages, gross wages, and the aggregate employment rate to the domestic tax shift. Results are reported for the domestic region (purple) and the foreign region (orange). Wages are shown as percentage deviations from the initial steady state, while employment is expressed in percentage point deviations.

Life-Cycle Adjustment Figure 2 illustrates how the reform changes household behavior over the life cycle. In the initial steady state, consumption is hump-shaped, labor income falls at retirement, and households accumulate assets during working life before decumulating them in old age. After the reform, working-age households benefit from higher after-tax labor income, but they also face lower gross wages, lower future pension entitlements, and a lower after-tax return on saving. As a result, they shift part of consumption forward and save less over the life cycle.

The labor-market profile also improves over much of the working life. Employment rises at younger and middle ages, while unemployment and non-participation decline. These gains support household income early in life, but they do not fully offset the weaker incentive to accumulate financial wealth. The life-cycle adjustment shown in Figure 2 therefore provides the link between the aggregate responses in this section and the cohort-specific welfare results reported in Section 5.

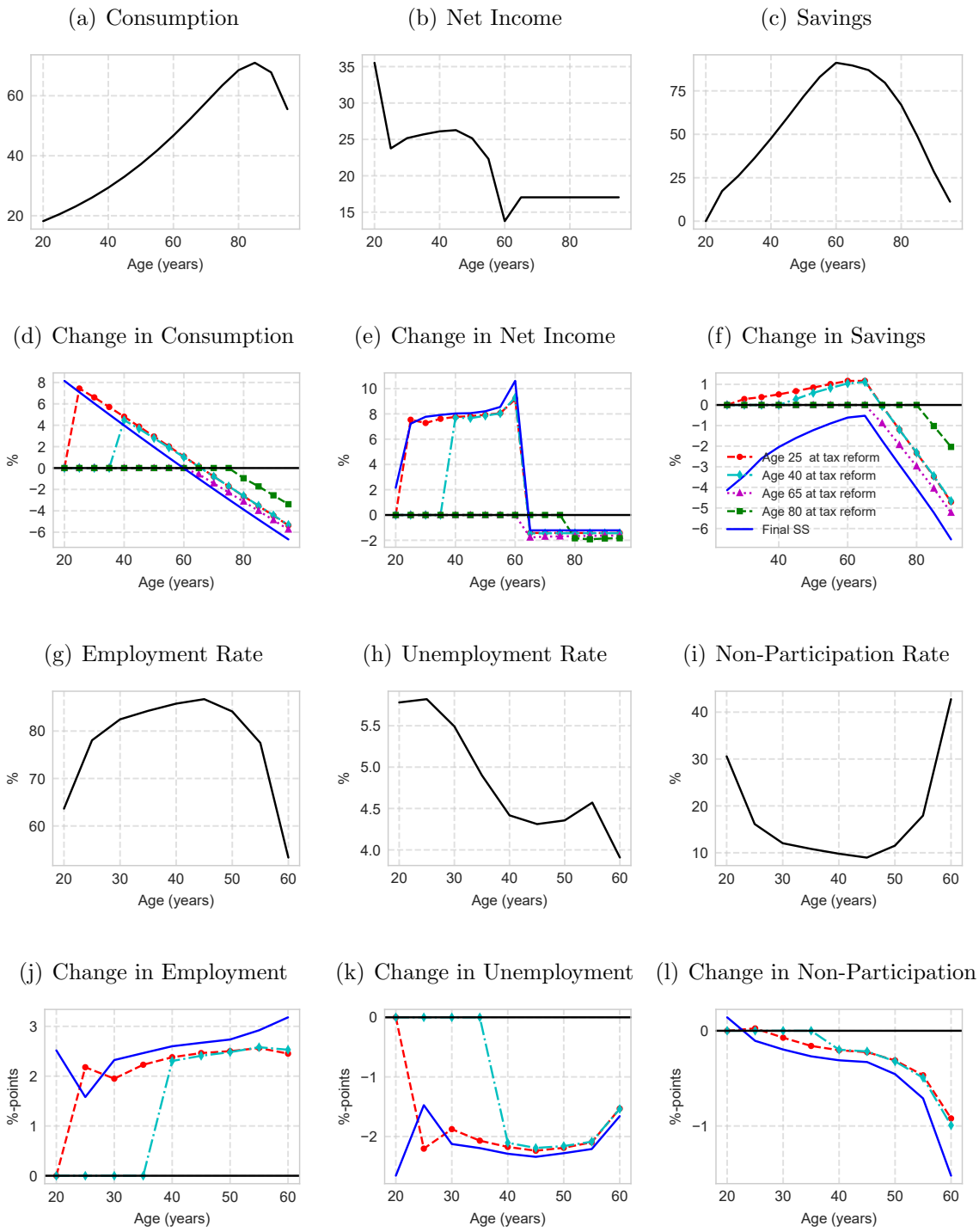
4.2 Aggregate Effects of the Tax Shift

Figure 3 summarizes the aggregate transition under the benchmark reform.

The labor income tax rate falls permanently by 5 percentage points in period $t = 1$. To preserve fiscal balance, the saving-income tax rises by about 3 percentage points on impact and gradually increases further to roughly 3.5 percentage points over the transition.

The labor market responds immediately. Employment rises by more than 2.5 percentage points in the long run, unemployment falls by nearly 2 percentage points, and

Figure 2: Life-Cycle Effects of the Tax Shift



Notes: Panels (a)–(c) show initial steady-state profiles of consumption, net income, and saving; panels (g)–(i) show employment, unemployment, and non-participation. Panels (d)–(f) and (j)–(l) report reform-induced changes relative to the initial steady state. Solid blue lines refer to the final steady state; dashed lines show cohorts affected by the reform at ages 25, 40, 65, and 80. Labor-market profiles are disciplined by age-specific employment data, while consumption and saving profiles are model-implied but qualitatively consistent with standard life-cycle patterns.

non-participation declines by about 0.5 percentage point. These changes reflect the lower labor tax wedge and the associated decline in gross labor costs under Nash bargaining.

The improvement in labor-market conditions generates a short-run expansion in domestic output. Output rises by around 2.5 percent on impact. The capital stock also increases initially, as firms respond to stronger labor demand, but this effect is not sustained to the same extent over time because domestic saving weakens. Aggregate saving falls persistently and decline by more than 1.5 percent in the long run.

This divergence between domestic investment and domestic saving is absorbed through external borrowing. Net foreign assets deteriorate steadily over the transition, indicating a growing reliance on foreign capital to finance domestic investment. At the global level, the reduction in domestic saving tightens capital supply and raises the world real interest rate by around 20 basis points.

Aggregate consumption increases slightly on impact as higher labor income supports household spending, but this effect fades over time. Lower asset income and smaller wealth holdings weigh on consumption in the longer run. Capital intensity follows a similar pattern: it rises initially, but eventually levels off and declines slightly as employment expands faster than the capital stock.

Overall, the benchmark reform delivers a clear short-run labor-market and output gain, but these gains are accompanied by lower aggregate saving and a weaker net foreign asset position in the long run. The open-economy dimension is therefore central to the quantitative transmission of the reform.

As a robustness check, Appendix B compares the benchmark reform with an approximate closed-economy version of the model. The qualitative labor-market effects remain, but the macroeconomic adjustment is substantially less favorable once external financing is largely shut down. In the approximate closed economy, output gains are smaller and fade more quickly, the capital stock eventually falls rather than rises, capital intensity declines much more strongly, the real interest rate increases sharply, and the savings-income tax must rise considerably more to finance the same labor-tax cut. These results confirm that the open-economy environment materially cushions the capital-accumulation costs of the reform by allowing part of the domestic saving shortfall to be financed abroad.

5 Distributional Effects and Welfare Analysis

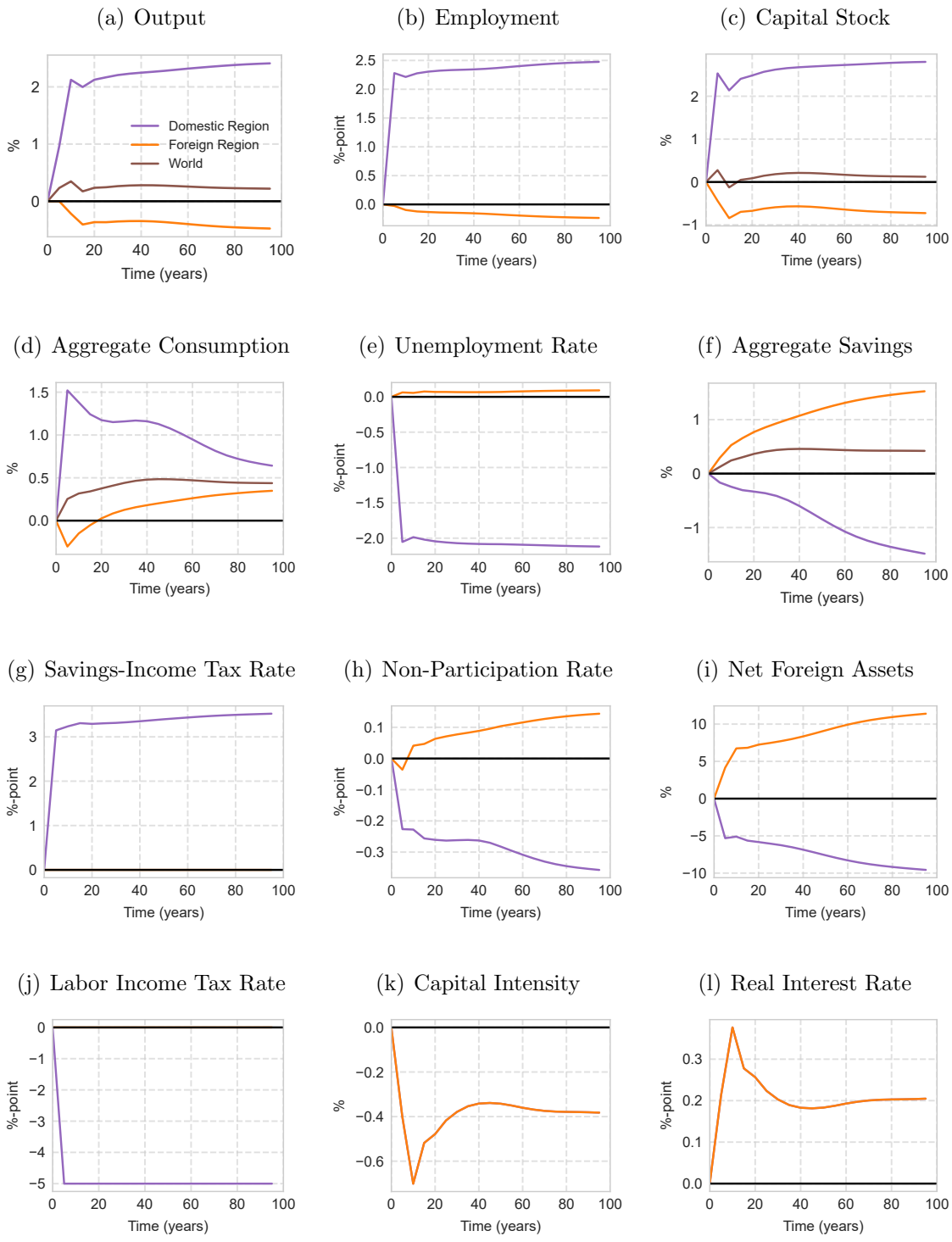
This section evaluates the welfare implications of the benchmark reform using a consumption-equivalent variation (CEV) measure. For each cohort k, the CEV, denoted by λ_k, is defined as the uniform proportional change in lifetime consumption under the baseline allocation that makes the cohort indifferent between the reform and the baseline:

$$V_k^{\text{reform}} = V_k\big((1+\lambda_k)c^{\text{base}},\, n^{\text{base}}\big)\,, \tag{47}$$

where positive values of λ_k indicate welfare gains from the reform. This measure provides a consistent metric for comparing lifetime welfare across cohorts that differ in age, asset holdings, and labor-market exposure at the time of the policy change.

Figure 4 reports the cohort-specific CEV profile. The benchmark reform generates pronounced intergenerational heterogeneity. Cohorts born after the reform experience persistent welfare gains, whereas welfare losses are concentrated among households close

Figure 3: Macroeconomic Effects of a Domestic Tax Shift



Notes: This figure displays the dynamic response of key macroeconomic aggregates to the benchmark domestic tax reform. Results are reported for the domestic region (purple), the foreign region (orange), and the global economy (brown). All variables are shown as percentage deviations from the initial steady state, except rates, which are expressed as percentage point deviations.

to retirement or already retired when the reform is implemented.

Future cohorts benefit most because they spend their entire working lives under lower labor-income taxation and more favorable labor-market conditions. They enter the economy after the tax system has changed and therefore adjust consumption and saving from the beginning of life to the lower after-tax return on financial wealth. In the benchmark, lifetime welfare gains exceed 1.25% of consumption for cohorts born sufficiently far after the reform.

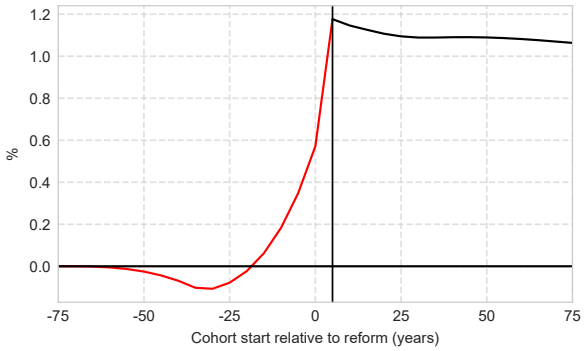
Cohorts already active in the labor market at the time of the reform also tend to gain, but by less. They benefit from higher disposable labor income and improved employment outcomes, yet they enjoy these gains only over the remaining part of working life. At the same time, they must adjust retirement planning to lower after-tax returns on saving and to weaker pension income induced by lower gross wages.

By contrast, households close to retirement or already in retirement experience welfare losses. These cohorts have little remaining labor income over which to benefit from the lower labor tax wedge, but they are immediately exposed to lower after-tax capital income. In addition, lower gross wages reduce pension benefits through the pension formula. Because these households have limited scope to reoptimize labor supply or rebuild asset positions, the adverse income effects dominate.

The welfare profile therefore reflects the timing of exposure to the reform. Younger households benefit from labor-market gains over a long horizon and can adjust saving behavior early in life, whereas older households bear the immediate decline in asset income and pension payments with little room for adjustment. The overlapping-generation structure is therefore essential for identifying this intergenerational incidence pattern.

Overall, the benchmark reform generates substantial gains for future cohorts, smaller gains for cohorts already of working age, and losses for older households. Section 6 returns to this welfare margin when comparing the benchmark with alternative forms of capital-income taxation.

Figure 4: Welfare by Birth Cohort (Consumption-Equivalent Variation)



Notes: Each point shows the consumption-equivalent variation (CEV) for one cohort. The cohort indexed by $k = 0$ is born in the period of the reform; negative values of k denote cohorts already alive when the reform is implemented, and positive values denote cohorts born thereafter. Positive values indicate welfare gains relative to the baseline.

6 Alternative Capital Tax Reforms

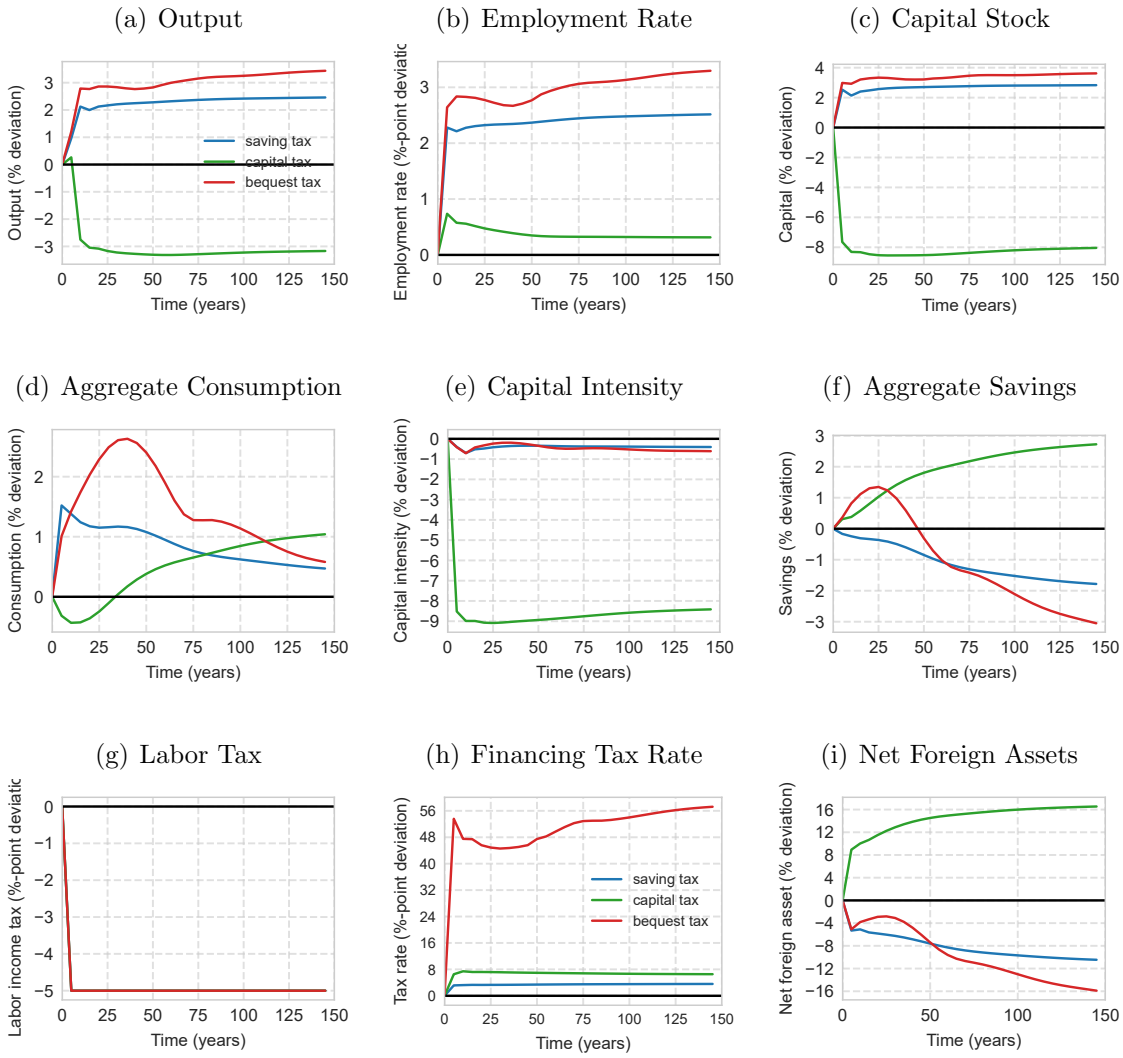
This section compares the benchmark reform with two alternative ways of financing the same labor-tax cut. In all cases, the domestic labor income tax is reduced permanently by 5 percentage points from period $t = 1$ onward. In the benchmark reform, the resulting revenue loss is financed by a higher savings-income tax. Here, we instead consider two alternatives: a tax on productive capital and a tax on accidental bequests. This comparison isolates how the choice of financing instrument shapes domestic activity, external adjustment, and intergenerational welfare. The benchmark reform financed through the savings-income tax is the paper's main policy-relevant experiment. The two alternative instruments are included as informative counterfactuals that clarify why the composition of capital taxation matters. The tax on productive capital should not be read as a literal calibration of a corporate income tax or a household wealth tax. Rather, it isolates the consequences of financing the labor-tax cut through a tax base that directly raises firms' user cost of capital and thereby distorts investment demand. The bequest-tax experiment is also stylized. In the model, the tax applies only to accidental bequests, not to intentional transfers driven by bequest motives such as warm-glow preferences, and only part of wealth at death enters the taxable margin because another part is absorbed by the imperfect-annuity structure. This case is therefore best understood as illustrating the mechanism of taxing intergenerational transfers rather than as a quantitative assessment of a feasible inheritance-tax reform.

Tax on productive capital. Financing the labor-tax cut through a tax on productive capital raises firms' user cost of capital and therefore directly weakens domestic investment demand. As shown in Figure 5, the domestic capital stock falls sharply and persistently, reaching a long-run decline of roughly 8% (panel c). Capital intensity drops by close to 9% (panel e), lowering labor productivity and offsetting much of the expansionary effect of the lower labor tax wedge on labor demand. As a result, employment rises only modestly (panel b), while output falls by about 3% in the long run (panel a).

The decline in domestic capital demand is mirrored in the external accounts. Aggregate saving increase over time (panel f), but a growing share of that saving is invested abroad rather than domestically. The net foreign asset position therefore improves markedly (panel i). Consumption initially falls as domestic activity and capital income weaken, and although the stronger external asset position provides some support over time, welfare gains remain substantially smaller than under the benchmark savings-income-tax reform (Figure 6). In particular, cohorts born after the reform still experience positive welfare effects, but these gains are much more limited because lower domestic capital accumulation depresses wages and output in the long run.

Tax on accidental bequests. Financing the labor-tax cut through a tax on accidental bequests avoids a direct distortion to firms' capital demand. Relative to the initial steady state, the domestic capital stock rises during the transition and remains persistently above baseline (panel c), while capital intensity declines only mildly (panel e). Labor-market effects are strongest under this instrument: the employment rate increases by more than 3 percentage points (panel b), and output rises by around 3 to 3.5% in the long run

Figure 5: Macroeconomic Effects of Alternative Capital Tax Reforms



Notes: This figure compares the dynamic responses of key domestic aggregates under three financing instruments for the same labor-tax cut: savings-income tax (blue), tax on productive capital (green), and bequest tax (red). All variables are expressed as percentage deviations from the initial steady state, except tax rates and employment rates, which are shown in percentage point deviations.

(panel a). Consumption also exhibits the strongest short-run expansion among the three reforms (panel d).

These domestic gains are accompanied by a pronounced deterioration in external balances. Aggregate saving increase only temporarily and then fall below baseline in the long run (panel f), while domestic investment remains strong. The resulting saving–investment gap is financed through sustained net capital inflows, leading to a sizable decline in net foreign assets (panel i). Over time, the weaker external position reduces the resources available for domestic consumption despite higher output.

The welfare implications are highly uneven (Figure 6). Cohorts already alive but still in working age at the time of the reform benefit strongly from the lower labor tax wedge and improved labor-market conditions. By contrast, the first cohort born after the reform experiences an immediate welfare loss, and distant future cohorts also lose in the long run. Cohorts born several periods after the reform benefit temporarily, but these gains remain well below those under the benchmark savings-income-tax reform. Bequest-tax financing therefore performs well in terms of aggregate activity, but produces the most uneven intergenerational welfare profile among the three instruments.

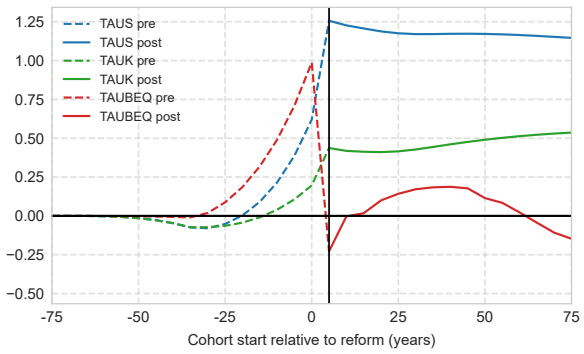
Policy comparison. Across all three financing instruments, the labor-tax cut raises employment relative to the initial steady state. The financing margin, however, is quantitatively decisive. The benchmark reform financed through a savings-income tax delivers the most attractive trade-off in our model, combining persistent labor-market gains with the strongest and most robust welfare gains for post-reform cohorts. Financing through a tax on productive capital performs worst in efficiency terms because it depresses domestic capital accumulation, productivity, and long-run output, even though future cohorts still experience positive welfare effects. Financing through a tax on accidental bequests preserves firms' investment incentives and generates the strongest employment and output response, but it also produces the most uneven intergenerational incidence, with gains for some cohorts and losses for both the first post-reform cohort and distant future generations. The broader lesson is that shifting taxation away from labor income cannot be evaluated at the level of broad tax categories alone: what matters is which component of capital income is taxed.

7 Conclusion

This paper studies revenue-neutral tax reforms that reduce labor income taxation and offset the resulting revenue loss through higher taxation of capital income. Using a calibrated two-region overlapping-generations model with life-cycle saving, labor market frictions, and integrated capital markets, we compare three alternative financing instruments: a tax on household saving income, a tax on productive capital, and a tax on accidental bequests.

The quantitative results show that the effects of such reforms depend crucially on which component of capital income is taxed. In the benchmark reform, a lower labor tax wedge raises employment and output in the short run, but higher taxation of household saving income reduces aggregate saving over time and worsens the net foreign asset position. The open-economy structure therefore matters not only for domestic transmission, but also for

Figure 6: Intergenerational Welfare Effects under Alternative Capital Tax Instruments



Notes: This figure plots consumption-equivalent variation (CEV) across cohorts for the three reforms. The cohort indexed by $k = 0$ is born in the period of the reform; negative values denote cohorts already alive when the reform is implemented, and positive values denote cohorts born thereafter. Positive values indicate welfare gains relative to the baseline. The benchmark savings-income-tax reform produces the most favorable welfare profile for future cohorts, while the productive-capital-tax and bequest-tax reforms generate weaker or more uneven outcomes.

the reform's international implications through capital flows and interest-rate adjustment.

The comparison across financing instruments yields three main conclusions. First, financing the labor-tax cut through a tax on productive capital performs worst in long-run efficiency terms because it raises the user cost of capital and depresses domestic capital accumulation, output, and wages. Second, financing the reform through a tax on accidental bequests avoids a direct distortion to firms' investment decisions, but produces a less favorable intergenerational allocation. Third, financing the reform through a tax on household saving income delivers the most attractive benchmark trade-off in our model, combining positive labor-market effects with long-run welfare gains for future cohorts and comparatively limited transitional losses.

The broader implication is that a shift away from labor income taxation cannot be assessed at the level of broad tax categories alone. What matters is the composition of capital taxation. Distinguishing between taxes on household saving, productive capital, and bequests is essential for evaluating the efficiency, external-adjustment, and intergenerational consequences of tax reform.

A limitation of the analysis is that it abstracts from demographic transition and focuses instead on the steady-state and transitional effects of tax-base reallocation in a quantitatively rich life-cycle environment. Extending the framework to incorporate demographic change or alternative fiscal instruments would be a useful direction for future research.

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A Calibration Details

This appendix complements Section 3 by reporting the calibrated parameter values used in the quantitative analysis. We distinguish between cohort-specific parameters and general model parameters. Population structure is summarized in Table 1, age-specific leisure parameters are reported in Table 2, and the remaining calibration inputs are collected in Table 3. Where convenient, Table 3 reports source-frequency objects in their original units; the corresponding five-year model-period values are obtained using the conversion formulas in Section 3.

Table 1: Survival Parameters (Human Mortality Database)

Parameter	*Domestic*	*Foreign*
Age-dependent survival rate		
θ_1	0.9983	0.9981
θ_2	0.9963	0.9957
θ_3	0.9937	0.9928
θ_4	0.9900	0.9885
θ_5	0.9841	0.9819
θ_6	0.9743	0.9708
θ_7	0.9573	0.9531
θ_8	0.9293	0.9257
θ_9	0.8871	0.8852
θ_{10}	0.8278	0.8287
θ_{11}	0.7454	0.7480
θ_{12}	0.6269	0.6300
θ_{13}	0.4470	0.4567
θ_{14}	0.2298	0.2456
θ_{15}	0.0639	0.0761

Table 2: Leisure Parameters

Parameter	*Domestic*	*Foreign*
Age-dependent leisure parameter		
ξ_0	0.7329	1.1055
ξ_1	0.4582	0.6604
ξ_2	0.3541	0.5265
ξ_3	0.2982	0.4697
ξ_4	0.2574	0.4630
ξ_5	0.2657	0.5159
ξ_6	0.3644	0.6864
ξ_7	0.6616	1.1787
ξ_8	0.7269	1.2109

Table 3: Calibration Parameters

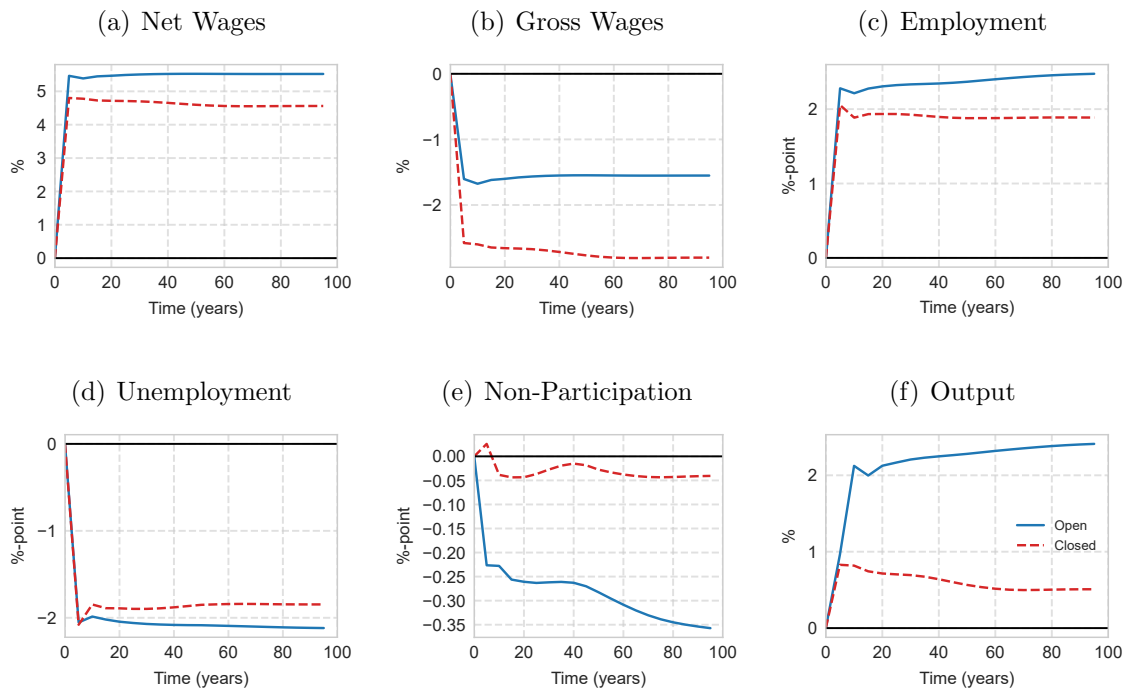
Parameter	*Description*	*Domestic*	*Foreign*
	Demographics		
$\bar{a}$	Statutory retirement age (years; model age)	65 (9)	
A	Maximum age (years; model age)	100 (15)	
$\hat{g}$	Population growth rate	0	
P_0	Initial cohort size	6.6	28.7
	Labor Market		
μ	Matching efficiency	0.8155	0.7937
ν	Matching elasticity	0.50	
χ^{q}	Job-destruction probability (quarterly)	0.04	
ϕ	Vacancy-posting cost	38.87	55.66
η	Bargaining power	0.50	
	Technology		
α	Capital share	0.33	
δ^{ann}	Depreciation rate (annual)	0.096	
	Preferences		
β^{ann}	Discount factor (annual)	0.9698	
κ	Leisure elasticity parameter	0.80	
	Taxes and Transfers		
τ^w	Labor tax in the initial steady state	0.34	
τ^s	Savings-income tax in the initial steady state	0.214	0.316
τ^k	Tax on productive capital in the initial steady state	0.0	
τ^x	Bequest tax in the initial steady state	0.0	
ρ_u	Unemployment replacement rate	0.35	
ρ_h	Pension replacement rate	0.519	0.635
ω	Annuity-market imperfection	0.75	
	International Trade		
γ	Home bias in final demand	0.6	0.4
σ	CES curvature parameter	1/3	

B Open versus Closed Economy

This appendix compares the benchmark reform in the baseline open-economy model with an approximate closed-economy version of the same framework. In both environments, the domestic labor income tax is reduced permanently by 5 percentage points and the domestic savings-income tax adjusts endogenously to preserve fiscal balance. The closed-economy case is implemented as a limiting case of the two-region model by shrinking the foreign region to negligible size. This preserves the model structure while largely shutting down the external financing margin. For this reason, the closed-economy series should be interpreted as an approximate autarky benchmark rather than exact financial autarky.

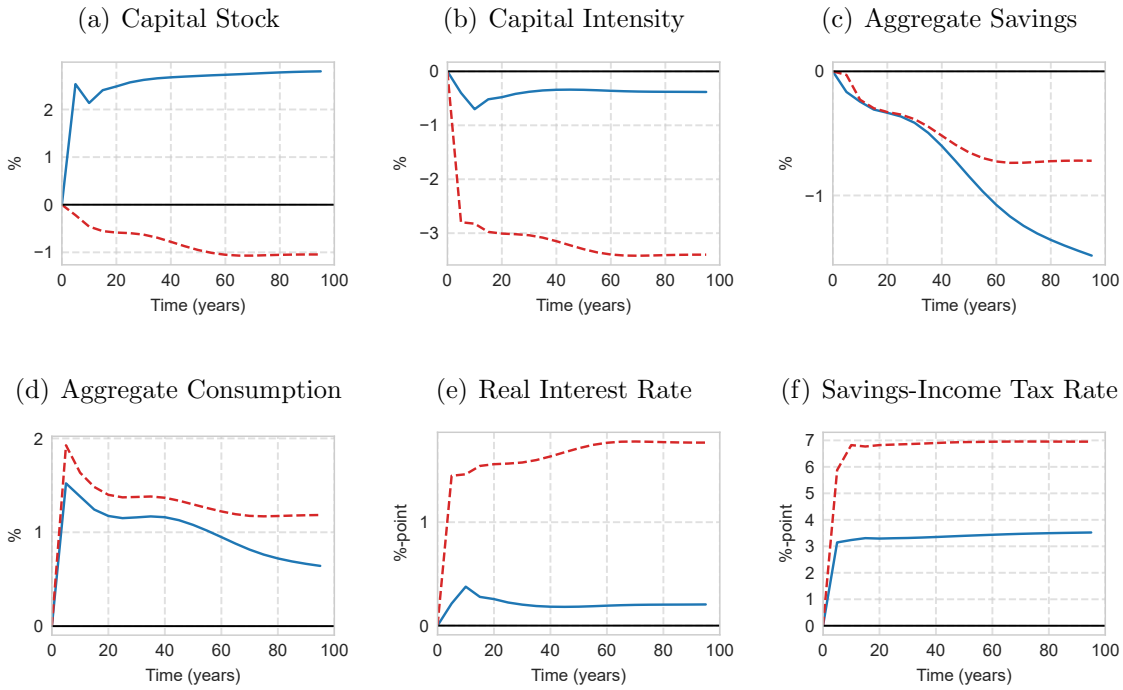
The comparison shows that the international dimension is quantitatively important for the benchmark reform. Relative to the open economy, the approximate closed economy generates smaller employment and output gains, a fall rather than a rise in the capital stock, a substantially sharper decline in capital intensity, and a much stronger increase in the real interest rate. The same labor-tax cut therefore requires a markedly larger increase in the savings-income tax rate. These results indicate that international capital mobility materially cushions the adverse capital-accumulation effects of the reform by allowing part of the domestic saving shortfall to be financed externally.

Figure 7: Benchmark Reform: Open versus Closed Economy, Labor-Market Adjustment



Notes: This figure compares the benchmark reform in the baseline open-economy model with the approximate closed-economy benchmark. In both cases, the domestic labor income tax is reduced permanently by 5 percentage points and the domestic savings-income tax adjusts endogenously to balance the government budget. The horizontal axis reports years since the reform. Wage and output responses are shown as percentage deviations from the initial steady state. Employment, unemployment, and non-participation are shown in percentage point deviations.

Figure 8: Benchmark Reform: Open versus Closed Economy, Capital Accumulation and Aggregate Adjustment



Notes: This figure compares the benchmark reform in the baseline open-economy model with the approximate closed-economy benchmark. The horizontal axis reports years since the reform. Capital, capital intensity, savings, and consumption are shown as percentage deviations from the initial steady state. The real interest rate and the savings-income tax rate are shown in percentage point deviations. Relative to the open economy, the approximate closed economy exhibits a much sharper decline in capital accumulation and a much stronger increase in the interest rate.